

Volume 62 – Number 5 – Supplement 2018

Indian Journal of Physiology and Pharmacology

The official Journal of the Association of Physiologists and Pharmacologists of India



Indian Journal of Physiology and Pharmacology

(Official Journal of Association of Physiologists and Pharmacologists of India)

EDITORS

Dr. K. K. Deepak

Executive Editor,
Professor and Head,
Department of Physiology,
All India Institute of Medical
Sciences, NEW DELHI – 110 029
Tel.: 011-26593583, 011-26594812
E-mail : exec.editor@ijpp.net.in

Dr. Neelam Vaney

Editor (Physiology)
Director Professor,
Department of Physiology,
University College of Medical
Sciences, (University of Delhi)
New Delhi - 110095
E-mail: physiol.editor@ijpp.net.in

Dr. Thirumurthy Velpandian

Editor (Pharmacology)
Ocular Pharmacology Dr. R.P. Centre
for Ophthalmic Sciences
All India Institute of Medical Sciences
New Delhi - 110 029
Tel.: +91-11-26593162, Fax: +91-11-26588919
E-mail: pharmacol.editor@ijpp.net.in

ASSOCIATE EDITORS

Dr. Ashok Kumar Jaryal

Department of Physiology,
AIIMS,
New Delhi – 110 029

Dr. Om Lata Bhagat

Department of Physiology,
AIIMS,
Jodhpur - 342 005,

Dr. Rajani Mathur

Department of Pharmacology,
Delhi Institute of Pharmaceutical
Sciences & Research,, Pushp Vihar,
New Delhi - 110 017

Dr. Farah Khaliq

Professor, Department of Physiology,
University College of Medical Sciences & G.T.B. Hospital,
Delhi University, DELHI

ASSISTANT EDITORS

Dr. Dinu S. Chandran

Department of Physiology,
AIIMS,
New Delhi – 110 029

Dr. Nabanita Halder

Ocular Pharmacology and
Pharmacology Division,
Dr. R. P. Centre, AIIMS,
New Delhi – 110 029

ADVISORY BOARD

List of the members of Advisory board is accessible at www.ijpp.com

Secretariat:-

Department of Physiology,
All India Institute of Medical Sciences,
Ansari Nagar, NEW DELHI - 110 029.

Website : www.ijpp.com

Mobile : 91 – 11 – 32017478 (Working hours)

Email : exec.editor@ijpp.net.in

IJPPAZ 62 (5) (2018) ISSN 0019-5499
Proceedings of
**64th Annual National Conference of
Association of Physiologists
and Pharmacologists of India**

Edited by
**Editorial Group
APPICON 2018**

Based on Research Paper Presentations at
APPICON 2018
held at
Manipal Academy of Higher Education, Manipal

From 29th to 1st December 2018

Published by:
**Department of Physiology & Pharmacology
Melaka Manipal Medical College
& Kasturba Medical College, Manipal
Manipal Academy of Higher Education
Karnataka, India**

PREFACE

It gives me great pleasure to extend a warm welcome to each of our esteemed eminent speakers and resource persons and delegates from abroad and India for this 64th Annual National Conference of Association of Physiologists and Pharmacologists of India [APPICON 2018], jointly organized and hosted by the Departments of Physiology and Pharmacology, Melaka Manipal Medical College and Kasturba Medical College, Manipal Academy of Higher Education [MAHE], Manipal, Karnataka, India.

This year marks APPICON 2018 as one of the flagship grand finale academic event in celebrating the 25th anniversary of MAHE Manipal and the 20th anniversary of Melaka Manipal Medical College, MAHE, Manipal.

This 3-day conference features exciting and thought provoking key note addresses, plenary lectures and several symposia by eminent national and international scientists, researchers and academicians as well as free paper and E poster presentations by more than 600 delegates from all over India and abroad. Additionally the preconference continuing medical education program organized, has three cross continental webinars by eminent international scientists as well as talks by national scientists and clinicians. Eleven preconference hands-on workshops are also being conducted by expert resource personnel from host institutes as well as those coordinated and conducted by the All India Institute of Medical Sciences [AIIMS] New Delhi, India.

As we look forward at the advancing horizons of Physiology and Pharmacology with clear challenges by newer technological advances, it is clear that our focus is to hone the skills of our young and curious learners in both medical education and research for better health care delivery in the next millennium. We hope that this conference will provide in-depth thought provoking insights to all the young at-heart participants in advancing and expanding their horizons of teaching and research experience.

I wish to put on record that we the organizers of APPICON 2018 at Manipal, acknowledge the whole-hearted constant support that we have received from our executive members of Association of Physiologists and Pharmacologists of India, Dr H N Mallick, Dr KK Deepak, Dept. of Physiology, AIIMS, New Delhi and Dr Ramji Singh, Dept. of Physiology, AIIMS, Patna. We are also greatly indebted to the constant encouragement, advice and support received from our National advisers who have been particularly instrumental in initiating and providing valuable inputs for this conference - Grp. Capt. Dr Dinesh Kumar Dubey, Dept. of Physiology, Ministry of Defense, New Delhi, Dr Laxmi T Rao and Prof. Dr Bindu Kutty, Dept. of Neurophysiology, NIMHANS, Bengaluru.

I wish to also whole heartedly thank each and every member of our entire organizing team who have dedicated their valuable time and worked hard together to organize this National event, and particularly to each APPI executive member and our management in making this academic event a memorable one.



Prof. Kiranmai S Rai, PhD
Organizing Chairperson
APPICON 2018

Acknowledgements

We would like to gratefully acknowledge the financial support received from Indian National Science Academy (INSA), Science and Engineering Research Board (SERB), Department of Science & Technology, Government of India, Council of Scientific and Industrial Research (CSIR), Medical Council of India (MCI) and Manipal Academy of Higher Education, Manipal for enabling us to publish the conference proceedings of APPICON 2018.

Organizing Committee

 **APPICON 2018** 

Indian Journal of Physiology and Pharmacology

Volume 62

Number 5 - Supplement 2018

Contents	Page No.
Scientific Programme	05 - 24
Key note address	25 - 26
Plenary Lectures	27 - 29
Invited Plenary	30 -34
Symposia	34 - 70
APPI Awardees	71 - 72
▶ Prof. R C Shukla Oration Award	
▶ B K Anand Research Prize	
▶ C L Malhotra Research Prize	
▶ M L Gupta	
▶ Dev Raj Bajaj Research Prize	
▶ Best Teacher Award	
▶ Sushila Thaker Prakruti Mandir	
▶ Lifetime Achievement Award	
Abstracts for R Srinivasan PG Award	73 - 74
Research papers oral presentation	75 - 120
Research papers poster presentation	121 - 225

Pre-Conference CME- Day 1, Tuesday: 27 /11/2018

Time		Event	
From	To		
8.00 AM	9.00 AM	Registration and Breakfast	Venue: Lobby, Dr.TMA Pai Hall 3
		<i>Invited lectures</i>	Venue: Dr.TMA Pai Hall 3
9.00 AM	10.00 AM	Dr Gopal Marathe Associate Professor, Dept of Studies in Biochemistry and Molecular biology, University of Mysore, Manasagangothri, Mysuru - 570 006	<i>Chair: Dr Ullas Kamath</i>
		Dr Shashikiran Umakanth Professor and Head Department of Medicine Dr TMA Pai Hospital Udupi	<i>Chair: Dr Santhosh U Pai</i>
10.00AM	10.20 AM	Inaugural function	Venue: Dr.TMA Pai Hall 3
10.20AM	10. 30AM	Tea break	Venue: Lobby, Dr.TMA Pai Hall 3
		WEBINAR 1	Venue: Dr.TMA Pai Hall 3
10.30 AM	11.30 AM	Dr. Zoltán Sarnyai, M.D., Ph.D. Professor of Pharmacology (Biomedicine) Head, Laboratory of Psychiatric Neuroscience James Cook University Townsville QLD 4811 AUSTRALIA P 07 4781 6992 T (INT'L) +61 7 4781 6992 E zoltan.sarnyai@jcu.edu.au W https://research.jcu.edu.au/portfolio/zoltan.sarnyai	<i>Chair: Dr Laxmi T Rao/ Dr Kiranmai S Rai</i>
11.30 AM	12.30AM		<i>Chair: Dr Ciraj</i>
		WEBINAR 2	Venue: Dr.TMA Pai Hall 3
		Dr. Bunmi S. Malau-Aduli Associate Professor in Medical Education Academic Lead, Assessment and Evaluation College of Medicine and Dentistry, James Cook University, Townsville QLD 4811 AUSTRALIA	

12.30PM	2.30 PM	Lunch	Venue: KMC Food Court
		Invited lecture	Venue: Dr.TMA Pai Hall 3
2..30 PM	3.00PM	Dr. Sahana Shetty, MBBS, MD(Med),DM(Endo), Consultant Endocrinologist, Associate Professor, Dept. of Endocrinology Kasturba Medical College, Manipal - 576104, India	Chair: Dr Sudha Vidyasagar
3.00 PM	3.15 PM	Tea break	Venue: Lobby, Dr.TMA Pai Hall 3
		WEBINAR 3	Venue: Dr.TMA Pai Hall 3
3.15 PM	4.00PM	Dr Sundar Balasubramanian Department of Radiation Oncology, Hollings Cancer Center, Medical University of South Carolina, Charleston, South Carolina 29425, USA. Email: balasubr@musc.edu	Chair: Dr Lavya Shetty / Dr Arul Amuthan
	4.00 – 4.15 PM	Tea break	Venue: Lobby, Dr.TMA Pai Hall 3

PRE-CONFERENCE WORKSHOP DAY 2, WEDNESDAY, 28TH NOVEMBER, 2018

Sl.No	Workshop (WS)	Time	Venue	Incharge/Coordinator
WS 1	Approach to investigate Pathophysiology of Bleeding disorders/Hemostasis and Pathophysiology of Bleeding Disorders	Half day session	MDL 4 th floor MMMC	Organized by: Melaka Manipal Medical College, Manipal Resource Personnel: Dr. Suresh C Nair, C.M.C, Vellore Dr Annamma Kurien, M.M.M.C, Manipal Dr. Shanthakumari, M.M.M.C, Manipal, Mr. Javed Ahammad MM , Mr. Srinivas, Ms. Asha Coordinators: Ms. Sanu Susan Jacob, Dr Prathap M Baby, Ms. Sujatha Prabhu, Ms. Aparna Tripathy
WS 2	Exercise physiology	Half day session	Center for sports science, medicine and research, Marena	Resource Personnel: Shifra Fernandes, Fiddy Davis Tulasi Ram, Baskaran C Coordinator: Ramesh MG
WS 3	Animal models in Neurophysiology - To study behavior & neurodegeneration	Full day session	Animal House	Resource Personnel: Dr Kiranmai S Rai, Dr Kavitha Liegelin, Dr Archana PR, Dr Prathiba D Almeida, Ms. Devasrita Dash, Dr. Mohan Amberkar, Dr Mohan Kumar S, Dr. Reena Parveen, Dr Anjaneyulu Konuri, Mr Shreevatsa Bhat, Mr Shivakumar Reddy, Dr. Rashmi K.S, Mr. Praveen Kumar S.E, Dr Kabir Dev Coordinator: Dr Sivakumar G

Sl. No	Workshop (WS)	Time	Venue	Incharge/Coordinator
WS 4	Multi-parametric non-invasive assessment of vascular functions	Half day session	Digilab 3 rd Floor MMMC	Organizing team: Departments of Physiology – AIIMS, New Delhi, VMMC and Safdarjung Hospital, New Delhi and GMCH, Chandigarh. Resource Personnel: Prof. A K Jaryal Dr. Manpreet Kaur, Dr. Dinu S Chandran Dr. Kiran Prakash Coordinator: Syed Mushraf
WS 5	Non-invasive neurophysiology and neuromodulation approaches – Role of Clinical physiologists	Half day session	KMC Pharmacology Demo 1	Organizing team: Cognitive Neurophysiology Laboratory, Department of Physiology, AIIMS, New Delhi. Resource Personnel: Prof K P Kochhar, Prof. Suman Jain, Prof. Raj Kumar Yadav, Dr Rohit Verma, Coordinator: Mr Murali Adiga
WS 6	Advancements in Regenerative Medicine – Stem cell research studies	Full day session	4 th Floor MMMC research lab	Organizing team: School of Regenerative Medicine, MAHE, Bangalore. Resource Personnel: Dr Srivatsa, Dr. D.Anandh, Dr. K. Shobha, Ms. Siva Priya, Ms. Sushma, Ms. Chaitra Venugopal, Mr. Krishnamoorthy Coordinator: Dr Kiranmai S Rai
WS 7	EEG and ERP-recording and analysis	Full day session	KMC Physiology Demo 1 and 2 and Neurolab	Organizing team: Departments of Physiology – Kasturba Medical College, Manipal and Axxonet System Technologies Bangalore. Resource Personnel: Dr. Kirtana R Nayak, Dr. Chinmay Suryavanshi Ajit, Mr. Chetan S Mukundan, Prof. C R Mukundan, Mr. Sumit Sharma, Dr. Vrinda Marigowda, Ms. Mohini Vijay Dr. Arun Sasidharan, Mr. Priyesh C Tejas Sikharappa Coordinators: Dr. Kirtana R Nayak, Dr. Chinmay Suryavanshi Ajit

Sl. No	Workshop (WS)	Time	Venue	Incharge/Coordinator
WS 8	Investigating and improving Antimicrobial Use	Full day session	5 th Floor MMMC Library	Organizing team: The WHO Collaborating Centre for Training and Research in Essential Medicines and Rational Use of Medicines. Resource Personnel: Dr. S. Manikandan Dr. R. Raveendran, Dr. M. Jayanthi Coordinator: Dr Vasudha Devi
WS 9	Basic techniques of molecular biology- cDNA synthesis, PCR analysis and Bioinformatics	Full day session	KMC Pharmacology Lab Ground Floor(9-1pm); Digilab MMMC (2-5pm)	Organizing team: Departments of Pharmacology - KMC and MMMC, Manipal Academy of Higher education, Manipal. Resource Personnel: Dr. Sri Lakshmi Bhavani G, Mrs. Rituparna Chakraborty, Dr. Kshitish Acharya K, Dr Meena Kumari Coordinator: Dr Ujjal Bose
WS 10	Basic techniques in histology and immunohistology for research on plant based extracts	Full day session	4 th Floor MMMC research lab	Organizing team: Melaka Manipal Medical College and Kasturba Medical College, Manipal. Resource Personnel: Dr Arul Amuthan, Dr Shiny Jasphin, Mr Manjunath Shetty Coordinator: Dr Arul Amuthan
WS 11	APPI Young Investigator Development Workshop-Research in Obesity - Dr. S K Singh sponsored workshop for undergraduate medical students	Full day session	KMC Physiology Demo 3	Resource Personnel: Dr Ramji Singh Dr K K Deepak, Dr H N Mallik Dr Gopal Marathe, Dr Sanjeev Kumar Dr Raj Kumar Yadav Coordinators: Dr Kirtana R Nayak, Dr Chinmay Suryanvanshi Ajit, Dr Dhiren Punja

Conference Scientific Programs

64th Annual National Conference of Association of Physiologists and Pharmacologists of India 2018 [APPICON 2018]

“Advancing horizons of medical Physiology and Pharmacology in research and teaching”

Conference dates- Nov 29th, 30th and Dec 1st, 2018

Conference Day 1. Key note & Plenary

Speakers	Title of talk	Time	Day, Date	Venue
Dr. Charles Limoli	Understanding the causes and consequences of “Space Brain”	8.30-9. 30 AM	Thursday 29 November 2018	<i>T.M.A. Pai Auditorium, 3rd Floor</i>
Dr. Marie-Catherine Vozenin	The era of modern radiation therapy: innovations to spare normal tissues	9.30 -10. 15 AM		
Dr. Dhandapani K	Heart Failure- Potential Cellular and Molecular Targets for Therapy	10.15 -11.00 AM		
Axxonet team	Sponsor talk	11.00 -11.15 AM		
	TEA BREAK- <i>T.M.A. Pai Hall 2</i>	11.15-11.30 AM		
Dr. Shashi Balasingh	Impact of prolonged monotonous environment at high altitude on mood and cognitive performance in acclimatized lowlanders	11.30-11.50 AM		

Symposia

Symposium -1 “Stem cell research- Hypes and Hopes”

Speakers	Title of talk	Time	Day, Date	Venue
Dr. Munjal Acharya	Regenerative medicine approaches to restore the brain function after chemo-therapy and irradiation	11. 50 AM- 1.20 PM	Thursday 29 November 2018	<i>T.M.A. Pai Auditorium, 3rd Floor</i>
Dr. Colin Jamora	Regulation of epithelial stem cells in wounded skin			
Dr. Anandh D	Neuroprotection by Human Dental Pulp Mesenchymal Stem Cells: From Billions to Nano			
Dr. Jyothi Prasanna	Human Mesenchymal Stem cell derived, iMHePs: Immune compatible surrogates to hepatic transplantation and valuable tools for predictive drug toxicity studies			
Dr. Anujith	Paradoxical Role of Zic3 In Adult Neurogenesis Unraveled by Stem Cell Model System			

Symposium -2 “Patient safety”

Speakers	Title of talk	Time	Day, Date	Venue
Dr. S Manikandan	Awareness and Training on Patient Safety: Catching Them Young	11.30 AM- 1.00 PM	Thursday 29 November 2018	<i>T.M.A. Pai Hall 2</i>
Dr.Umesh Prabhu	Safe healthcare			
Dr. Jayanthi	Medication safety in cancer chemotherapy – The JIPMER experience			

Symposium -3 “Integrative Medicine Practice and Research”

Speakers	Title of talk	Time	Day, Date	Venue
Dr. Joseph Thas	Integrating Traditional Siddha Medicine For Skin Diseases	11.30 AM- 1.00 PM	Thursday 29 November 2018	T.M.A. Pai Hall 1
Dr. Parthiban	Understanding and Unravelling the autism menace- Scope in Integrated AYUSH system			
Dr. Sankar G	Integrative Approach In Infertility .DOES SOCIETY ALLOWS THEM?			
Dr. Vishaal Bhat	Integrative Medicine Education and Research: Experience at CIMR, Manipal			
Dr. Arul Amuthan	Scope and challenges of Integrative Medicine practice in Indian scenario			

LUNCH BREAK- 1.00 -2.00PM Venue –TMA PAI HALL 2

Paper presentations

Speakers	Title of talk	Time	Day, Date	Venue
	PG award - R Srinivasan Award	2.00-3.00PM	Thursday 29 November 2018	T.M.A. Pai Auditorium, 3rd Floor
5 parallel	E-Poster presentations			
5 parallel	Free paper [Oral] presentations			
	TEA BREAK	3.00-3.10PM		T.M.A. Pai Hall 1 5 venues

Symposium -4 “Current updates in neurobiology of sleep”

Speakers	Title of talk	Time	Day, Date	Venue
Dr. Bindu Kutty	Our understanding on Neurobiology of Meditation from Sleeping Brain Perspectives	3.00-5.00PM	Thursday 29 November 2018	<i>T.M.A. Pai Auditorium, 3rd Floor</i>
Dr. Kamalesh K. Gulia	Importance of sleep during pregnancy for maternal-child outcomes: Recent updates			
Dr. Ravindra P N	Neurophysiology of Sleep and Autonomic Functions			
Dr Arun Sasidharan	Importance of sleep cycles and instability patterns within them: a viewpoint from Polysomnography study in Schizophrenia			
Dr. Sushil Jha	Sleep & Memory: How sleep helps in making memories?			
Dr. Rahul Venugopal	Beyond Polysomnography: Importance of ERP and tACS on sleep stability			
Mr. Gulshan Kumar	Sleep and Dreams: Lucid Dreams and an Approach to Study Consciousness.			

Symposium -5 “Updates on Autonomic Functions”

Speakers	Title of talk	Time	Day, Date	Venue
Grp. Capt. Dr. Dinesh Kumar Dubey	Updates On Autonomic Functions	3.00-5.00PM	Thursday 29 November 2018	<i>T.M.A. Pai Hall 2</i>
Dr. T N Satyaprabha	Efficacy of yoga on modulation of autonomic nervous system			
Dr. Kaviraj Udupa	Advances in Autonomic Functions Investigation and potential role as bio-markers in Neurological and Psychiatric disorders			
Dr. Sathya Subramani	Range of Blood pressures over a respiratory cycle (Beat to beat blood pressure variability) can be measured non-invasively and cost-effectively with CMC NIBP –			

	a device from CMC.		
Dr. Anil Pandey	Sympathetic regulation of blood pressure: is there a difference in male and female?		

Symposium -6 “Brain in Addiction – Bench to Bedside”

Speakers	Title of talk	Time	Day, Date	Venue
Dr Nagesh B Pai	Neurobiology of addiction	3.00-5.00PM	Thursday 29 November 2018	T.M.A. Pai Hall 1
Dr Sanjay Chandragiri	What is different in Behavioural addiction			
Prof. Wilf Yeo	Pharmacological trends in Addictive Disorders			
Dr BS Shankararayana Rao	Brain Stimulation Reward : A Novel Strategy to Treat Stress and Depression-induced Cognitive Deficits			

5.00-6.00 PM -General Body Meeting–Venue T.M.A. Pai Hall 1

6.30PM -8.00 PM- Inaugural ceremony & Cultural event –Venue- T.M.A. Pai Auditorium, 3rd Floor

8.00 PM –Banquet dinner –Venue- TMA Pai Hall 2

Conference Day 2. Key note & Plenary

Speakers	Title of talk	Time	Day, Date	Venue
Dr. William K Boyes	Environmental Risks for Neurological Disorders, Current and Emerging Concerns	8.30-9.15 AM	Friday 30 November 2018	<i>T.M.A. Pai Auditorium, 3rd Floor</i>
Dr Vivek Sharma	APPI award: R.C Shukla oration award	9.15- 10.00 AM		
Dr. K Ramnarayan	Heutagogy for the Millennial Learners	10.00-10.30 AM		
Wolter Kluyvers	Sponsor talk	10.30-10.45 AM		
	TEA BREAK	10.45-11.00 AM		
	<i>T.M.A. Pai Hall 2</i>			

Symposium -7 “Environmental influences on Physiological parameters”

Speakers	Title of talk	Time	Day, Date	Venue
Col. Dr Anuj Chawla	Human Physiology at high altitude: a reflection on three decades of research	11.00AM-12.30 PM	Friday 30 November 2018	<i>T.M.A. Pai Auditorium, 3rd Floor</i>
Dr Sunil Kumar Hota	Military Physiology At High Altitude: A DRDO Perspective			
Dr Debashish Bandopadhyaya	Mechanism of cardio-protection by melatonin			
Dr Padmavathi Ramaswamy	"COPD in Non-smoking Women – Role of Indoor air pollution"			
Dr Ajay Kumar Nair	Altering the internal environment on demand – meditation and wellbeing			

Symposium -8 “Best Educational Practices – Student engagement in learning and research”

Speakers	Title of talk	Time	Day, Date	Venue
Dr. Vasudha Devi	Pharmacology education and self-determined learning: integrating theory into practice to facilitate the development of capacity for pharmacotherapy among medical students	11.00AM-12.30 PM	Friday 30 November 2018	<i>T.M.A. Pai Hall 2</i>
Dr. Kirtana R Nayak	Team based learning In Physiology for case and competency based learning			
Dr. Bhagyalakshmi	Task based learning in Physiology using standardized patient encounter			
Dr. Dhiren Punja	Introduction of Simulation with ALS manikin in I MBBS Physiology training			
Dr. Ganesh Kamath	PBL at MIMIC			

Symposium -9 “Nutrition”

Speakers	Title of talk	Time	Day, Date	Venue
Dr. Jamuna Prakash	Phytochemicals: Retention And Bioavailability From Processed Foods	11.00AM-12.30 PM	Friday 30 November 2018	<i>T.M.A. Pai Hall 1</i>
Dr. Kiranmai S Rai	Stress and essential nutrients: Outcomes on early brain development			
Dr. Sneha Ambwani	Correlation between Serum Levels of Vitamin D & Schizophrenia			
Dr. Sucharitha S	Nutrition and Skeletal Muscle- Understanding the role in health and disease			
Dr Suneeta Kalasuramath	Scenario and strategies to fight Iron deficiency anemia			

LUNCH BREAK- 12.30 -1.45 PM

Venue –TMA PAI HALL 2

PANEL DISCUSSION

Moderator	Theme of Panel Discussion & Panelists	Time	Day, Date	Venue
Dr Laxmi T Rao	<p>“Physiology in the practice of Medicine” PANELISTS- Dr Ved Prakash Mishra, Dr A Krishna Rao, Dr PLN Rao, Dr KK Deepak, Dr HN Mallick, Dr Ramji Singh, Dr Ashok Jaryal, Dr Harsha Halahalli, Dr Lakshmi Naik, Dr Prabha Adhikari, Dr Vikas V</p>	2.00-3.30 PM	Friday 30 November 2018	T.M.A. Pai Auditorium, 3rd Floor

Invited Plenary

Speakers	Title of talk	Time	Day, Date	Venue
Dr. Prabha Adhikari	Towards prevention of dementia in India-Making the impossible possible	3.30-5.00PM	Friday 30 November 2018	T.M.A. Pai Auditorium, 3rd Floor
Dr. TR Raju	Can Yoga ameliorate Alzheimer’s disease through stress reduction?			
Dr. K Dilip Murthy	Prenatal Stress and the Enigmatic Pyramid			
Dr. KK Deepak	The Pros and Cons of pursuing Clinical Physiology			

Paper presentations

Speakers	Title of talk	Time	Day, Date	Venue
5 parallel	E-Poster presentations	4.00-5.30 PM	Friday 30 November 2018	T.M.A. Pai Hall 1
5 parallel	Free paper [Oral] presentations			
	TEA BREAK- T.M.A. Pai Hall 2	5.20-5.30PM		5 venues

Conference Day 3. Plenary

Speakers	Title of talk	Time	Day, Date	Venue
Dr. Mamata Naidu	An integrated testing strategy using a weight of evidence approach for identifying novel structural associations with skin sensitization	8.30 -9.00 AM	Saturday 1 December 2018	<i>T.M.A. Pai Auditorium, 3rd Floor</i>
Dr. CR Mukundan	Emotion: Cognitively Molded Drive	9.00-9.20 AM		
Dr. KP Puthuraya	How to be successful Physiologist	9.20-9.40AM		
	TEA BREAK - <i>T.M.A. Pai Hall 2</i>	9.40-10.00AM		

Symposium -10 “Brain and Behavior”

Speakers	Title of talk	Time	Day, Date	Venue
Dr Laxmi T Rao	Anxiety and fear cognition after early life stress.	10.00-11.30 AM	Saturday 1 December 2018	<i>T.M.A. Pai Auditorium, 3rd Floor</i>
Dr. Sajikumar Sreedharan	The p75 neurotrophin receptor is a necessary mediator of synaptic and behavioral changes induced by sleep deprivation			
Dr Shobi Veleri	Genetic dissection of cilia genes gives molecular insights into neurodegenerative diseases			
Dr. Pradeep Punnakkal	NMDA receptor GluN2 subtypes control epileptiform events in the hippocampus			
Dr. Preethi Hegde	Cortico amygdala interactions and fear extinction in Enriched Environment exposed Wistar Rats			
Kumari Anshu Jha	Valproate exposure in prenatal environment: effect on attentional functions			

Symposium -11 “Real world evidence enabled patient access”

Speakers	Title of talk	Time	Day, Date	Venue
Mahesh Vishwanath Iyer	Real World Evidence (RWE) - enabling data access	10.00-11.30 AM	Saturday 1 December 2018	T.M.A. Pai Hall 2
Madhur Garg	Real World Evidence (RWE) for accelerated patient access			

Paper presentations

Speakers	Title of talk	Time	Day, Date	Venue
5 parallel	E-Poster presentations	10.00 AM-12.00 PM	Saturday 1 December 2018	T.M.A. Pai Hall 1 5 venues
5 parallel	Free paper [Oral] presentations			

12.30 -1.30 PM Valedictory function with certificate distribution

LUNCH BREAK- 1.30 -2.30 PM

Venue –TMA PAI HALL 2

APPICON 2018-CONFERENCE SCHEDULE
Conference Day 1, Thursday: 29/11/2018

Time		Event	
		From	To
8.00 AM	8.30 AM	Registration 3	Venue: Lobby Dr.TMA Pai Hall Breakfast- Venue: Dr.TMA Pai Hall 2
8.30AM	9.30 AM	Key note address: Dr Charles Limoli, UCL, USA	Chair: Dr T R Raju & Dr Sathish Rao
9.30 AM	10.15 AM	Plenary lecture 1- Dr. Marie-Catherine Vozenin, Switzerland	Chair: Dr Rajgopal KV & Dr Sumil K Narayan
10.15 AM	11.00 AM	Plenary lecture 2: Dr Dhandapani K, South Carolina, USA	Chair: Dr Padma Kumar
11.00 AM	11.15 AM	Sponsor talks parallel- Talk by Axxonet	
11:15 AM	11:30 AM	Tea break	Venue: Dr.TMA Pai Hall 2
		Invited Plenary lecture	Symposium 2
		Chair: Dr Pradeep Kumar	
		Dr Shashi Balasingh	Venue: Dr.TMA Pai Hall 2
		Symposium 1	Integrative medicine practice and research
		Venue: Dr.TMA Pai Hall 3	Chairs: Dr A K Saxena & Dr Navin Sainis
		Stem cells- Hypes and Hopes	
		Chairs: Dr Mallikarjun Rao & Dr Anju Shukla	Dr Joseph Thas Dr Parthiban Dr Sankar G Dr Vishaal Bhat Dr Arul Amuthan
		Dr Munjal Acharya Dr Colin Jamora Dr Anandh D Dr Jyothi Prasanna Dr Anujith	Dr S Manikandan Dr Umesh Prabhu Dr Jayanthi
1.00 PM	2.00 PM	Lunch	Venue: Dr.TMA Pai Hall 2
2.00 PM	3.00 PM	PG award - R Srinivasan Award	Chairs/ Judge: Venue: Dr.TMA Pai Hall 3
			Symposium 3
			Venue: Dr.TMA Pai Hall 1

			Dr Rajshekar [SOAHS] & Gp.Capt. Dr Dimesh K Dubey	
			Free paper presentation -5 parallel	
3.00 PM	3.10 PM		E Poster presentations -5 parallel	Free paper presentation -5 parallel
			Tea break	Venue: Dr.TMA Pai Hall 2
			Symposium 4	Symposium 5
			Venue: Dr.TMA Pai Hall 3	Venue: Dr.TMA Pai Hall 2
			Current updates in Neurobiology of Sleep	Brain in Addiction – Bench to Bedside
			Chair: Dr HN Mallick & Dr Bharati Mehta	Chair: Dr PSVN Sharma & Dr Vijaya Chandran
3.00 PM	5.00 PM		Dr Bindu Kutty Dr Kamalesh K. Gulia Dr Ravindra P.N. Dr Arun Sasidharan Dr Sushil Jha Dr Rahul Venugopal Mr Gulshan Kumar	Dr Nagesh Pai Dr Sanjay Chandragiri Dr Wilfred Yeo Dr B S Shankanarayana Rao
5.00 PM	6.00 PM		General body meeting	Venue: Dr.TMA Pai Hall 1
			Inaugural ceremony	Venue: Dr.TMA Pai Auditorium (Hall 3)
6.30 PM	8.00 PM		Felicitations- Dr A Krishna Rao & Dr P L N Rao	Awards-APPI Life time achievement & Seven other awards
			Cultural events	
8.00 PM onwards			Banquet dinner	Venue: Dr.TMA Pai Hall 2

Time		Event	
From	To		
8.00 AM	8.30 AM	Breakfast	Venue: Dr.TMA Pai Hall 2
8.30AM	9.15 AM	Key note address – Dr William K Boyes, US EPA, North Carolina, USA	Chair: Dr Bindu Kutty, Dr N Udupa
9.15 AM	10.00 AM	APPI awards: R.C Shukla oration award -Dr Vivek Sharma	Chair: Dr RG Latti
10.00AM	10: 30 AM	Plenary lecture 3- Dr K Ramnarayan, MMMC, MAHE, Manipal	Chair: Dr Ramji Singh
10.30 AM	10.45AM	Sponsor talk –Wolter Kluyvers	
10.45 AM	11.00 AM	Tea break	Venue: Dr.TMA Pai Hall 2
		Symposium 7	Symposium 8
		Venue: Dr.TMA Pai Hall 3	Venue: Dr.TMA Pai Hall 2
		Environmental influences on Physiological parameters	Best Educational practices -- Student engagement in learning and research"
11.00 AM	12.30 PM	Chair: Dr Asim Das, Dr Harsha Halahalli	Chair: Dr Ramji Singh, Dr Pragna Rao, Dr Neelam Vaney
		Col. Dr Anuj Chawla Dr Sunil Kumar Hota Dr Debasish Bandyopadhyay Dr Padmavathi Ramaswamy Dr Ajay Nair	Dr Vasudha Devi Dr Kirtana Nayak Dr Bhagyalakshmi Dr Dhiren Punja Dr Ganesh Kamath
12.30 PM	1.45 PM	Lunch	Venue: Dr.TMA Pai Hall 2
2: 00 PM	3.30 PM	Panel discussion: Physiology in the practice of	Moderator- Dr Laxmi Rao
		Venue: Dr.TMA Pai Hall 3	Panelists: Dr Ved Prakash Mishra, Dr A Krishna Rao, Dr PLN Rao, Dr KK Deepak, Dr HN Mallick, Dr Ramji Singh, Dr Ashok Jaryal, Dr Harsha Halahalli,

Day 3, Saturday: 1/12/2018			
Event			
Time	From	To	
8.00 AM	8.30 AM	8.30 AM	Breakfast <i>Venue: Dr.TMA Pai Hall 2</i>
8.30 AM	9.00 AM	9.00 AM	Plenary lecture 4 Dr Mamta Naidu CCSB Tufts Sch Med, Boston, MA, USA <i>Chairs: Dr N Udupa, Dr T Velpandyan</i>
9.00AM	9.40 AM	9.40 AM	Invited Plenary lectures Dr C R Mukundan Dr KP Puthuraya <i>Chairs: Dr (Brig) Sankar Prasad Goerthi, Dr Sudhakar Nayak</i> <i>Chair: Dr Ramesh Bhat</i> <i>Venue: Dr.TMA Pai Hall 3</i>
9.40AM	10. 00AM	10. 00AM	Tea break <i>Venue: Dr.TMA Pai Hall 2</i>
			Symposium 10 <i>Venue: Dr.TMA Pai Hall 3</i>
			Brain and behavior <i>Chairs: Dr Kiranmai S Rai,</i>
10.00 AM	11.30 AM	11.30 AM	Dr Laxmi T Rao Dr Sajikumar Sreedharan Dr Shobi Veleri Dr Pradeep Punnakkal Dr Preethi Hegde Ms. Kumari Anshu Jha <i>Chair: Dr Avinash Shetty, Dr. Mahadeva Rao</i> Mr. Mahesh Vishwanath Iyer Mr. Madhur Garg
10.00 AM	12.00 PM	12.00 PM	E Poster presentations -5 parallel <i>Venue: Dr.TMA Pai Hall 2</i>
12.30 PM	1.30 PM	1.30 PM	Valedictory function with certificate distribution Awards-R Srinivasan; Free paper & e-poster <i>Venue: Dr.TMA Pai Hall 3</i>
1.30 PM	2.30 PM	2.30 PM	Lunch <i>Venue: Dr.TMA Pai Hall 2</i>

64th Annual National Conference of Association of Physiologists and Pharmacologists of India 2018 [APPICON 2018]

“Advancing horizons of medical Physiology and Pharmacology in research and teaching”

Conference dates- Nov 29, 30 and Dec 1st 2018

Abstracts of Key note & Plenary speakers

KEYNOTE SPEAKERS

1. Dr Charles Limoli



Understanding the causes and consequences of “Space Brain”

Charles Limoli, Vipin Parihar, Janet Baulch and Munjal Acharya

University of California, Irvine, USA 92697-2695

Exposure to the space radiation environment poses inherent risk to normal tissue functionality, especially when considering the resultant damage to the intricate cellular structures that define the central nervous system (CNS). The complex radiation response of the CNS is underscored by the surprising sensitivity of mature neuronal populations to structural degradation caused by low dose exposures to individual and/or combinations of charged particle species. As a result, multiple irradiation paradigms have been shown to elicit a wide spectrum of persistent cognitive deficits involving diverse and complex molecular mechanisms.

Both light and heavier ionized charged particles have been found to elicit a significant reductions in dendritic complexity, spine density, synapse density and myelination. The structural decrements

ranging from gross changes in dendritic arborization to ultrastructural changes quantified by electrons microscopy, occur throughout variety of neurons located in various cortical and hippocampal subfields. Structural decrements map to behavioral performance, and are also associated with major mood disorders involving anxiety, depression and extinction. In addition to the structural changes caused by cosmic rays, increased levels of inflammation are also found to persist in the irradiated brain, an effect that differs distinctly between the sexes and likely underscores the markedly different behavioral responses between male and female mice following space radiation exposure.

Inherent to space travel are both low doses of mixed fields of different radiation types, and low dose rates, on the order of 1 mGy/day. Since the predominance of NASA funded radiation studies originate at the accelerator at Brookhaven National Lab, and implement acute exposures at dose rates in the range of cGy/min, effort has been made at modeling protracted, space relevant low dose rates using the neutron irradiation facility at Colorado State University. Using a ²⁵²Californium source, animals can be irradiated a 1 mGy/day with neutrons (78 keV/mm) and about 20% of the total dose emanating from gamma rays – a useful surrogate for the delta rays emanating from primary charged particle trajectories through tissues. With this system we have now uncovered that low dose rate exposures elicit multiple behavioral decrements in mice and rats along with impaired long-term potentiation and a hyper-excitability of CA1 pyramidal cell neurons in the hippocampus. These behavioral and electrophysiological findings uncover new concerns with deep space travel and point to the complexities of the CNS radiation response and the uncertainties ahead for NASA in mitigating CNS risks associated with cosmic radiation exposure.

2. Prof. William K Boyes



Environmental Risks for Neurological Disorders, Current and Emerging Concerns

Prof. William K. Boyes

US EPA, North Carolina, USA

Engineered nanomaterials (ENM) are a growing aspect of the global economy, and their safe and sustainable development, use, and eventual disposal requires the capability to forecast and avoid potential problems. This review provides a framework to evaluate the health and safety implications of ENM releases into the environment, including purposeful releases such as for antimicrobial sprays or nanoenabled pesticides, and inadvertent releases as a consequence of other intended applications.

Considerations encompass product life cycles, environmental media, exposed populations, and possible adverse outcomes. This framework is presented as a series of compartmental flow diagrams that serve as a basis to help derive future quantitative predictive models, guide research, and support development of tools for making risk-based decisions. After use, ENM are not expected to remain in their original form due to reactivity and/or propensity for hetero-agglomeration in environmental media.

Therefore, emphasis is placed on characterizing ENM as they occur in environmental or biological matrices. In addition, predicting the activity of ENM in the environment is difficult due to the multiple dynamic interactions between the physical/chemical aspects of ENM and similarly complex environmental conditions. Others have proposed the use of simple predictive functional assays as an intermediate step to address the challenge of using physical /chemical properties to predict environmental fate and behavior of ENM. The nodes and interactions of the framework presented here reflect phase transitions that could be targets for development of such assays to estimate kinetic reaction rates and simplify model predictions. Application, refinement, and demonstration of this framework, along with an associated knowledge base that includes targeted functional assay data, will allow better de novo predictions of potential exposures and adverse outcomes.

PLENARY LECTURES

1. MC Vozenin



The era of modern radiation therapy: innovations to spare normal tissues

MC Vozenin ¹

Radiation Oncology Laboratory, CHUV, Lausanne, Switzerland.

The incidence of cancer is increasing worldwide with more than 14 million new cases per year. About fifty percent of cancer patients are treated with radiation therapy (RT), making it, after surgery, the most important contributor to cancer cure. In the era of targeted therapies, RT remains one of the most precise and powerful targeted treatments. Thanks to major advances in physics, imaging, and ballistics, high-precision dose delivery is successful in safely reducing the volume of irradiated normal tissues. New and very appealing RT approaches using high or very high dose per fraction (hypofractionation), such as stereotactic body radiotherapy (SBRT), also called stereotactic ablative radiotherapy (SABR) or stereotactic radiosurgery (SRS), are increasingly used, both in early stage cancers and in some oligo-metastatic patients. Increasing tumor sensitivity to irradiation, increasing normal tissue tolerance to radiation, or optimally avoiding normal tissue while distributing curative doses to tumors are the major paths towards improving the therapeutic index of radiotherapy. Furthermore, the clinical management of normal tissue complications is nowadays a critical issue both for clinicians and patients as the number of long-term cancer survivor is increasing thanks to improvement of therapeutics and emergence of combined modalities of treatment (1, 2). In this review, we will discuss the current status of normal tissue complications, their management, as well as the current status and future opportunities for clinical implementation of novel strategies to prevent, mitigate, and cure radiation injuries based upon the physiopathological and molecular understanding of cell and tissue responses to ionizing radiation (3, 4). Novel radiation therapy approaches will also be discussed (5-8).

References

1. Montay-Gruel P, Boivin G, Vozenin MC. Novel strategies to prevent, mitigate or reverse radiation injury and fibrosis
In: Anscher MS, Valerie, editors. Strategies to Enhance the Therapeutic Ratio of Radiation as a Cancer Treatment: Springer; 2016.
2. Montay-Gruel P, Meziani L, Yakkala C, Vozenin MC. Expanding the therapeutic index of radiation therapy by normal tissue protection. *Brit J Radiol*. 2018.
3. Bourgier C, Rivera S, Vozenin MC, Boisselier P, Azria D, Lassau N, et al. Pravastatin Reverses Established Radiation-Induced Cutaneous and Subcutaneous Fibrosis in Head and Neck Cancer Patients: Results of a Biology-Driven Clinical Trial, Pravacur Phase 2. *int J Radiat Oncol Biol Phys*. 2017;99(2):S74-S.
4. Meziani L, Mondini M, Petit B, Boissonnas A, Thomas de Montpreville V, Mercier O, et al. CSF1R inhibition prevents radiation pulmonary fibrosis by depletion of interstitial macrophages *Eur Respir J*. 2018.
5. Favaudon V, Caplier L, Monceau V, Pouzoulet F, Sayarath M, Fouillade C, et al. Ultrahigh dose-rate FLASH irradiation increases the differential response between normal and tumor tissue in mice. *Sci Transl Med*. 2014;6(245):245ra93.
6. Montay-Gruel P, Petersson K, Jaccard M, Boivin G, Germond JF, Petit B, et al. Irradiation in a flash: Unique sparing of memory in mice after whole brain irradiation with dose rates above 100Gy/s. *Radiother Oncol*. 2017.
7. Montay-Gruel P, Bouchet A, Jaccard M, Patin D, Serduc R, Aim W, et al. X-rays can trigger the FLASH effect: Ultra-high dose-rate synchrotron light source prevents normal brain injury after whole brain irradiation in mice. *Radiother Oncol*. 2018.
8. Vozenin MC, De Fornel P, Petersson K, Favaudon V, Jaccard M, Germond JF, et al. The advantage of Flash radiotherapy confirmed in mini-pig and cat-cancer patients. *Clin Cancer Res*. 2018.

2. Dr Dhandapani Kuppuswamy



Suppression of Angiotensin II-induced maladaptive changes in the Heart and Kidney by Caveolin-1 Scaffolding Domain Peptide

Panneerselvem Chinnakkannu, Charles Reese, John Antony Gaspar, Saraswathi Panneerselvam, Dorea Pleasant-Jenkins, Catalin Baicu, Elena Tourkina, Stanley Hoffman, and **Dhandapani Kuppuswamy**

Division of Cardiology, Department of Medicine, Medical University of South Carolina, Charleston, SC 29425: PC, SP, CB, DK

Division of Rheumatology, Department of Medicine, Medical University of South Carolina, Charleston, SC 29425: CR, ET, SH

Research Centre, Ananda College, Devakottai, Tamil Nadu 630302, India: JAG

Department of Regenerative Medicine and Cell Biology, Medical University of South Carolina, Charleston, SC 29425: DPJ

Metabolic disorders such as hypertension, obesity, diabetes mellitus often affect multiple organs and contribute to the development of congestive heart failure. Elevated angiotensin-II (AngII) due to dysregulated renin-angiotensin system causes systemic hypertension that results in: (i) endothelial dysfunction characterized by reduced vasodilation and increased vascular inflammation and vascular permeability; (ii) hypermigration of bone marrow (BM) cells to the stressed organs that result in profibrogenic signaling and organ fibrosis, primarily affecting the heart and kidney; and (iii) maladaptive ventricular hypertrophy and compromised ventricular function. To explore potential mechanisms that contribute to the AngII-induced pathological changes, we focused on caveolin-1, a structural cytoplasmic membrane

protein that is involved in the formation and function of caveolae. In addition to its role in endocytosis and receptor trafficking, caveolin-1 is a master regulatory protein that acts by inhibiting a wide range of kinases and other signaling molecules. The ability to inhibit kinases and other signaling molecules is localized to the caveolin-1 scaffolding domain (CSD, amino acids 82-101 of caveolin-1). CSD has a beneficial effect in several mouse model systems for human diseases. Our recent studies show that myocardial fibrosis and the loss of cardiac function due to left ventricular pressure-overloaded (PO) via transverse aortic constriction in mice could be averted by treatment with the CSD peptide.

To extend our observations on the beneficial effects of CSD, we use AngII infusion model (2.1 mg/kg/day for 2 wk) to create systemic hypertension in mice. AngII infusion was found to cause cardiac hypertrophy (increased heart weight to body weight ratio and cardiomyocyte cross-sectional area); fibrosis in the heart and kidney (increased levels of collagen I and heat shock protein-47); and vascular leakage (increased levels of IgG in the heart and kidney). Echocardiograms of AngII-infused mice showed increased left ventricular posterior wall thickness and isovolumic relaxation time and decreased ejection fraction, stroke volume, and cardiac output. CSD treatment (bolus i.p. injections, 50 μ g/mouse/day) of AngII-infused mice significantly suppressed all of these pathological changes including fibrosis, hypertrophy, and vascular leakage, and improved ventricular function. Furthermore, while AngII infusion caused profibrogenic signaling by increasing b1 and b3 integrin levels and Pyk2 activation (non-receptor tyrosine kinase) in the heart and kidney, CSD treatment significantly suppressed these changes. Finally, BM cells isolated from AngII-infused mice showed hypermigration toward stromal cell-derived factor-1. When AngII-infused mice were treated with CSD, BM cell migration was reduced to the basal level observed in cells from control mice. Importantly, under all these conditions, CSD did not affect the AngII-induced increase in blood pressure (BP), indicating that the beneficial effects of CSD were not mediated via normalization of BP. These results strongly indicate that CSD suppresses many of the AngII-induced pathological changes in mice, suggesting that CSD can be developed as a novel treatment for patients with hypertension and heart failure.

3. Dr K Ramnarayan



“Heutagogy for the Millennial Learners”

Prof K Ramnarayan

Chairperson – Manipal University Jaipur &
Vice President-Faculty Development
Manipal Academy of Higher Education, Manipal

Students today have a unique outlook to learning as the majority of them are millennial learners while their teachers belong to the earlier generations. This intergenerational gap is often an impediment to learning in spite of imaginative instructional initiatives. Awareness of the principles and practice of Heutagogy will foster more effective learning in the current curricular conundrum.

4. Dr Mamta Naidu



An integrated testing strategy using a weight of evidence approach for identifying novel structural associations with skin sensitization

Mamta Naidu^{1*}, Rebecca Jones^{2@},
Daniel Chang², Yintak Woo^{2@}, Judy Strickland³,
Nicole Kleinstreuer⁴

¹ Center of Cancer Systems Biology- Tufts University
School of Medicine, Boston, MA

² Risk Assessment Division, Office of Pollution Prevention
and Toxics at the Office of Chemical Safety and
Pollution Prevention, Environmental Protection Agency,
Washington, D. C.

³ Integrated laboratory Systems, RTP, N. C.

⁴ NIH/ NIEHS/ DNTP/ NICEATM, RTP, N. C.

*Presenting author (previous work conducted at USEPA)
@Retired

The purpose of this project is to develop a framework for assessing the dermal

sensitization potential of new or existing chemicals under the Toxic Substances Control Act

(TSCA). A clear understanding of structural alerts associated with skin sensitization is needed to

recommend appropriate test alternatives to reduce and replace vertebrate animal testing. These tests need to provide information of equivalent (acceptable to OECD guidelines) scientific

quality and relevance. Structural associations with local lymph node (LLNA) data were

determined by considering physical and chemical properties, *in vivo/ in vitro* data, potency and

analog data from USEPA’s Office of Pollution Prevention and Toxics (OPPT) chemical

databases and the chemical/ structural fragments associated with skin sensitization. We

compared these associations with existing structural alerts to determine if skin sensitization can

be predicted. For that, chemicals with identified structural alerts will be tested in validated *in*

vitro tests for skin sensitization to understand assay applicability domains. Multiple defined

approaches and computational models are being considered for integrated testing strategies. A

weight of evidence approach (*i.e., in vivo, in vitro, and modeling analyses*) will be then used to

evaluate skin sensitization potential of identified chemicals.

Disclaimer:

The views expressed in this abstract are those of the authors and do not represent Agency

policy or endorsement. Mention of trade names of commercial products should not be

interpreted as an endorsement by the U.S. Environmental Protection Agency.

INVITED PLENARY LECTURES

1. Dr Shashi Balasingh

Director
NIPER, Hyderabad



Impact of prolonged monotonous environment at high altitude on mood and cognitive performance in acclimatized lowlanders

Shashi Bala Singha, b,* and Saroj Kumar Das c,d

a Defence Research and Development Organization,
Rajaji Marg, New Delhi 110011, India

b National Institute of Pharmaceutical Education and
Research, Balanagar, Hyderabad, India

c Defence Institute of High Altitude Research, Defence
Research & Development Organisation, C/o 56 APO,
Leh-Ladakh, Jammu & Kashmir, India

d Centre for Biotechnology, Siksha 'O' Anusandhan
(Deemed to be University), Bhubaneswar, Odisha, India

Corresponding Author Email: drshashisingh@gmail.com

Human body can adapt to high altitude through immediate and long-term acclimatization. Reports also showed that mood alterations upon acute exposure to high altitude were correlated to poor cognitive performances. Most of the studies address the effect of high altitude on mood function, but studies are limiting with respect to monotonous environment at high altitude and its possible role in mood and cognition. Repetition of events for considerable period of time with a prolong unaltered surroundings leads to monotony. To address the role of monotony on mood and cognition, the study was conducted on human participants who were never moved to high altitudes before the base line data was acquired. Present study aimed at to illustrate the role of monotonous environment at high altitude on mood function and cognitive performance of acclimatized lowlanders living with group of ≤ 5 ($ALL \leq 5$) and ≥ 10 ($ALL \geq 10$) and follow-up of volunteers were carried out after 8 and 12 months of high altitude induction. To assess presence or absence and severity of depression, three validated scales were administered such as patient health questionnaires (PHQ), Beck depression inventory (BDI) and composite international diagnostic interview-short form (CIDI-SF). Mini

Mental State Examination (MMSE) and Multi-Domain cognitive screening test (MDCST) was administered to ascertain the cognitive performance of volunteers and then serum BDNF, plasma homocysteine, Vit-B12 and Folic acid level were estimated. The follow-up study revealed that serum BDNF level was significantly low in $ALL \leq 5$ after 12 months ($12ALL \leq 5$) of follow up when compared to $12ALL \geq 10$ and base line. Study also shown that Volunteers of $12ALL \geq 10$ have better cognitive performance and mood status than that of $12ALL \leq 5$. Staying in small groups at high altitude for a prolonged period of time may altered the mood and cognitive performances due to reduction in possible ways of interaction among the volunteers in monotonous environment. High altitude with prolong monotony stress may aggravated as more serious mood behavioral manifestation like depression and increased prevalence of mild cognitive impairment (MCI). Therefore chronic absence of novelty in the inhabiting environment at high altitude consolidated the symptoms of depressive mood and also altered the cognitive performances. Rehabilitation facility might be an alternative to interrupt monotony induced neuropsychological alteration at high altitude.

Acknowledgment: We are greatly indebted to all the volunteers for their whole hearted cooperation despite the extreme climatic conditions in Ladakh and without whose support we could not have successfully completed the study. The study was financially supported by Defence Research and Development Organization, Government of India

2. Dr Prabha Adhikari



Towards prevention of dementia in India-Making the impossible possible

Dr Prabha Adhikari

Professor and HOD of Medicine

Chief of Geriatric Unit

Yenepoya Deemed to be University

While cure is yet a dream for millions of people who suffer from dementia, it is encouraging for physicians, general practitioners and everybody caring for the elderly to know that the burden of dementia can be reduced by more than a third by addressing

9 modifiable risk factors and further by inculcating healthy brain ageing practices.

Dementia is a neurodegenerative condition with progressive loss of memory and other cognitive functions. As on today there is no drug to cure this disease or halt its progression. Alzheimer's disease, Vascular dementia by and large contribute to more than 75% of cases, while frontotemporal dementia, Lewy Body Dementia and dementia due to Parkinsonism contribute to rest of them. With the figures of people living with dementia touching 46.8 million in 2015 and an estimated figure of 131.5 million for the year 2050, with 68% of them from low and middle income countries, India has to wake up to take cognisance of the fact that several of the modifiable risk factors are not yet addressed. Estimated cost of care of dementia for USA for the year 2015 was 818 billion US\$, while the cost of care in India has not been estimated.

It is important to recognise treatable conditions that mimic dementia such as Vitamin deficiencies such as Pellagra, Thiamine deficiency, Endocrine diseases such as Hypothyroidism, treatable brain conditions such as Bilateral subdural Haematoma, Normal pressure Hydrocephalus, HIV infection, chronic hyponatremia, Chronic hypoglycaemia and TB Meningitis. Depression and Delirium which may present with cognitive deficits need to be recognised and treated. While we are able to find this in the fortunate few, life course approach for prevention of dementia, including heart protecting practices and healthy brain ageing practices will surely reduce the number for India.

Modifiable risk factors for include Low Education attainment in early life, poor foetomaternal nutrition, mid life Hypertension, midlife obesity and Hearing loss, and late life Diabetes Mellitus, late life depression, Physical inactivity, smoking in late life, poor social engagement are some of modifiable risk.

Life style factors like obesity, hypertension and diabetes along with smoking increase the risk of vascular disease, brain inflammation and oxidative stress. Rich social network and reduced depression improves brain cognition by increased cognitive stimulation and physical activity reduces inflammation and stress and vascular damage.

Novel risk factors, that are likely to emerge in future include obstructive sleep apnoea and poor sleep quality. If we look at midlife risk factors such as hypertension, obesity and hearing loss coexist in most of the patients with obstructive sleep apnoea. We need to have more screening programmes for obstructive sleep apnoea. There are several protective factors such as Mediterranean diet, cognitive stimulation activities

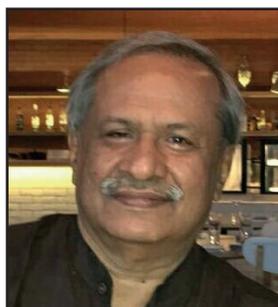
and bilinguality for cognitive protection. However none of them have been able to eliminate dementia. Living near major roads, visual impairment, head injury even a minor one are emerging as risk factors. However they have not appeared in the population attributable risk fraction.

With this data we need an action plan for India. Already there are enough programmes for early life to better the foeto-maternal nutrition and education. We need to strengthen these programmes. There is a national National Programme For Prevention and Control of Cancer, Diabetes, Cardiovascular Disease and Stroke (NPCDCS) which is working on managing diabetes, hypertension, smoking cessation, dyslipidemia, physical activity which is active in some of the states but still in its infancy in some of the states. However there is no governmental programme for screening for hearing loss or supply of quality hearing aids to middle aged and older people. There is urgency to incorporate this in the national programme. There is no programme to keep the elderly happy, active and socially engaged. There is need for active ageing programme to keep them physically and mentally fit. Traffic rules have become stringent with compulsion on wearing seat belts and helmets thus reducing head injury. There is need to reduce prices for nuts, fruits and vegetables, healthy oils which are components of healthy Mediterranean diet. We need to explore ingredients from Indian diet too. Diet rich in circumin, Brahmi and Kesar could probably help in developing good neuronal network. Even Om chanting and other spiritual practices are helpful. If we seriously work towards life course approach, and healthy heart and brain ageing practices, we will move towards Dementia free India.

References

1. Prince M, Wimo A, Guerchet M, Ali GC, Wu YT, Prina M. World Alzheimer report 2015—the global impact of dementia: an analysis of prevalence, incidence, cost and trends. London: Alzheimer's Disease International, 2015.
2. G. Livingston, A Sommerlad, V Orgeta, et al. Dementia prevention, intervention, and care. *Lancet* 2017; 390: 2673–734.

3. Dr T R Raju



Can Yoga ameliorate Alzheimer's disease through stress reduction?

Dr. T.R. Raju

A.S. Paintal Distinguished Scientist Chair of ICMR
National Institute of mental Health and Neurosciences,
Bangalore-560029

Yoga is an ancient practice with more than 5 thousand years old; through yoga we can control the mind and it is also a science of wellness and the science for achieving harmony between body soul and mind. Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA) University utilizes Yoga, Ayurveda and Naturopathy to treat patients suffering from different non communicable disorders. Before we start exploring the possibility of yoga as a therapy for Alzheimer's, We need to look at the relationship between stress and Alzheimer's disease. There are several published reports, which suggest a strong association between stress and the risk of dementia, A β aggregation, formation of amyloid plaques and hyper-phosphorylation of tau protein. Chronic stress also produces an insult to prefrontal cortex and hippocampus but causes the activation of amygdala. Such a situation results in the enhanced activity of HPA axis leading to secretion of more glucocorticoids. In an acute stress, glucocorticoids produce beneficial action through binding to mineralocorticoids receptors. However in the chronic stress there is an excessive release of glucocorticoids, which activate low affinity glucocorticoids receptors, causing detrimental effects to hippocampus prefrontal cortex and ultimately leading to neuronal death. Activation of microglia from M2 to M1 time and formation of reactive astrogliosis also occur. There is also an imbalance in the autonomic nervous system activity leading to more of sympathetic response compared to parasympathetic activity.

Practice of yoga ameliorate stress through a reduction in diurnal corticosteroid levels at all-time points, increase parasympathetic activity, suppression of amygdala, reduction in blood pressure and an increase in BDNF and other factors which can relieve stress. It has also been shown that practice of yoga by elderly in residential care home can increase visual, verbal and working memories as well as an

improvement in the executive function. Accordingly, yoga provides us an excellent opportunity to combat stress there by reducing chances for susceptibility to Alzheimer's diseases.

4. Professor Dr K Dilip Murthy



Prenatal Stress and the Enigmatic Pyramid

**Professor Dr K Dilip Murthy and
Mitchel G Constance**
Faculty of Medicine & Health Sciences
Universiti Malaysia Sabah (UMS)
Kota Kinabalu, 88400, Malaysia

Stress is inevitable and the body's hypothalamo-pituitary-adrenal axis gets activated to cope with the stress. However, excess stress has deleterious effects on the physical and mental well-being of any animal species, including the humans. Stressful experiences during pregnancy, not only affects the mother but also the growing foetus. Pyramid models constructed with the same base to height ratio as the Great Pyramid of Giza, when aligned on a true north-south axis, is believed to generate, transform and transmit energy which has many beneficial effects.

The present research was carried out to evaluate the effects of housing pregnant Sprague Dawley rats subjected to restraint-stress outside (RC) and under the pyramid (RP). Comparison was made with unstressed normal controls (NC). The effects on the offspring's morphometric physical development, plasma corticosterone levels and hippocampal CA3 pyramidal neuron arborisation were evaluated on postnatal days 10, 21, 40 and 60 in the rats.

The results showed significant hypertrophy of adrenal gland and increase in plasma corticosterone in the stressed mothers as expected. Interestingly, we found that the geometric shape of the pyramid and the energy generated within had therapeutic potential that could be used to reduce stress effects. The significant results observed will be the focus of the presentation. This study prompts us to explore the rehabilitation effects on brain and behaviour of previously stressed animals under the pyramid in the future.

5. Dr. Kishore K Deepak



The Pros and Cons of pursuing Clinical Physiology

Dr. Kishore K Deepak, MD, PhD, FAMS, DSc
Dept. of Physiology, AIIMS, New Delhi
[kkdeepak@gmail.com]

The scope of Clinical Physiology has grown over several decades. The clinical physiology can be broadly defined as the application of the knowledge of human physiology to patients in a health care setting. As a specialty for medical doctors, Clinical Physiology is a diagnostic/interventional specialty to which patients are referred to undergo specialized tests/interventions carried out by physiologists. These may include the investigations related to pulmonary functions, autonomic function, vascular functions, gastro-intestinal related functions, polysomnography, clinical neurophysiology including intra-operative monitoring etc. Similarly the patients may be referred for interventions like yoga and biofeedback. The list is by no means complete and it may be much wider. We have been pursuing clinical Physiology for over three decades at the department of Physiology. Our experience suggests that pursuing Clinical Physiology is both rewarding and relevant.

Much before International Union of Physiological Sciences (IUPS) gave a call for recognising Clinical Physiology as an accepted branch of Physiology (Linderholm, 1990), we started working on it in late 80s by establishing a formal lab facility for autonomic function testing. Considering the value of Clinical Physiology other medical institutions and colleges have also followed us. The clinical physiology has large scope and it will continue to evolve since newer non-invasive technologies keep on emerging. Let us develop specific models and guidelines of clinical physiology for patient care, research and medical education for our country.

In a study the author have shown that the emergence of clinical physiology is associated with serious decline in quality of basic research in physiology per se, especially experimental physiology involving animal/tissue and cell handling skills. This serves as a setback to the hardcore integrative physiology which was pursued during the times of Anand and Paintal. Additionally the clinical physiology demands extra working hours, serious responsibility, ethical

issues, and ability to take crucial decisions. Several clinical decisions have repercussions as they need to be defended at several platforms. Thus, there is need to train new generation of physiologists not only in these skill sets but also in handling basic question in physiology involving live tissue and animals.

1. Linderholm H. Clinical physiology: an accepted branch of physiology. Clin Physiol. 1990 May;10(3):215-9.
2. Deepak KK. Scope for research in clinical physiology. Indian J PhysiolPharmacol1995;39(5):15-16. (www.ijpp.com).

6. Dr C R Mukundan



Emotion: Cognitively Molded Drive

Emotional reactions and cognitive processes have been scientifically considered the two important functional domains of the brain. Emotional experiences and expressions formed the two major emotional domains. Another important force within the living system has been called the 'drive', or 'arousal' which provides the propelling fuel for life. Cognitive processes comprised of several processing functions of signals received from outside and the processing of the retrieved signals in the brain. The major cognitive processing stages are attending to the signals arriving from outside or retrieved from within, registration of the signals, encoding and transcoding of signals for semantic and symbolic interpretations, and using retrieved and recreated sensory-motor imageries and their semantic interpretations. Cognitive judgments are made use of for assigning positive and/or negative values for the drive, which transform them into positively and negatively valued emotions. When the drive reaches a Critical Value of Potentiation (CVP), it automatically initiates the specific action. Several of the criminal as well as asocial actions are automatically initiated, when individuals entertain such molded drive to become stronger without any self-control and the drive initiates the specific action. An important aspect of socialization of a growing child is to learn to control the drive so that the drive does not reach CVP and initiates anti-social actions, for which the person may be subjected to severe punishments including fatal ones. Social conditioning is the most important training program of life for each

growing child to learn to control the drive, so that he or she learns to release the drive only for carrying out positive actions, which help the person and the connected institutions or family grow positively. Absence of training through social conditioning in the early years and the resultant absence of self-control on drive may allow the individual behave in antisocial manner. Early disciplined growth by practicing both drive enhancement and its control could help each child, on the one hand, to learn to release drive for positive goal directed actions and consequent achievements, and on the other hand, never to raise drive, which will throw him into asocial actions either within the family or in the social groups, with whom one lives and works.

7. Dr K P Puthuraya



How to be a successful Physiologist

Dr.K.P. Puthuraya

Former Director of Rajiv Gandhi University of Health Sciences

Life is a process of aging and growing. Aging is adding years to life, while growing is adding life to years. Apart from adding years, we must also add life to our years. We all get wedded twice in our life-once to our profession and again to our life partner. Most often, both are out if our choice, but sometimes we had no other choice. Whatever it is, once wedded, we must live a productive and successful life. Success is achieving what you aim and realizing what you dream. Steps to succeed are dreaming, planning and execution. All of us have four types of life-professional, personal, family and a social life. Very few are successful in all these four types of life.

Professionally, a successful physiologist is the one, who is basically a good teacher, a good examiner, as well as a good research worker.

A good teacher is the one, who has mastery over the subject, has a love for teaching, knows the art of teaching, has dignity and has the motivational capacity. In short, he must love his profession, subject and students.

As an examiner, he must ensure that the deserving students should not fail and the undeserving should not pass. He should also engage himself in research activities as physiology is a gold mine for research.

Personally he must be a good human being, who is simple, sincere, humble and honest and has lot of internal beauty. Family wise, he must enjoy a good family life. Socially, he must an acceptable and respectable person by all in the society. Finally, he should not forget that, it is difficult to reach a good height, but still more difficult to remain in that height. For this you need maturity of mind, which is judged by your patience when you have nothing and your attitude when you have everything.

1. Symposia-Stem cells-Hypes and Hopes

Dr Munjal M. Acharya



Department of Radiation Oncology
University of California Irvine
California 92697, USA

Regenerative medicine approaches to restore the brain function after chemo-therapy and irradiation

Cranial irradiation (IRR) and chemotherapy for the clinical management of brain cancer is associated with the severe cognitive decline, which is particularly concerning for pediatric cancer survivors. Cancer therapy triggers a range of neurodegenerative effects including inflammation, reduced neurogenesis, oxidative stress and compromised neuronal structure. We have demonstrated the neurocognitive benefits of a range of biologic and pharmacologic approaches to prevent or reverse cancer therapy-related cognitive dysfunction (CRCDD). In these studies, irradiated or chemotherapy treated animals receiving human neural stem cells showed long-term benefits in cognitive function and an improvement of neuropathology. Transplanted stem cells in the injured brain preserved host neuronal architecture and attenuated inflammation. Moreover, transplantation of stem cell-derived exosomes provided similar benefits in resolving brain injury and cognition, implicating for

a trophic role in cell-based regenerative therapy. The miRNA profiling of stem cell-derived exosomes short listed a number of candidate miRNAs targeting learning and memory, neurogenesis and synaptic signaling pathways. We have optimized the route of exosome delivery for the smooth translation of this approach. We have also shown that elimination of microglia in the irradiated or chemotherapy exposed brain reversed CRCD, pointing to another potentially beneficial therapeutic target. This talk will highlight the various mechanisms contributing to CRCD, with an emphasis on new strategies and novel therapeutic targets for ameliorating the unintended side effects that define CIRCD. This work is supported by the U.S. National Institutes for Health, California Institute for Regenerative Medicine and American Cancer Society.

Dr. Colin Jamora



IFOM-inStem Joint Research Laboratory
Institute for Stem Cell Science and Regenerative Medicine
Bangalore, India

Regulation of epithelial stem cells in wounded skin

As the primary barrier of the body to the outside world, the skin has evolved a remarkable capacity to heal itself following nearly constant exposure to pathogens, environmental toxins, and physical damage. This wound-healing response is the product of a complex physiological program involving numerous cell types that communicate with each other to restore the functional state of the tissue. Our work has spanned the spectrum of the wound healing response from the inflammatory phase to the proliferative phase to the tissue-remodeling phase. In this talk, I will focus on our efforts to decipher the signaling networks that govern the activation of skin stem cells during the wound-healing program. This is an important avenue to pursue as disturbances in the regulation of this program contribute to pathologies found in many prevalent diseases. For instance, a compromised wound healing “on switch” is a deficit found in diabetic patients that can lead to tissue death and amputation of affected regions. At the other extreme, defects in the wound healing “off switch” leads to a host of inflammatory diseases such as psoriasis and eczema, and the uncanny parallels with

tumorigenesis have led to the resurgence of the idea that cancer is a non-healing wound. Thus we actively extend our fundamental studies on deciphering the cellular crosstalk and molecular mechanisms governing wound healing to the identification of novel therapeutic targets for a wide array of diseases with a so-called wound signature

Dr. Anandh D



Associate Professor,
School of Regenerative Medicine
MAHE, Bengaluru

Neuroprotection by Human Dental Pulp Mesenchymal Stem Cells: From Billions to Nano

Mesenchymal stem cell (MSC) therapy in recent years have gained significant attention. Though the functional outcomes following MSC therapy for neurodegenerative diseases are convincing, various mechanisms for the functional recovery are being debated. Nevertheless, recent studies convincingly demonstrated that recovery following MSC therapy could be reiterated with MSC secretome per se thereby shifting the dogma from cell therapy to cell “based” therapy. In addition to various functional proteins, stem cell secretome also includes extracellular membrane vesicles like exosomes. Exosomes which are of “Nano” size have attracted significant interest as it can pass through the blood brain barrier far easily than macro size cells or growth factors. Exosomes act as a cargo between cells to bring about significant alterations in target cells. As the importance of exosomes are getting unwind, it is imperial to carry out a comprehensive study to evaluate the neuroprotective potential of exosomes as compared to conventional co-culture or total condition medium treatments. Thus, the present study is designed to compare the neuroprotective potential of MSC derived exosomes with MSC-condition medium or neuron–MSC-co-culture system against kainic acid induced excitotoxicity in an in vitro condition. The study also aims at comparing the neuroprotective efficacy of exosomes/condition medium/co-culture of two MSC viz., neural crest derived human Dental Pulp Stem Cells (hDPSC) and human Bone-

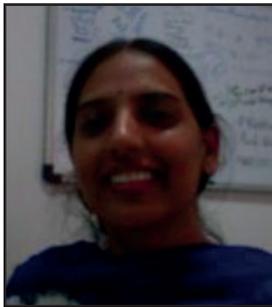
Marrow Mesenchymal Stem Cells (hBM-MSC) to identify the appropriate MSC source for treating neurodegenerative diseases. Our results demonstrated that neuroprotective efficacy of MSC-exosomes is as efficient as MSC-condition medium or neuron-MSC co-culture system and treating degenerating hippocampal neurons with all three MSC based approaches could up-regulate host's endogenous growth factor expressions and prevent apoptosis by activating cell survival PI3K-B-cell lymphoma-2 (Bcl-2) pathway. Thus, the current study highlights the possibilities of treating neurodegenerative diseases with "Nano" size exosomes as opposed to transplanting billions of stem cells which inherit several disadvantages.

Dr. Anujith Kumar, Ph.D.



Associate Professor,
School of Regenerative Medicine, MAHE
Email: anujith.kumar@manipal.edu

Dr. Jyothi Prasanna S, Ph.D.



Additional Professor,
School of Regenerative Medicine, MAHE
Email: jyothi.prasanna@manipal.edu

Human Mesenchymal Stem cell derived, iMHeps: Immune compatible surrogates to hepatic transplantation and valuable tools for predictive drug toxicity studies

Owing to scarcity of liver donors there is a dire need for human hepatocytes for drug toxicity screening and as alternatives to orthotopic liver transplantation. Due to ease of expansion of Adipose derived Mesenchymal stem cells (ADMSCs), an attempt was initiated to derive hepatocyte-like cells depicting functional characteristics of mature human hepatocytes by a trans-differentiation approach using a combination of developmentally relevant transcription factors and hepatogenic growth factor cues. iMHeps so derived exhibited functional characteristics of adult liver metabolism as evidenced by robust drug inducible CYP activity and exhibited conserved immune modulatory properties intrinsic of native ADMSCs. Preliminary investigations suggest that iMHeps support hepatotropic virus entry. iMHeps could thus emerge as alternatives to primary hepatocytes for adult hepatocyte drug metabolism studies, analysis of hepatocyte-pathogen interactions and as immune compatible transplantable surrogates to human hepatocytes during end stage liver disease.

Paradoxical Role of ZIC3 in Adult Neurogenesis Unraveled by Stem Cell Model System

Adult neurogenesis, a process of generating functional neurons from adult neural precursors, is governed by numerous cellular factors including transcription factors. Zinc finger protein of cerebellum 3 (ZIC3) is one such transcription factors implicated in maintenance of pluripotency of Embryonic Stem Cells (ESC) and in neurogenesis. Previous studies revealed ZIC3 to be important in maintaining the neural precursor stage by inhibiting neural differentiation. Persistent expression of Zic3 in major parts of the adult Mouse brain intrigued us to question its restricted role in maintaining neural progenitors. In the present study using mouse and human stem cell model systems, we are attempting to unravel the essential role of ZIC3 in adult neurogenesis. Human dental pulp stem cells (DPSCs) upon differentiation, generated cells co-expressing Tyrosine Hydroxylase (TH) and Glutamic acid Decarboxylase (GAD) 65 along with other genes, typical of an Olfactory bulb (OB) identity. Expression of TH showed a positive correlation with that of ZIC3 i.e., Loss of function of ZIC3 abrogated TH expression with a concomitant increase in GAD65 whereas, ZIC3 overexpression led to up regulation of TH accompanied by decrease in GAD65 expression. Chromatin immunoprecipitation assay further established a direct binding of ZIC3 to a response element within TH promoter region and thus driving its expression. Similar effects on TH and GAD65 expression were observed upon administration of SHH, a morphogen implicated in dopaminergic neuron development. Upon inhibition of ZIC3, SHH mediated up regulation of TH expression was abrogated. Also, a direct regulation of ZIC3 by SHH was demonstrated using luciferase reporter assay. The observations were authenticated using Mouse OB primary neurons and Embryonic Stem Cell (ESC) derived OB like cells. In all, our study assigns a novel role for ZIC3 in dopaminergic interneuron specification in OB.

2. Symposia-Patient Safety

Dr. S. Manikandan



Associate Professor of Pharmacology,
JIPMER, Pondicherry.

Awareness and Training on Patient Safety: Catching Them Young

Patient safety in simple terms is the prevention of harm to the patients. It involves reducing the errors and the adverse effects occurring out of them. Medical errors in health care delivery is one of the preventable causes for morbidity and mortality. As these are preventable, we must take every effort to prevent it from happening so that patient safety can be increased.

The JIPMER Safety Council (JQC) was formed in 2012 as a multidisciplinary team. Twelve groups were formed and each of these groups had around 8 to 10 members. The various groups are as follows

1. Nosocomial Infection
2. Medication safety
3. Fire safety and disaster management
4. Work place / work force safety
5. Never events
6. EMSD safety
7. Accreditation
8. Operation room safety
9. Blood and injection safety
10. SOP & Checklist group
11. Radiation safety
12. Sentinel events and root cause analysis

Training and Awareness among faculty and other health care professionals

Each group in JQC had a group leader and members. The first aim of the group was to create an awareness among all other faculty and other healthcare professionals in the hospital. Every group conducted awareness program for all faculty involving internal and external resource persons. Many tolls were

prepared by each group and all the faculty were sensitized regarding the use of these tools to improve patient safety. For example, the operation safety and checklist group worked together and prepared checklist for various steps before the surgery.

Training the residents

The junior and senior residents are an important work force in the health care delivery of our hospital. When the residents entered their first year, they have to undergo compulsory training on patient safety. This was conducted during their orientation program in the first year. After this, periodic mock drills and training ere also conducted. They were also sensitized about the various custom made tools prepared by JQC.

Training interns and MBBS students

The interns are the youngest member of the healthcare delivery team and it is essential that they are trained. They were sensitized during their interns' orientation program and asked to follow measures to improve patient safety. We also brought in a culture change by including patient safety in the curriculum. For a second year MBBS students, medication safety was included as a practical exercise and they were taught about various measures to reduce medication safety. Patient Safety day is also celebrated every year and lot of interesting competitions regarding patient safety were conducted.

Dr Umesh Prabhu



Dr Umesh Prabhu MBBS, DCH (India), DCH (London)
MRCPCH FRCPCH (London)

Consultant Paediatrician (1992-2010)

Clinical Director of Paediatrics (1992-1998)

Medical Director of Bury NHS Trust (1998-2003)

NPSA Board Member (2001-2003)

NCAS National Adviser (2003-2015)

CHAI Adviser for Paediatric Complaints

National Vice-Chairman of BIDA and BAPIO at
different times

Adviser to BMA, GM, NCAS and DOH on inclusion
and Diversity

Safe Healthcare

Health is the wealth of the nation. Every nation needs healthy population to work and create wealth for the nation. Leaders duty is to care for the most vulnerable people of our society. When the nation creates wealth, it can spend on the most vulnerable people of the society like elderly, unemployed, poor, sick, children and people with mental health and so on.

Healthcare must be safe, good quality and affordable by everyone. If healthcare is no affordable or safe or good quality many patients suffer and it is mostly the most vulnerable patients of the society suffer the most.

In USA each year 200,000 patient die due to 'preventable medical errors. In UK each year approximately 20,000 patients die and 55,000 patients suffer more than 6 months or permanently disabled due to 'medical errors' and nearly 80 to 90% of these medical errors are preventable by excellent systems, process, good governance and good team working and supporting staff to provide safest and the best care to each and every patient.

In my presentation I will be presenting how we transformed our hospital and reduced harm to patients by 90% just in 8 years by transforming a culture of bullying, racism, discrimination to kind, caring, compassionate, learning and supportive culture. I will be focusing mainly on 'medicine management' and the role played by Pharmacists in reduced harm to patients. We focused on good ward based Pharmacists, excellent audit, good training of all staff on medicine management, training for all junior doctors on effective medicine management, electronic prescribing and medicine review of all patients who are on polypharmacy and rationalisation of medications on a regular basis.

In the whole of UK, the NHS can save nearly £3 Billion a year by rationalising medicine management and getting medicine management right. NHS can probably save nearly £10 Billion a year by focusing on patient safety and quality and by empowering non-medical staff and making them independent practitioners.

I will be presenting what India can learn from Western nations and how to improve patient safety in India. Pharmacists and other Allied professionals can play a huge role in India in reducing healthcare cost, access and educating the public and patients and reduce the healthcare costs and make it affordable for everyone.

Dr. M. Jayanthi



Additional Professor of Pharmacology,
JIPMER, Pondicherry.

Medication safety in cancer chemotherapy – The JIPMER experience

Medication error as defined by the National Coordinating Council for Medication Error Reporting and Preventing, is "any preventable event that may cause or lead to inappropriate medication use or patient harm, while the medication is in the control of the health care professional, patient, or consumer". In other words, it is a failure in the treatment process that leads to or has a potential to lead to harm in the patient. The errors could be minor and harmless, at the same time major errors could result in life-threatening problems. Among the early reports from the Institute of Medicine, USA it was estimated that about 44,000 to 98,000 deaths per year in US was attributed to medical errors, making it the eight leading cause of death. Another report estimated that about 1-2 % of patients in UK and US hospitals are harmed by medication errors, most of which are due to errors in prescribing. Though not many studies have been reported on medication errors in India, drug administration errors have accounted for a good number of medical errors.

Errors could crop in during any of the stages of medication process – prescribing, dispensing, preparing the medicine for administration, administering the dose using the appropriate route and method and monitoring effect of the medicine on the patient. Prescription errors can occur due to omissions, wrong choice of drugs or the dose, brand name prescribing, inaccuracy in writing and poor legibility of handwriting. However, the detection of the medication errors is a difficult task because the health professionals do not voluntarily report them for the fear of any disciplinary action that could be taken by the higher authorities or just the ignorance about the importance of reporting or simply 'why should I bother' attitude. Moreover, there is no legal obligation to report medication errors in India as of now. Encouraging a blame free error reporting culture and non-punitive atmosphere in the hospital could help in detecting the medication errors and formulating effective steps for minimizing these

errors. This involves co-operation from various disciplines of health care because the medication process involves the whole medical team including physicians, pharmacists and the nurses.

Cytotoxic drugs are very useful in the treatment of many malignancies. However, these drugs are well known for their wide range of toxicities due to narrow therapeutic index. Medication errors involving anticancer treatment could result in potentially harmful effects and/or diminished anticancer response in the cancer patients and further worsen the quality of life. In addition to in-patient therapy, many of the anti-neoplastic drugs are administered on out-patient basis in day care centres. Therefore extra care needs to be taken while prescribing, calculating and administering the correct dose and drug to the correct patient. In addition, caution needs to be taken in storing, diluting, administration of chemotherapeutic drugs and disposing the waste resulting from anticancer drug use. A systematic planning to identify and prevent medication errors can help to rationalize anticancer drug use and safeguard the health of patients as well as that of all the personnel working in the cancer unit.

3. Symposia- Integrative medicine practice and research

Dr. J Joseph Thas



Dr. J Joseph Thas BSc, MBBS, MSc, PhD, DSc
Consultant

Muthu Damaian Hospital, Tirunelveli,

Professor and Head (Retired),
Department of Pharmacology,

Post-Graduate Studies and Research Centre,
Govt. Siddha Medical College, Tirunelveli,
Tamil Nadu, India

Phone: +91 462 2580982/2573725

Mobile: +91 94434 56518;
Email: josephthas@gmail.com

Integrating Traditional Siddha Medicine For Skin Diseases

Siddha medicine and Ayurveda are the two most ancient medical systems of India. The word Siddha means established truth. Siddha was the mother for all Asian traditional medicines. The founders and promoters of such a Siddha school of thought were known as Siddhars. These mystic people recorded their findings in medicine, yoga, and astrology in Tamil and Sanskrit. Fundamental Principles of Siddha include theories of Five Elements (Aimpootham), and Three Forces/Faults (Mukkuttram). The Eight Methods of Examination (Envakai Thervukal) is used to determine diagnosis, etiology, treatment and prognosis.

The author who is qualified in modern medicine and Siddha tries to present a comprehensive account of the relevance of Siddha Medicine in the contemporary practice of dermatology in areas where it is really competitive to modern dermatology with exclusive evidences from his clinical practice.

Skin diseases are known as Thol Noikal in Siddha. We do not have any ancient text book of Siddha devoted entirely to dermatology. Siddha describes skin conditions under the following broad headings namely Karappan, Punkal, Amman, Kuttam, Vida kadi etc. It is difficult to equate these Siddha technical terms to the terms of modern dermatology.

Siddha has safe herbal and herbomineral treatment for psoriasis, eczema, alopecia, diabetic ulcer, warts, vitiligo, pemphigus, pompholyx, leprosy, and many more very common and rare diseases. Lifestyle modifications including diet are important.

Karappan:

Karappan is the major classification under which many of the skin conditions are explained in Siddha. The definition for Karappan is so broad that it is possible to describe any skin condition under this term. Simple conditions like eczema to complicated cancer penis are discussed under the heading of Karappan. Psoriasis, eczema, fungal, bacterial infections, and a variety of other skin conditions can be considered under Karappan.

Eczema - In various types of dermatitis, laxatives are given initially for 3 days. Herb mineral drugs like Rasaganthi mezhuku, decoctions and powders containing Smilax china are extensively used.

Impetigo contagiosa and erysipelas - These conditions respond well to Pachai ennai, an oil made from Datura stramonium leaves and Vetchipoo thailam, an oil prepared from flowers of Ixora coccinea .

Lichenoid papules (Karanai) - In Prurigo nodularis Rasaganthi mezhuku

orally and Chirattai thailam externally control the condition satisfactorily

Psoriasis - Siddha has revolutionized Psoriasis treatment with simple herbal oils and decoctions. Kanda karappan and Kutta karappan denote generalized plaque type of psoriasis all over the body. Manda karappan means psoriatic scalp. Vata karappan/ Thimir Vata Karappan denote psoriatic arthritis. The condition explained under kalanchaka vatam also fit into psoriatic arthritis. Some call psoriasis as kalanchaka padai. Vetpalai (Wrightia tinctoria) thailam, an oil is the main stay of Siddha treatment. Chirattai thailam, an oil derived by destructive distillation of dry coconut shells, is used as a keratolytic. Several other herbal and herbomineral drugs are also used.

Erythroderma (Chattai karappan) - An emergency condition like psoriatic erythroderma can be treated with drugs used for psoriasis.

Diabetic ulcer - Siddha considers diabetes mellitus as meka noi because

urine is faulty. Diabetic foot ulcers often lead to amputations. Siddha treatment given by the author has prevented several amputations. Medicated gauzes (Kara cheelai) are mentioned in Siddha to dress ulcers. Apart from the work conducted by the author, there is no other report regarding their use in contemporary practice. Medicated gauzes are named by their color such as green, yellow, red, etc. Herbal oils and other forms of preparations are also mentioned in Siddha texts. Further extensive research is needed.

Vesiculo bullous diseases (Koppula Noi):

Pemphigus vulgaris - Pemphigus vulgaris, the killer skin disease can be handled without systemic corticosteroids and immunosuppresses.

Pompholyx (Kai Kaal Koppula Noi/Koppula Karappan) - This is another blistering disease characterized by bilateral symmetrical vesicular eruptions of the palms and sole. Siddha herb mineral drugs internally and Pachai ennai for external

application are used by the author. This frequently relapsing bothersome disease responds to Siddha treatment.

Leprosy (Kuttam) - The influence of modern medicine is so profound that no

leprosy patient usually comes for Siddha treatment. The author has so far treated a few leprosy patients who did not get satisfactory results with multidrug therapy. It is possible to treat multidrug resistant cases as well as Erythema Nodosum Leprosum or Type II reaction due to multidrug treatment

Cosmetic Medicine:

Acne (Mukaparu) and Prickly heat (Verkuru) - are treated with herbal pastes. In cases of acne, the author prescribes laxatives to relieve chronic constipation often found in patients before starting the treatment

Warts - Ammai denotes pox diseases caused by viral infections. Siddha calls warts as unni. Isolated lesions can be removed with local application of herbomineral preparations that function like a chemical cautery. Wide spread warts also respond to Siddha treatment

Premature graying of hair (Ilam Narai) - Premature graying of hair (Ilam Narai) treated successfully in patients in the age group not exceeding the teens. It takes three months to restore the hair to its black colour. The author has not failed in any one case so far.

Alopecia - Different forms of alopecia respond well to Siddha herbal oils. A rare cosmetic surgery for alopecia outlined in ancient Siddha text but hitherto not practiced was established to be successful by the author. According to the ancient text the denuded area is pricked with Sankan mul (thorn of Azima tetracantha). This is followed by application of a paste of Arsenic penta sulfide ground with fresh juice of Eclipta prostrata. The author used to infiltrate the area with local anesthetic and prick with a hypodermic needle and apply drugs. The author was astonished to find after some years that in cosmetic medicine now they are using derma comb, derma roller with fine needles for the same purpose of promoting hair growth in alopecia.

Vitiligo (Ven Kuttam) - In brown- or dark-skinned individuals, depigmentation

resulting in vitiligo is a social stigma in India. These unfortunate ones are looked upon and discriminated as lepers by some. Treating widespread vitiligo with drugs alone is still a problem. Only after exhausting all the avenues in Allopathy people come to Siddha practitioners. The author modified the so-far established line of Siddha treatment. It was a great success. Now, treating vitiligo has become very simple. Anyhow further research is needed.

Dr Partheeban



Dr. Partheeban Kanagasabai

Director-swabhimaan holistic solutions for autism
Plot no 218 and 68, Palkalai nagar, Palavakkam
Chennai, India.

Understanding and Unravelling the autism menace- Scope in Integrated AYUSH system

We stand in the midst of a portentous epidemic, which has claimed the minds of hundreds of thousands of young children. The incidence of Autism is in alarming rise. The recent CDC (centre for disease control and prevention) study from United States says 1 in 55 children come under Autism spectrum, which now surpasses both childhood cancer and Down's syndrome. New study in South Korea says 1 in 38 children is in the spectrum. Non availability of India specific prevalence study doesn't mean that the disorder is rare. Lack of necessary awareness about the condition in general population and medical community, prevents most of those children from being diagnosed and receive the services they need. To date, there has been little relief for children and adults who continue to suffer from this diverse range of disorder.

The biological profile of Autism is complex, which extends beyond brain dysfunction. Autism is both multi-factorial, involving many causes, and multi-systemic, involving many parts of the body, not just the brain. Hence, we should guard against the tendency to embrace a tunnel vision perspective on this complex disorder.

It's being observed in several studies among people in Autism spectrum that, it's the co-morbid conditions which are making the picture looks severe and if they can be given proper attention, the condition is much more easily manageable for the individuals in the spectrum and the care givers.

Awareness about various facets of Autism including heavy metal toxicity, dietary allergies and sensitivity, immune system dysfunction, auto-immune issues,

sluggish liver function, nutritional deficiencies, sensory integration issues, difficulty in language processing and speech, problems related to attention, concentration and memory are essential for the effective intervention of this ominous condition.

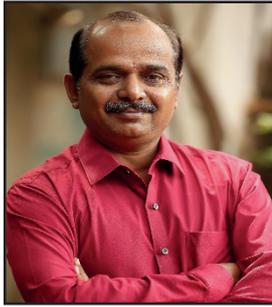
Sudden changes in behaviour, aggression, loss of acquired skills, covering ears with hands, irritability, teeth grinding, walking on toes, oppositional behaviour, self-injurious behaviour, repetitive rocking, chewing on clothes or other objects are some of the behaviours which may indicate an underlying co-morbidity.

Auto-immune conditions, anxiety, sleep disorders, neuro-inflammation and immune disorders, sensory integration dysfunction, seizures, Gastritis, Oesophagitis, GERD, Asthma, Eczema, allergies, ear infections, respiratory infections, migraine headaches and allergy disorder including non IgE – mediated disorders and food intolerances are some of the few co-morbid conditions seen in Autism spectrum disorder.

These co-morbid conditions can be best managed with Siddha system of medicine. Immuno-modulators in Siddha system of medicine, boosts the Child's immunity. Therefore frequent infections, which cause setbacks in the child's progress, can be contained by medicines. For instance, Korosanai mathirai, a paediatric medicine in Siddha system has great effect in dealing with leaky gut syndrome, a key feature in Autism. Symptomatically it helps immensely in treating constipation, which is very common in kids with ASD. It's needless to say that the whole vicious cycle of cognitive decline which is seen in autism, which starts in the teen ages, can be helped in high order when gut- brain relationship in Autism is understood well. Siddha medicines play a huge role in establishing and strengthening gut-brain relationship. For aggression, a common symptom which is seen in adolescents with Autism, valuluvai ooral kudineer (decoction of *Celastrus paniculatus*) plays a clear role in calming them down.

The purpose of this lecture is to establish the scope of Siddha system of medicine and other AYUSH systems including Yoga and Ayurvedic therapies in managing the co-morbid conditions of Autism spectrum disorder effectively and hence children in the spectrum can lead a constructive and comfortable life. We rejoice whenever a child once labelled autistic, now playfully interacting with other children. We rejoice when such children smile at their parents, expressing love by hugging their family members. It is as if these children emerged from their tunnel of silence and discovered a new life, it is as if these children have recovered something truly sacred about the humanity, love for one another.

Dr Sankar G



Dr.G. SANKAR, BSMS
Director, Ezhil Siddha Hospital,
Chengalpattu, Tamilnadu Pin-603001

Visiting Consultant,
Arogya Siddha Hospital,
Chennai Saravana Hospital, Salem

Integrative Approach to Infertility- Does the Society allow them?

In Indian culture where Parenthood is considered as a true indicator of happy married life. Infertility has nowadays become a major health concern, which is nowadays classified as Complex Lifestyle Disorder. Mother Nature is everything and it gives us all. Reproduction is nature's design to propagate it's race. According to WHO , Reproductive Rights are legal rights and freedom towards reproduction and reproductive health. Rights lies within the couple to decide freely and responsibly the number, space, timing of children.

The anxious waiting is being exploited, Unwarranted or overuse of medications, Unwanted surgeries takes toll , overrides or even manipulates the natural function of reproductive system. It takes a heavy toll on patients economy leaving them distressed.

A Siddha Physician perspective:

Siddha system, the mother of AYUSH System combines good science with the art of adaptation to each patient. (The concept of PRECISION MEDICINE is branching from the root of Siddha) The module is a blend of hope and reality. It promotes the Confident – Conscious – Conception and hormonal health naturally, and Improves / maintain Functional Fertility, but as every system it has its own Limitations.

ENVAGAI THERVU analysis:

Octomeric analytical is the diagnostic module of Siddha which includes naadi (Digital fiddling) to assess the arrangements or derangements of vital trisomatic parameters unrelated to his/ her age in a totally uninfluenced conditions. NEIKURI (oil drop on urine test) is the optimistic repercussions of the urine sample to a gingely oil drop, reveals the pathophysiology beyond its microscopic contents. Both

are observational, non- invasive, inexpensive unique techniques of siddha.

Siddha Agastya muni:

The famous SIDDHAR AGATHIA MUNI in his book 'Agathiar Sillarai Kovai' has dedicated a chapter 'Agathiar Karpha Kole' in which he described six types of uterine disorders which can contribute to infertility. They are Paasam Patri Irutthal (fungal infection), Vayu Niraithal - Karpa Vayu, Thasai Valarchi (fibroids), Kirumi Nerainthu Irutthal (Worms And Infections), Karukuzhi Uthiram Moodi Irutthal (Tubal Block), and Karukuzhi Matharthu Irutthal (Infantile Uterus).

INTEGRATION - OUR EXPERIENCES AND OBSERVATIONS:

Following are the female and male factors causing delayed conception, that could be battled with the integrative approach;

1. PCOS – has nowadays becoming epidemic.

Adolescent PCOS respond well with Siddha Gynae diet, exercises, Yogasanas, and simple herbal remedies like betel leaves with pepper, uterine alteratives. Adult PCOS with infertility is the real concern and family pressure compound the woes. Metformin and super ovulation with clomiphene is the common choice, but can't be continued more than 5-6 cycles.

When integrated with Vishnugrandi choornam (Evolvulus alsenoides), a rhythmic ovulation occurs. Research studies about Vitex decoction proves it reduces the circulating testosterone levels. For Luteal phase defect and Lutenised unruptured follicle, a classic combo of Five astringents powder, and Vitex decoction, makes follicle rupture on optimal day with good trilaminar endometrial thickening. Premature ovarian failure and subnormal AMH levels are on the rise nowadays. For Rising age with threatened miscarriages, Siddha offers 'Malatuku Karpam' (an unique formulation for rejuvenating the aging uterus).

2. Tubal Factors:

Though STDs are the common cause, In India TB Salphingitis (even golden standard tests can't pick) the empirical use of ATT by experienced gynecologists along with Liver corrective like Phyllanthus restore the tubal transport. Phyllanthus also ensures the quality of ovum. Adutheendapalai kuzhi thylam along with Vellaraggu choornam repairs the tubal architecture and previous surgical adhesion and scars.

3. Endometriosis:

Pregnancy is the solution to postpone this disease. When infertile patients are counselled for medical management with Lupron, an unhealthy fear creeps in. Even D- Lap has its limitations, hence ART is the available option. But Decoction of Vitex negundu along with classic grinded salt Kariuppu Mezhugu, one of the popular herbal preparation described by Legend Kannusamiyam in his book, or Nava Uppu Mezhugu are effective in checking the metastasis. Upto second stage, we can integrate with this medication.

4. Fibroids:

Usually other than intra murals or large sized fibroids, other fibroids don't interfere. Fibroids may interfere early with implantation. Traditional herbal formulations sathaguppai choornam, described in Siddha materia medica consists of Sathaguppai, karunjeeragam, manjal in equall portions reduces the mass sizes.

5. Male Factors - Varicocele

It has dubious effects in sperm fertility index and it's surgical correction can be avoided when integrated with 'Pre Conception Siddha Health Care', in which detoxification and cleansing according to the body constitution is done. Chandra Gandhi Choornam, the herbal preparation described in Kannusamiyam along with Neermulli kudineer improves both count and motility.

6. Male factors - Male Sexual Dysfunctions (MSD) and Masturbation:

Eradication of myths through education of essence of sexual life and reproduction will clear the doubts. Masturbation is the first selfie of mankind. The myths have marked depressive effects in getting proper erection. Mostly 90% of erection dysfunctions are psychogenic. Mere reassurance and alternatives like Venpoosani, Ashwagandha, Tetrakottai can battle the dysfunction.

7. Male factors - Oligo astheno teratospermia in IVF:

intervention with zinc based parpam, komudra silasathu parpam along with decoction of Tribulus shows marked improvement to oligospermia. It can be integrated with an IUI procedure rather than ICSI or IVF, which will be economic in Indian scenario. In asthenospermia patients, Rasa ganthi mezhugu, a siddha classic polyherbal preparation with buttermilk for three weeks ensures rapid motility.

Azoospermia with obstruction can't be dealt with, but with normal FSH and Testosterone levels can be treated with classic Siddha formulations like Poorna Chandrodayam, Saalamisiri legium, Vithathi legium, Tamarai magarantham and

Neichitti keerai powder. They will enhance the testicular sperm congregation, reproductive index which can be picked up by the Embryologist and utilized in the first ICSI or IVF treatment, thereby improving the success rates and lowering the patient economic burden also.

Another famous SIDDHAR YUGI MUNI has written a song about absence of seminal fructose indicating the congenital anomalies, where we Siddha Physician has lesser role.

FUTURE SCOPE OF INTEGRATIVE INFERTILITY CARE:

Integration of traditional systems with allopathic system and reverse pharmacology will be the future scope in health care, which need Ethical and Quality Integration combined with Reverse Pharmacological Exploration (efficacy, safety standards, therapeutic value), the key to unlock the misery of not only infertility but for all NCDs and rising cancers. To reassure and resolve the alleviation of the sufferings should be a collective social responsibility.

"WE MAKE LIVING BY WHAT WE GET:

WE MAKE A LIFE BY WHAT WE GIVE".

Dr Vishaal Bhat



Integrative Medicine Education and Research: Experience at CIMR, Manipal

Education and research in integrative medicine is important to understand and implement it effectively in the evolving field of health care. Our patients continue to use complementary and alternative medical systems in addition to modern medical therapy, thus exposing themselves to drug-herbal interactions, adverse reactions and unethical practices.

The vast varieties of alternative therapeutic processes and levels of evidence to support their practice poses a challenge in the understanding of integrative medicine education and research. This calls for innovative educational approaches for the effective understanding of the principles and practice of integrative medicine.

As much as education in the field of integrative medicine is going to be essential in future decades, there is also an increasing need to scientifically validate the use of traditional medicine in the context of modern medical practice. This is because of the numerous herbal products that come into the market as health supplements that promise miracle cures in myriad conditions. Patients generally tend not to inform their physicians about the use of these methods, resulting in therapeutic failure or drug interactions that can have significant morbidity and mortality.

Increased use of unproven therapies places the public at risk and escalates the need for rigorous research in complementary and alternative medicine therapies.

Depending on the culture of the medicine practiced, research in conventional medicine builds its strong reputation on a linear model that targets an end result. The eradication of smallpox and polio, or the removal of a cancerous tumour, are examples.

Complementary/alternative medicine (CAM) therapies focus on achieving harmony of all systems for perfect health.

Existing research is limited. Conclusions about the effectiveness of these therapies is infrequently available as a result of lack of funding and an inadequate research infrastructure. The development of a collaborative infrastructure will make adequate evaluation of complementary/alternative medicine possible. Development of a research network that includes both alternative medicine research experts and alternative medicine practitioners will facilitate the rapid production of research outcomes. As a unique research centre directly associated with a clinical practice, CIMR provides the ideal setting for initiating and overseeing integrative medicine studies.

A standard that measures perfect health is not currently available. Once developed it will need validation. For either the conventional or CAM paradigm to be accepted, each must fulfil the research requirements of the other system. These requirements can be contradictory, making the process difficult to accomplish.

We at the Centre for Integrative Medicine and Research (CIMR) believe that both the conventional and CAM approaches can be incorporated into a valuable paradigm of integrative medicine. An integrative approach combines conventional therapies with CAM therapies to utilize the strengths of both.

I will be discussing the challenges we face in taking education and research in integrative medicine at CIMR, MAHE, Manipal.

Dr Arul Amuthan



**Dr. Arul Amuthan MD (Siddha),
MSc. Medical Pharmacology**

Team Leader – Division of Siddha
Center for Integrative Medicine and Research
Senior Lecturer in Pharmacology
Melaka Manipal Medical College
Manipal Academy of Higher Education
Manipal, Karnataka, India
Email: arul.amuthan@manipal.edu
Mob: 9986353238

Scope and challenges of Integrative Medicine practice in Indian scenario

In the emerging world of lifestyle-related disorders and chronic diseases, the standalone modern (allopathic) medicine may not be sufficient to cater to the demands of the ailing society. In India, the patient is having rights to choose the medical system for his ailment. The availability of multiple medical systems for a patient is known as medical pluralism. There are many factors that favour the selection of particular medical system such as faith on tradition, side effects of drugs, high cost, word of mouth, physicians approach and marketing strategy by pharma industry. At present, one diabetes mellitus patient takes two allopathic antidiabetic tablets, one herbal decoction prepared in home which is read in the local newspaper, one herbal tablet prescribed by Ayurveda/Siddha physician and Yoga self-practice by belief. The patient often changes the herbal supplements on his own, but this information is neither revealed by patients nor documented by the physician. Even though, this patient is with integrative approach, there is no rational for their usage. Suppose if the blood glucose level is controlled well, the consulting physician thinks the drugs given by him works well; or if the glucose level is raised, then physician may change medication. Here, both the clinician and patient are misled by each other.

Ideally, no medical system is complete enough to offer cent percent healthcare and each medical system are unique with their own strengths. Hence, it is the physicians duty to prescribe or suggests or recommend to other medical system or refer to the appreciate drugs or therapy or physician. In India, the healthcare is the state concern, hence the integrative

practice or cross-pathway is not permitted in all the states. Even, there is no structured course to learn about other medical system in India. But, in 13 states of India, the state govt. enacted laws for allowing Ayurveda/Siddha/Unani doctors to practice allopathic medicine (only in specific situation) including Surgery, Gynaecology, Obstetrics and deal with medico-legal issues on the basis of Central Council for Indian Medicine (CCIM) direction under the IMCC ACT 1970, CLAUSE NO 17(3) and 2(1). These 13 states include Assam, Maharashtra, Uttar Pradesh, Punjab, Gujarat, Bihar, Uttarakhand, Karnataka, Tamil Nadu, etc. Many families or friends having doctors have qualifications in multiple medical system are able to practice integrative medicine due to their personal relationship and good understanding.

Till date, none of the AYUSH drugs have been extensively studied for their pharmacokinetic, pharmacodynamic and toxicity profiles. So, there is no available scientific evidence to draw the clinical decision for combining multiple medical systems in a particular disease. Moreover, the basic philosophy of disease, diagnosis and treatment are differing for each medical system. So, in this Indian context, the integrative medicine practice is really challenging, which is patient oriented, rather than system oriented. Since already the integration happened at the patient's level, the medical doctors and researchers are in the position to look into it.

Physicians from multiple medical system must have open dialogues to understand the strengths and limitations of each systems. The drug or herbal or dietary practices of own patients must be documented in medical records. Later these records will reveal lots of information for us. Physicians from different medical systems can practice 'goodwill referral' and must discuss with other physicians about each patient. Ultimately, the clinician should decide what drug or which medical system to be given for the patient, nor the patient to decide. Hence, medical universities are expected to conduct series of CME or symposium to update the knowledge on other medical systems. If possible, the disease specific integrative medicine courses which introduces all the concepts and treatment modalities available in all the medical systems for a particular disease.

For a successful integrative practice, there must be a deeper understanding of different medical systems which can be done only by introducing sufficient syllabus from other medical systems. Over a period of time, all the alternative medical systems should be synchronized and made a single degree course. This will reduce lots of confusion among patients as well as doctors. The Pharmacy researchers in India must take up the research to understand the pharmacology of traditional drugs, that would be helpful in taking clinical decisions on Integrative medicine. Phytochemical standardization, toxicity

profile, pharmacology of herbal drugs, drug-herbal interaction, drug-herbal synergism, clinical comparison of different treatment modalities and additional benefits after combining multiple therapies are the key areas to be focused for further research.

From the government side, there must be a legal protection for such integrative practice, which is yet to be discussed. If the patient get benefit, of course all the systems ready to share the credit, whereas if there is something wrong, who will take responsibility? So, there must be a systematic approach or process to evaluate such issues and find solution. Since AYUSH drugs are not approved in aboard countries and also AYUSH is the legally approved medial systems in India, Indian is the best place to practice or research the integrative medicine. Indian Institutions, researchers and physicians can show the real harmony of integrative medicine to the world and be the premier in this new approach. The research team comprising of doctors from different medical systems, pharmacologist, paramedical practitioners and researchers along with policy makers together need to work synergically for integrative medicine.

4. Symposia: Current Updates on Neurobiology of Sleep

Prof. Dr Bindu Kutty



Prof. Bindu M. Kutty
Prof. & Head, Dept. of Neurophysiology,
NIMHANS, Bangalore 560029
bindu.nimhans@gmail.com

Our understanding on Neurobiology of Meditation from Sleeping Brain Perspectives

Meditation practices are intense sensory, emotional and cognitive experiences leading to achieve a perfect harmony between body and mind. Proficient meditative practices help to integrate brain functions and regulate various physiological mechanisms. Studies report that long term meditative practices help to establish a deep physiological state of restful alertness associated with a parasympathetically meditated hypometabolic state along with enhanced

wakefulness. As most of the studies have been carried out during waking state, we are yet to understand the efficacy of meditation on sleep. As sleep is important for maintaining health and well being, it is of importance to undertake research studies to elucidate the effect of meditation practices on sleeping brain functions. Studies carried out in long term TM practitioners have shown that meditative practices enhance the slow wave sleep, REM sleep with reduced EMG activity. In addition, the enhanced theta –alpha activity observed during sleep was considered as an electrophysiological correlate of stabilized state of higher consciousness during sleep. Such studies provide us opportunities on the importance of meditation on sleep, brain and consciousness. We have undertaken whole night polysomnographic studies to elucidate the trait and state changes in brain activity during sleep associated with meditation proficiency. In our study, we have observed better sleep organization among senior Vipassana meditators when compared to the novice meditators. Senior Vipassana meditators with more years of daily meditation practice showed enhanced slow wave sleep, reduced lighter sleep state along with reduced awakenings during sleep which are signatures of better sleep. Whereas the novice practitioners with less meditation proficiency did not show such changes in sleep architecture. We have also observed distinct changes in REM sleep organization among senior Vipassana meditators with enhanced REM duration and REM density. As REM sleep is associated with many important functions of brain plasticity, enhanced REM organization seen in meditation practitioners could be indicative of enhanced plasticity and associated changes in consciousness. In addition, the senior meditators showed a distinct spindle delta dynamics indicative of specific thalamo-cortical mechanisms associated with sleep. Overall, whole night polysomnographic studies underscore the nuances of meditation proficiency on brain, sleep and consciousness.

Dr Kamalesh K Gulia



Kamalesh K Gulia, PhD

Scientist F, In-charge, Division of Sleep Research

Department of Applied Biology, Biomedical
Technology Wing

Sree Chitra Tirunal Institute for Medical Sciences &
Technology, Trivandrum

An Institute of National Importance under Government of
India

Thiruvananthapuram 695012, Kerala, India
Email: kkguliak@hotmail.com

Importance of sleep during pregnancy for maternal-child outcomes: Recent updates

Adverse effects of sleep deprivation in people of different age-groups have been studied to a certain extent; however, not much attention is paid to pregnancy associated sleep disturbances. To evaluate the effects of experimental sleep restriction during pregnancy on the brain development of offspring, the elegant studies were conducted in rats under controlled conditions. As rats are altricial in nature (born helpless and require care for a length of time similar to human babies), these serve a good model to understand developmental changes due to prenatal sleep loss. It is practically difficult to conduct such studies in human subjects due to several ethical constraints.

Sleep consists of two distinct components non-rapid eye movement (NREM) and REM sleep. In one study, restriction of total sleep i.e. both the components of sleep (NREM and REM sleep) was carried out for 5 hr/day during third trimester of pregnancy (gestational days 15-20) in the Wistar rat model using gentle handling technique (1). Sleep-wake profiles of the pups born to them and to the control rats were recorded on postnatal days 1 to 21. Pups of sleep restricted dams had higher percentage of active sleep (AS, precursor of adult REM sleep) and lower quiet sleep (QS, precursor of adult NREM sleep) and wakefulness. Moreover, longer durations of sleep-wake cycles, reduced delta power in EEG, higher ratio of AS to QS in these pups indicated immature brain at birth and delayed development of networks for sleep-wakefulness. The signs of delayed maturation, which are usually found in premature babies, were

observed in the pups of sleep restricted mothers in spite of having longer gestation period. This report not only highlighted the importance of sleep during pregnancy, but it also indicated that neonatal sleep monitoring can be used as a tool for early assessment of retarded brain development.

The effects of restriction of REM sleep were carried out during the third term of pregnancy on the sleep profiles of neonates in another study (2). Pups of REM sleep deprived dams had AS that was not only markedly higher in percentage during all the studied days, but also had reduced latency during later postnatal days 15 to 21. QS and wake periods were lower. These factors, along with less frequent but longer sleep-wake cycles indicated maturational delay in the sleep-wake neural networks. These novel reports showed that maternal sleep deprivation during pregnancy can delay and impair the development of sleep-wake profile in the offspring. We have already reported the emergence of distinct phenotype traits of depression and hyperactivity in offspring when the dams had compromised REM sleep and total sleep respectively during pregnancy (3-6). The changes in sleep quality and quantity during normal pregnancy indicated fragmented sleep and increased homeostatic drive evident from delta power during NREM sleep (7). Thus, examination of altered sleep-wake patterns during early development may provide crucial information about deranged neural development in the offspring.

References

1. Aswathy BS, Kumar VM, Gulia KK (2018). Immature sleep pattern in newborn rats when dams encountered sleep restriction during pregnancy. *International J Developmental Neurosci.* 69: 60-67.
2. Aswathy BS, Kumar VM, Gulia KK (2018). The effects of rapid eye movement sleep deprivation during late pregnancy on newborns's sleep. *J Sleep Res.* 27: 197-205.
3. Gulia KK, Kumar VM (2018). Ultrasonic vocalizations and behavior of rat pups born from sleep-deprived dams. In *Handbook of Behavioral Neuroscience Series, Handbook of Ultrasonic Vocalizations-A Window into the Emotional Brain.* Edited by Stefan M Brudzynski, Chapter 44, Vol 25, pages 467-478. (Available online 27 April 2018).
4. Gulia KK, Patel N, Kumar VM (2015). Increased ultrasonic vocalizations and risk-taking in rat pups of sleep-deprived dams. *Physiol Behav.* 139: 59-66.
5. Radhakrishnan A, Aswathy BS, Kumar VM, Gulia KK (2015). Sleep deprivation during late pregnancy produces hyperactivity and increased risk-taking behaviour in offspring. *Brain Res.* 1596: 88-98.
6. Gulia KK, Patel N, Radhakrishnan A, Kumar VM (2014). Reduction in ultrasonic vocalizations in pups born to rapid eye movement sleep restricted mothers in rat model. *PLoS One.* 9(1):e84948.
7. Sivadas N, Radhakrishnan A, Aswathy BS, Kumar VM, Gulia KK (2017). Dynamic changes in sleep pattern during post-partum in normal pregnancy in rat model. *Behav Brain Res.* 320: 263-274.

Dr. P.N. Ravindra



Dr. P.N. Ravindra MD, PhD
Prof and Head, Dept of Physiology
Gadag Institute of Medical Sciences, Gadag

Neurophysiology of sleep and Autonomic Functions

Sleep is the most cherished behavioural state of day to day life of all the living creatures. We spend almost on an average 6-7 hours a day, the quality of which is major determining factor for physical, mental health and sense of well being. Neurophysiological and autonomic interaction play important role in generating quality sleep.

Sleep in Humans is heterogenous state with alternating NREM and REM ultradian rhythms. Thalamocortical oscillations with its progressive hyperpolarisation due to GABAergic influence will generate EEG pattern during various stages of NREM sleep viz., N1 stage, N2 stage and N3 stage. Among these N2 with sleep spindles and/or K complex being its hallmark signatures is critical. Autonomic status during N2 directs sleep either towards N3 (deep sleep) or to REM sleep state. If N2 stage is associated with parasympathetic activity, sleep progress to deep sleep, whereas, N2 with sympathetic predominance brain is driven towards REM sleep. However, the most intriguing point is that, during REM sleep there is sympathetic predominance, eventhough, REM sleep is driven by acetylcholinergic activities. The mechanisms associated with neurophysiological and autonomic network will be detailed.

The Neurophysiological and autonomic activities involved during sleep are modulated due to long duration of meditation practice among experienced meditators. Meditation practice is demonstrated to

alleviate age associated attenuation in thalamocortical oscillations thereby retaining N3 sleep stage even in old age, which is immense positive beneficial effect on maintain of sleep homeostasis. In meditators, coactivation of both sympathetic and parasympathetic activity during REM sleep is demonstrated which could be one of the possible mechanisms for cardio protection from REM sleep associated overt sympathetic drives. The mechanism associated with these observations will be hypothesised.

Dr Arun Sasidharan



Senior Research Officer & Research Program Manager,
Axxonet Brain Research Laboratory (ABRL),
Axxonet System Technologies Pvt. Ltd., Bengaluru, India.

Importance of sleep cycles and instability patterns within them: a viewpoint from Polysomnography study in Schizophrenia

Sleep is a self-organising dynamic state with repeated transitions between NREM and REM states in short bouts called sleep-cycles. There is growing evidence that each sleep cycle could represent a different picture of one's brain in terms of thalamo-cortical interactions as well as neurotransmitter levels. Electrophysiological studies during sleep, within the time-frame of sleep cycles, could offer a unique opportunity to study such differences through complex thalamocortical oscillatory events. Due to the functional disconnection from external world, it also avoids the confounds of waking cognition (such as attention, motivation and comprehension), when studying mental disorders. Schizophrenia is a devastating mental disorder whose pan-cerebral involvement eludes neuroscientific investigations. As with other mental disorders, whole night polysomnography studies have reported various parameters suggesting impaired sleep initiation and maintenance among patients with schizophrenia, averaged over the whole sleep period. They could

have missed the sleep instabilities and compensations that may be limited to specific sleep-cycles. Moreover, such dynamics could also be reflected in sleep-associated EEG oscillation – slow-waves and sleep-spindle – adding further evidence to the 'thalamocortical dysfunction hypothesis' in schizophrenia. During this talk, findings from our recently published work will be presented, which addressed some of these questions. This study had examined sleep-stage changes and spindle-delta dynamics across sleep-cycles among 45 patients with schizophrenia and 39 age-gender-matched healthy controls, and reported disruption of NREM-REM balance during the 2nd sleep cycle among the patient group. We found that when sleep-promoting activity in NREM (such as slow-waves and spindle) increase, the subsequent REM is disrupted with awakenings. Inferring from prior literature, we speculated that transient disruptions in thalamo-cortical network and aberrant neurotransmitter interactions within sleep cycles may be responsible for such a phenomenon, and may impact waking behaviour/symptoms of persons with schizophrenia. The talk will also share some interesting new ideas of using sleep as a therapeutic window, to stabilize the NREM-REM cycling process and thereby improve the symptoms of Schizophrenia. Sleep-based therapeutic interventions can bypass the confounds of the patient compliance issues inherent to during wake state and can give access to unique stage-specific brain networks over long time periods.

Ethical Statement:

The study protocol and informed consent form signed by all participants were approved and monitored by Institutional Human Ethics Committee and Research Committee of National Institute of Mental Health and Neuro Sciences (NIMHANS), Bangalore, India.

Acknowledgement:

The Primary Research work done at Department of Neurophysiology, NIMHANS, Bengaluru, India. We thank the other authors of the primary work: Sunil Kumar, Ajay Kumar Nair, Ammu Lukose, Vrinda Marigowda, John P. John and Bindu M. Kuty. This work was funded in part by Indian Council for Medical Research (ICMR), Government of India (Senior Research Fellowship; Ref. No.: 3/1/3/37/Neuro/2013-NCD-I) and Department of Biotechnology (DBT), Government of India (Grant No. BT/PR/8363/Q6 MED/14/1252). The follow-up studies mentioned are being jointly explored at Axxonet Brain Research Laboratory, Axxonet, Bengaluru, India.

Dr. Rahul Venugopal



Dr. Rahul Venugopal
NIMHANS, Bengaluru

Beyond Polysomnography: Importance of ERP and tACS on sleep stability

Conventional polysomnographic studies are the gold standard in assessing sleep dynamics. Hypnogram gives us a descriptive narration of sleep stages the subject navigated in his/her previous night's sleep. Event related potentials (ERPs) and transcranial electrical stimulation (tACS) studies are widely attempted in wake brain to understand cognitive processing involved in multiple tasks. Simple auditory ERP paradigms can be used as a tool to explore information processing during sleep. tACS can be applied via scalp electrodes during various sleep stages to actively probe the role of specific oscillations during that stage of sleep. These active intervention/probing techniques won't hinder the ongoing sleep and provide us detailed hints regarding sleep stability, differential sensory information processing etc. Macro sleep parameters from polysomnography combined with ERP and tACS measures will provide a sleep profile which captures various aspects (passive and active) of sleep dynamics.

Certain ERP components are seen only in certain sleep stages like N2/N3. These can be the electrophysiological markers of active inhibition of information coming from external world. The N550-P900 complex seen in NREM stage reflect the ability of the network to generate delta waves so that the deep sleep can be guarded well. This can be assessed as a measure of sleep depth/integrity. REM and N1 stages are less guarded from information processing. The strength of these ERPs can be correlated with macro-sleep parameters like NREM disruptions, stage durations etc. which are indicators of sleep stability.

tACS offers a non-invasive intervention technique to establish a causal link between neural oscillations and cognitive functions. tACS effectiveness is dependent on frequency, phase of ongoing rhythm, amplitude & duration of stimulation, montage of stimulation electrodes etc. tACS as a neuro modulatory technique can be applied below sensory at specific frequencies

to entrain ongoing neural oscillations. tACS offers an opportunity to selectively entrain oscillations of interest. Delta stimulations (0.75 Hz) during NREM stages have shown an increase in delta band power post stimulation establishing the mechanism of neural entrainment. Associated power spectral changes following tACS stimulations are of peculiar interest. For example: The relation between REM disruptions and theta power suppression.

Understanding the characteristic effects of these oscillatory entrainments and morphological parameters of sleep ERPs across stages with macro-micro sleep variables will provide new avenues to target minimally invasive intervention modalities for a variety of sleep disorders.

Gulshan Kumar



Gulshan Kumar
NIMHANS, Bangalore

Sleep and Dreams: Lucid Dreams and an Approach to Study Consciousness.

Lucid dreaming is a specific state of dreaming which is characterized by the dreamer's awareness of being in a dream and has the ability to volitionally control its content. Lucid dreaming is also considered as paradoxical state at a subjective level as it contains both the element of waking and dreaming consciousness. Every human being experiences different states of consciousness like waking, dreaming and deep sleep state. Wake and sleep states are two different behavioural states orchestrated by brainstem and thalamo-cortical oscillations. During wake, awareness about oneself and surrounding is present and accordingly there is enhanced attention, perception and emotions and form the basis for adaptation to external environment whereas in sleep, there is decreased motor functions, enhanced threshold for sensations and reduced awareness about oneself and the environment.

With the discovery of Rapid Eye Movement(REM) sleep and other experiments it was shown that upon awakening from REM sleep dreams are recalled in 74-80% of cases, whereas only 30-40% of awakenings from the non-REM (NREM) sleep resulted in dream

recall. Allan Hobson in 2009 came up with a paper in which he recognizes lucid dreams are scientifically relevant and a very powerful tool to understand the neurobiology of consciousness. Consciousness is a subjective awareness of the world, the body and the self, including awareness of the awareness. Primary consciousness is a subjective awareness of the perception and emotion whereas secondary consciousness includes subjective awareness of the perception and emotion that is enriched by abstract analysis(thinking) and metacognitive components of consciousness.

To take lucid dreaming as scientific topic, it is highly supported by EEG, fMRI and tACS studies which showed that how brain activities change from one state of consciousness to another. Many early studies gave insight of a relationship between the level of lucidity and the overall amount of EEG power in the alpha band (8-12 Hz). However, subsequent studies detected EEG power increase in beta band (13-20 Hz), restricted to the parietal region and gamma band (30-80 Hz) in frontal and fronto-lateral regions during lucid dreaming. Lucid dreaming is a learnable skill and a variety of techniques are being used for lucid dreaming induction. Skeletal muscles of the sleeping body during REM dreams are actively suppressed by neural structures in the brain stem keeping dreamers from actually acting out actions in their dreams but with very one clear exception that is eye movements during REM sleep. Dreamers can move their eyeballs in REM sleep according to a prearranged pattern of eye movements like Left-Right-Left-Right and researchers exploit this property (distinct Electro-oculogram) to objectively verify the lucid dreams with subjectively reported dream content by the dreamers. Different ways can be used to induce lucid dreams, some of them mainly focus on present moment (e.g. reflecting whether one is dreaming right now), focus on the future (e.g. autosuggestion or intention to remember one is dreaming) or with external stimuli like auditory stimuli. Our quantitative EEG experiment on lucid dreaming showed that there is increase in gamma frequency in fronto-temporal region while lucid dreaming, a region involved in abstract thinking, planning task and decision making.

5. Symposia-Updates on Autonomic functions

Gp Capt Dinesh K Dubey



Gp Capt Dinesh K Dubey

Jt Dir (Med) & CI Sp (Physiology)
Central Org ECHS, Delhi Cantt, New Delhi-110010

Updates on Autonomic functions

It is an enigma that millions of physiological functions continues to function 24 x 7 without making the individual aware off. 'Homeostasis' remains a challenge for humans in ever changing surrounding conditions, dietary items, exercises, sleep(quality & quantity), sensory input and emotions. Autonomic functions are affected by internal as well as external factors.

Autonomic functions can be accessed directly or indirectly by quantifying the activity of sympathetic nervous system or parasympathetic nervous system or both. These methods involve assessment of function of nervous system, CVS, respiratory system, GIT, Urogenital system, renal activity, blood, immune system, liver functions etc.

Some of the time tested methods are HR, Valsalva maneuver, BP, PFT, KFT, Blood count etc. Response to deep breathing, Isometric hand grip test, orthostatic standing, thermoregulatory sweat test are also few of the established autonomic evaluatory tests.

Recently some newer methods like HRV, BPV, Baro receptor sensitivity, GI Peristalsis, HUTT, CPT, Micro-Neurography, measurement of N/T levels, SSR, QSART have been involved which can give more accurate functional assessment of ANS.

Assessment ANS is quite a complex and time consumable task. No single test can adequate and complete information regarding autonomic status of an individual. It is the combination of the information gathered through the battery of test which gives reasonable picture of the state of ANS. Since disturbance of the ANS play an important role in the pathogenesis and cause of many diseases therefore these recent and old established methods give better understanding of the patho-physiology and management of different diseases.

Dr. T N Satyaprabha



Dr. T N Satyaprabha M.D.,
Professor of Neurophysiology, NIMHANS, Bangalore

Efficacy of yoga on modulation of autonomic nervous system

Yoga is an ancient and traditional system of Indian medicine known to enhance the connection between body and mind. It is widely used as a therapeutic intervention for a variety of diseases. And these effects of Yoga are achieved by modulation of the autonomic nervous system (ANS), i.e., by reducing the sympathetic tone and increasing the parasympathetic tone. Regular yoga practice improves a wide range of clinical conditions associated with autonomic dysfunction, such as hypertension, diabetes, anxiety, depression, migraine, epilepsy and pain.

Several studies report association between Yoga and markers of ANS activity (Heart rate, baroreflex sensitivity, galvanic skin resistance, evoked potentials), attention, cognitive ability, emotional regulation, and mental resilience.

Heart rate variability (HRV) testing plays a greater role in understanding the intrinsic mechanisms underlying the potential effects of Yoga. Several studies indicate the beneficial immediate, short and long-term effects of yoga on HRV. A majority of studies provide evidence that yoga promotes a reduction in sympathetic tone and enhancement of cardiovagal function.

Similar results were obtained by studies on meditation influencing HRV power / sympathovagal balance (SVB).

Autonomic dysfunction is a key component in the underlying mechanism causing sudden unexplained death in epilepsy (SUDEP). In our previous studies, we have shown improvement in autonomic functions post 10 weeks (daily) practice of Yoga, thereby reducing chances of SUDEP. We have also shown the beneficial effects of Yoga in reducing headache frequency and intensity by enhancing the vagal tone and improving the cardiac autonomic balance in patients with migraine. Yoga is reported to modulate baroreflex sensitivity by increasing the parasympathetic activity after 6 weeks of regular training.

Thus mind-body interventions by Yoga showed significant improvements in heart rhythm coherence ratio of HRV and maintain autonomic balance. This beneficial influence of Yoga on SVB is quite consistent across a diverse array of studies.

Dr. Kaviraja Udupa



Kaviraja Udupa and Sathyaprabha TN
Dept. of Neurophysiology, National Institute of Mental Health and Neuro Sciences (NIMHANS), Hosur road, Bangalore INDIA 560 029.

Advances in Autonomic Functions Investigation and potential role as bio-markers in Neurological and Psychiatric disorders

Regulation of autonomic nervous system (ANS) is crucial for maintaining functions of visceral systems of the body, which is critical in maintaining the homeostasis of all the physiological functions. This homeostasis is altered in various disease conditions including neurological and psychiatric disorders which are challenging to manage with debilitating course. It has been observed that there is no clear cut involvement of autonomic nervous system in terms of conventional autonomic tests (Ewing's tests) in some of these disorders at least in the early part of disease process. Hence, more sensitive measures such as heart rate variability (HRV), blood pressure variability (BRV), baroreceptor sensitivity (BRS) and sudomotor functions in exploring altered cardiac autonomic functions could be further investigated in these disorders. Although, involvement of ANS has well established in various neurological disorders such as Parkinsonism, epilepsy, ataxias and headache, there is no clear understanding of severity of autonomic involvement in relation to the disease progress. Majority of the studies have demonstrated that decreased vagal activity associated with decreased HRV measures in patients with these neurological conditions and psychiatric disorders including Major depressive disorders, bipolar disorders, anxiety disorders, post-traumatic stress disorders and schizophrenia. In this regard, there is expanding interest in utilizing recent advances in autonomic evaluation in terms of non-conventional

autonomic function tests such as pupillary & lacrimal functions, salivary & gastric secretion, gastrointestinal motility, bladder functions, penile plethysmography, sudomotor functions and HRV measures at different stages of the disease advancement.

Although these autonomic evaluation strategies have been successfully considered as biomarkers in management of Parkinsonian disorders (because of early involvement of vagal function in pre-motor stage of the disease), we are still lacking the clear understanding of pathophysiology of autonomic involvement in other neurological disorders. Further newer models of ANS evaluation needs to be designed to capture dynamic changes in HRV and baroreflex sensitivity measures in these conditions. We shall briefly discuss these neurophysiologic perspectives of autonomic evaluation proposing various few of the newer protocols of investigation, which are emerging in research and clinical management of these medical conditions. Hopefully, these newer protocols or combination of comprehensive ANS evaluation techniques may augment the investigation strategies to understand the pathophysiology of ANS involvement thus achieving better management of patients with these disabling neurologic disorders.

One of the major concerns is non-specific involvement of cardiac autonomic functions in various systemic, neurological and psychiatric disorders. These issues could be circumvented by designing newer screening tools to investigate HRV modulation by specific mental tasks to be tested for specific psychological conditions. Further, comprehensive evaluation of various levels of ANS is critical in understanding the autonomic involvement in these disorders. However, these newer screening tools as potential biomarkers in various psychiatric disorders need to be replicated in larger multicentric trials. Thus this field of investigation is challenging and requires collaboration with various laboratories working in the field of autonomic functions to obtain optimal outputs to design better management strategies for these debilitating neurological and psychiatric disorders.

Dr. Sathya Subramani



Dr. Sathya Subramani

Department of Physiology, CMC, Vellore.

Range of Blood pressures over a respiratory cycle (Beat to beat blood pressure variability) can be measured non-invasively and cost-effectively with CMC NIBP - a device from CMC.

Abstract: Blood pressure is reported as systolic blood pressure (SBP) over diastolic blood pressure (DBP), giving just point estimates for both SBP and DBP, which vary from beat to beat over a single respiratory cycle. Our estimate of the variations in SBP, measured intra-arterially in a set of patients will be presented in the conference as an oral presentation by a student (Mukadam et al). Such variations in BP over a respiratory cycle are termed as Traube waves. The physiological phenomenon responsible for Traube waves is under debate. This lecture will focus only briefly on the physiology of the phenomenon of beat to beat BPV. The aim of the lecture will be to introduce a new device that the departments of Physiology and bioengineering at CMC Vellore have developed for measuring the complete range of SBP and DBP in an individual, which occur over a respiratory cycle. The technology of the oscillometric method (the only type of automated device that is available) will also be discussed to present a comparison of our method with the current standard.

Beat to beat variability of blood pressure is an independent risk factor for organ damage and the only methods available currently to measure it are the expensive Finapres and sphygmocor. CMC NIBP is a cost-effective non-invasive BP monitoring device that employs photo-plethysmography and a cuff. The cuff inflation/deflation protocol is unique to the instrument. The data is analyzed automatically using an algorithm developed by us. The values for ranges of SBP and DBP measured with CMC NIBP are comparable with intra-arterial recordings in the same subject.

Dr Anil Kumar Pandey



Dr Anil Kumar Pandey

Professor & HOD, Physiology, Registrar Academic
ESIC Medical College & Hospital, NIT-3,
Faridabad-121001, NCR Haryana
Phone: 0129-2985084, Mobile: +91-7042918222
Email: drpandeyak@yahoo.co.in,
registraracademicfb@gmail.com

Sympathetic regulation of blood pressure: is there a difference in male and female?

Hypertension is a major problem not only in Western culture but also in Indian society. Risk of hypertension increases with age in male. The women have lower risk of hypertension and cardiovascular disease compared with men until menopause. It is relevant to discuss sex differences in the sympathetic control of blood pressure and how these mechanisms change with age in male and female. It has recently been documented and accepted that men and women regulate blood pressure by diverse physiological mechanisms. This is important for both the understanding and the clinical management of individual patients with hypertension.

The sympathetic nervous system has an essential role in the regulation of arterial blood pressure and in the genesis of hypertension. There are several evidences that points to differences between the sexes for control of blood pressure by integrative mechanisms. This suggests that the development of hypertension in women and men follow may pursue different pathway. Main aspect of sympathetic control of BP is its substantial variability in various individuals. In healthy young men, the variability in sympathetic nerve activity (SNA) is balanced by changes in cardiac output and vascular adrenergic responses so that BP remains similar, and normal, across a several fold range of resting SNA values. In young women, variability in resting SNA is similar to that seen in men, but the 'balancing' mechanisms are strikingly different; women display better β -adrenergic vasodilatation compared with men, which minimizes the presser effects of a given level of SNA. Ageing is associated with augmented SNA and a loss of the balancing factors seen in younger people, leading to an increased risk of hypertension in elderly. Loss of estrogen with menopause in women appears to be linked mechanistically with the decrease in α adrenergic vasodilatation and the increased risk

of hypertension in older women. Other important factors contributing to hypertension via sympathetic mechanisms are arterial stiffness and obesity, both of which increase with ageing. It may be concluded with a discussion of important areas in which more work is needed to understand and manage appropriately the sex-specific mechanisms in the development and maintenance of hypertension.

The information may be utilized to start understanding how essential hypertension develops in younger and older men and women and is there a different role for the sympathetic nervous system in the onset and maintenance of hypertension in women versus men?

Key words: Sympathetic Mechanism, Blood pressure control, sex differences, β -adrenergic vasodilatation.

6. Symposia-Brain in addiction-Bench to Bedside

Dr Nagesh Brahmavar Pai



Dr Nagesh Brahmavar Pai

Foundation Professor and Academic Leader,
Psychiatry & Chair, Phase2 MD Program
Graduate Medicine, Faculty of Science,
Medicine and Health, University of Wollongong, Australia

Neurobiology of Addiction

Addiction is a chronic, relapsing disorder characterized by craving, compulsive drug use, and loss of control over limiting drug intake. Understanding of biological basis of addiction, has advanced significantly over the last 3 decades in part due to major progress in genetics and neuroscience research and to the development of new technologies. This presentation will update the neurobiological processes through which biological and socio-cultural factors contribute to resilience against or vulnerability for drug use and addiction. We will also review the recent understanding of the aberrant, impulsive, and compulsive behaviours that are characteristic of addiction in addition to findings on the desensitization of reward circuits, which dampens the ability to feel pleasure and the motivation to pursue everyday activities; the increasing strength of conditioned responses and stress reactivity, which results in increased cravings for alcohol and other

drugs and negative emotions when these cravings are not sated; and the weakening of the brain regions involved in executive functions such as decision making, inhibitory control, and self-regulation that leads to repeated relapse. These advances in our understanding of brain development and of the role of genes and environment on brain structure and function have built a foundation on which to develop more effective tools to prevent and treat substance use disorder.

Dr Sanjay Chandragiri



Sanjay S Chandragiri MD, DFAPA
Associate Professor of Psychiatry,
Geisinger Commonwealth School of Medicine.
Psychiatry Residency Program Director,
Wright Center for Graduate Medical Education
Scranton, Pennsylvania, USA

What is different in Behavioural addictions

Addictive illnesses (substance use disorders) are gaining more attention due to a rapid increase in their incidence, a better understanding of the neurochemical pathways involved and more treatment modalities available. However, behavioral addictions which share much of the same biological mechanisms and maladaptive behavior patterns, are somewhat neglected. Several behavioral addictions are recognized. Pathologic Gambling is now classified under substance use disorders. In addition there are other behavior addictions which are under consideration for future inclusion in classificatory systems or classified elsewhere (other than substance use disorders). We will review the patterns, possible etiology and available treatments for these disorders.

Prof Dr Wilfred Yeo



Dr Wilfred Yeo
Foundation Professor of Medicine & Clinical
Pharmacology and Director for Teaching Hospitals;
Graduate Medicine; Faculty of Science, Medicine and
Health; University of Wollongong, Australia

Pharmacological trends in Addictive Disorders

Research has revolutionized our understanding of drug use and addiction, driving a new appreciation of the neurobiological, genetic, epigenetic, social, and environmental factors that contribute to substance use disorders (SUDs). Ground breaking scientific discoveries about the brain and its role in addiction coupled with changes in society's views are enabling us to respond more effectively to the problem. We are moving away from the misconception that people with addictions are morally flawed and lacking in willpower that resulted in an emphasis on punishment rather than prevention and treatment. The presentation will review the international pharmacological trends in substance use. Research has also identified many evidence-based prevention and treatment strategies, but there remains a frustrating bench-to-bedside gap. There is a persistent failure of effective interventions being distributed and adopted to improve the lives of individuals, families, and communities. The range of treatment options available for most SUDs remains limited. FDA-approved pharmacotherapies exist for dependence on opioids (i.e., methadone, buprenorphine, and extended release naltrexone), alcohol, and nicotine, often used in combination with evidence-based psychosocial treatments. However, the efficacy of these treatments is far from ideal. Data will be presented on progress regarding pharmacological targets for SUDs.

Dr BS Shankaranarayana Rao



BS Shankaranarayana Rao
Department of Neurophysiology
National Institute of Mental Health and
Neuro Sciences (NIMHANS)
Hosur Road, Bengaluru - 560 029, INDIA
bssrao.nimhans@gmail.com

Brain Stimulation Reward: A Novel Strategy to Treat Stress and Depression-induced Cognitive Deficits

Brain stimulation reward (BSR) has been considered as one of the intensely rewarding behavioral experiences. Our previous studies have demonstrated that brain stimulation rewarding experience induced dendritic and spine remodelling in CA3 hippocampal and layer V motor cortical pyramidal neurons. These structural changes were accompanied by an increase in the levels of biogenic amines and facilitation of learning and memory. On the contrary, major depression is a multifactorial disorder which is comorbid with enhanced anxiety and cognitive deficits. Depression is also associated with anhedonia with altered reward functions. Interestingly, depression-induced impaired reward functioning could also precipitate cognitive deficits. Further, recent studies have demonstrated that stimulation of rewarding brain regions ameliorates depressive symptoms in both humans and rodents. However, the effects of self-stimulation of lateral hypothalamus - medial forebrain bundle (LH-MFB) on depression-induced cognitive deficits and associated structural and molecular changes is unknown. Accordingly, we have investigated the effect of chronic intracranial self-stimulation (ICSS) of LH-MFB in an animal model of depression. We demonstrated that ICSS of LH-MFB in depressed rats ameliorated anhedonia, behavioral despair and improves spatial working memory. Interestingly, amelioration of spatial learning and memory deficits were associated with normalization of depression-induced loss of AMPA receptors and aberrant changes in the levels of biogenic amines and aminoacids in the hippocampus and prefrontal cortex. Interestingly, like depression, chronic stress also induces dendritic atrophy of CA3 hippocampal and prefrontal cortical pyramidal neurons, which was associated with decreased levels of biogenic amines and impaired learning and memory. Hence, we have evaluated

the effect of ICSS on stress-induced dendritic atrophy of CA3 hippocampal and medial prefrontal cortical pyramidal neurons. The results revealed a significant restoration of stress-induced dendritic atrophy in pyramidal neurons of CA3 region of the hippocampus and layers II-III and V of the prefrontal cortex and also ameliorated stress-induced cognitive deficits and altered neurotransmitter levels. Our results provide evidence for developing rewarding brain stimulation experience as a potent and novel therapeutic approach for restoration of cognitive deficits in stress, depression and other neuropsychiatric disorders.

Key words: Brain stimulation reward, Endogenous depression, Chronic stress, Dendritic atrophy, Cognitive deficits, Prefrontal cortex, Intracranial self-stimulation, Biogenic amines, AMPA receptors, anhedonia, Structural plasticity

Acknowledgements: CSIR, ICMR, DST-SERB, DBT and NIMHANS for financial support.

7. Symposia: Environmental influences on Physiological parameters

Col Dr Anuj Chawla



Col Dr Anuj Chawla
Senior Advisor Physiology
Professor and Head
Department of Physiology
Army College of Medical Sciences, Delhi
Email: anuj_chawla69@yahoo.com

Human Physiology At High Altitude: A Reflection on Three Decades of Research

High altitude has been variously defined in literature. It is generally agreed that altitudes beyond 2500 – 2700m constitute high altitude areas (HAA). Rapid ascent to these altitudes is associated with a significant risk of acute and sub-acute High Altitude Illness (HAI). Above this altitude there is a definite and significant reduction in peak exercise capacity and sub-maximal exercise endurance. This is so, since at this altitude the low ambient barometric pressure results in an alveolar oxygen partial pressure (PAO₂) close to 60mm Hg. At this PAO₂, the effects of hypoxia on the human body are obvious and easily recognizable.

Altitudes greater than 5500 - 5800m (18000 – 19000 feet) are classified as extreme altitude. Ascent to these altitudes is associated with a greater risk of acute and sub-acute HAI. The physiological response to these altitudes is pronounced as is decrement in maximal exercise capacity and endurance for sub-maximal exercise. The degree and time course of acclimatization to these altitudes is debatable and it is believed that the human body does not completely acclimatize to extreme altitude.

Altitudes between 1500m – 2700m (5000 feet to 9000 feet) are classified as moderate altitudes. Certain physiological function such as exercise capacity is impaired at these altitudes and a definite acclimatization response has been reported. Acute HAI's are known to occur at these altitudes however their incidence is very low.

The human body responds to HA by certain systemic changes starting immediately on ascent and continuing over hours, days, weeks and months. This response helps us to live and perform better at HA and is known as "acclimatization". Acclimatization is reversible upon descent to lower altitudes. Acclimatization at a given altitude reduces the risk of acute high altitude illness (HAI) at the altitude, reduces the risk of acute HAI on further ascent and improves an individual's work endurance. The peak work capacity however, never recovers to reach sea-level values during stay at high altitude.

The rate and magnitude of the acclimatization response depends on the rate of ascent to HA and the actual altitude attained. There is considerable variability in these responses between different individuals. Failure of adequate acclimatization responses or an exaggerated response, can both lead to HAI. For example, a blunted ventilatory response to hypoxia or an exaggerated rise in haemoglobin at HA can predispose an individual to Acute and Chronic Mountain Sickness respectively. The time course of the reversal of changes of acclimatization is not well documented but may take from hours to days, weeks and maybe months. The up-regulated hypoxic ventilatory response seen with stay at HA may reverse in hours to days, whereas the increased haemoglobin values and haematocrit seen at HA, in all probability, decline over weeks to months.

Research in High Altitude Physiology and Medicine holds special significance for the Indian Armed Forces. The Armed Forces Medical Services and the Defence Research and Development Organisation have been spearheading research in this fascinating field for decades now. The large numbers of troops stationed at high altitude provide an excellent opportunity to generate high quality authentic data. An analysis of the different Indian research initiatives and projects in the field of high altitude medicine and physiology of the last three decades reveals interesting trends. These make for interesting comparison with Western

data and published reports in this field. The present paper highlights some of these contrasting trends and attempts to understand the underlying basis for these differences.

Dr Sunil Kumar Hota

Additional Director, O/o DG (LS),
DRDO Bhawan, Rajaji Marg, New Delhi.
drsunilhota@hqr.drdo.in

Military Physiology at High Altitude: A DRDO Perspective

The unique topography of the high Himalayas and extreme operational conditions pose a formidable challenge to the troops guarding the national frontiers. Hypobaric hypoxia compounded by extreme cold weather, high UV radiations and fear of unknown, test the physiological and psychological limits of endurance in these operational conditions that require physical fitness and fast cognitive responses. Persistent research by the life sciences cluster of laboratories have endeavoured to bridge this hiatus between 'performance efficiency' & 'performance need' to augment the combat readiness of troops in high altitude environment. Considerable research on high altitude maladies have resulted in identification of physiological and molecular mechanisms pertaining to acute exposure illness like acute mountain sickness, HAPO, HACO and chronic exposure disorders like hypertension & cognitive impairment. Interventional strategies developed to ameliorate these adverse effects of high altitude induction include physiological hormesis, prophylactic and therapeutic approaches. Sustained performance at the upper physiological limits through phyto-medicinal approaches has also been evaluated and the results are promising. Seabuckthorn seed oil for chronic hypoxia exposure induced hypertension, bark extract of T arjuna for acute mountain sickness, gaultheria oil for cold and hypobaric induced joint pain are some approaches whose efficacy has been validated in high altitude conditions. With DRDO establishing the World's highest research station at Chang La to facilitate research in high altitude physiology, the scope for gaining insights into physiological responses in thin air is immense and the implications on national defence are colossal.

Dr Debasish Bandyopadhyay



Professor
Department of Physiology
Oxidative Stress and Free Radical Biology Laboratory
University of Calcutta
University College of Science and Technology
92, APC Road, Kolkata 700 009, India
e-mail: debasish63@gmail.com

Mechanism of cardio-protection by melatonin

Role of melatonin as an antioxidant against situations of oxidative stress in microbes, plants, animals and humans has been currently increasingly recognized world-wide and is now thought to be more ancient function than its role in regulating biological rhythms. Ischaemic heart disease and consequential myocardial infarction is a health problem of global concern and its ubiquitous prevalence is increasing globally on an annual basis. The involvement of oxidative stress in myocardial ischaemia has long been recognized around the globe. Mitigation of oxidative stress in myocardial ischaemia results in better cardiac health and a better cardiac performance, and, it seems antioxidants may play an effective role in cardio-protection. As melatonin is available ubiquitously and as physiological and pharmacological doses of melatonin has been found to exhibit minimum or no side effects when applied to mitigate various situations of oxidative stress, attention has been focused on its cardio-protective efficiency and some of the important studies carried out in the last decade provided undoubted confidence. Studies have been undertaken to explore the protective effect of melatonin against isoproterenol bitartrate (ISO)-induced rat myocardial injury and to test whether melatonin has a role in preventing myocardial injury and the underlying mechanism(s). Our in vivo studies in rat model indicated that melatonin efficiently protects the rat myocardium through its direct as well as indirect antioxidant mechanism(s). The in vitro studies further demonstrated melatonin's capability to remove competitive inhibition of cardiac mitochondrial energy metabolizing enzymes caused by ISO indicating toward mechanism(s) not well understood. A new mechanism of action of melatonin seems emerging as further extension of our in vitro studies indicated binding of melatonin

with antioxidant enzymes that masks the vulnerable sites of these antioxidant enzymes, thus preventing oxidative damage.

Dr Padmavathi Ramaswamy



Department of Physiology,
SRMC & RI, Chennai

“COPD in Non smoking Women – Role of Indoor air pollution”

Exposure to indoor air pollution has been associated with a range of adverse health outcomes. Although, this has been a risk factor prevalent in homes since civilization began, recognition that this is a major contributor to the global burden of disease and the national burden of disease in India has been recent. The burden of disease attributable to use of biomass fuels in India is estimated at 5-6 percent of the national burden of disease. COPD (Chronic Obstructive Pulmonary Disease) is one of the major contributors to the global burden of diseases. Recent INSEARCH study has reported a prevalence of 3.5% (1). COPD is defined as per GOLD 2018, “a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases” (2).

Although smoking remains the predominant risk factor (3), it needs to be emphasized that prevalence of COPD in non-smokers suggests the existence of other risk factors such as passive smoking, occupational exposure, and indoor air pollution (4). Cor pulmonale, has long been attributed to long-term exposure to smoke from biomass among non smoking rural women (5). In India, up to 34,000 cases of chronic respiratory disease in women under 45 years are attributable to exposure to Indoor Air Pollution due to solid fuel use. The Solid fuels are burnt in inefficient stoves in poorly ventilated spaces in close proximity to household members especially women and children exposing them to very high concentrations of pollutants. Generation of region specific health data will aid the policy makers to implement appropriate corrective measures

Sri Ramachandra Institute of Higher Education and Research (Environmental and Medical College Departments) team led by Dr. Balakrishnan have conducted large-scale studies for IAP and health assessments. Concentrations recorded were around 600 microgm/m³ in kitchen, 400 microgm/m³ in living, 100 microgm/m³ in outdoor locations (6). The concentrations of the pollutants released are often 20 fold higher than typical health standards (PM_{2.5} annual- 10ug, 24hr- 25ug). Exposure to such high levels of pollution has been linked to several respiratory disorders (7) and have estimated the COPD prevalence (2.4%) in a non-smoking, primarily biomass-using rural women population, using objective lung function measurements and clinical criteria (8). Epidemiological studies accomplished by SRMC & RI (9) pave the way for understanding opportunities for intervention design and evaluation of intervention effectiveness. Indeed, addressing such environmental risks is an essential element for ensuring equity in quality of life among populations, and it is hoped that the information presented in this conference represents a small, incremental step toward achieving that goal.

References:

1. Jindal SK, Aggarwal AN, Gupta D, Agarwal R, Kumar R, Kaur T, et al. Indian study on epidemiology of asthma, respiratory symptoms and chronic bronchitis in adults (INSEARCH). *Int J Tuberc Lung Dis* 2012; 16 : 1270-7
2. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global Strategy for the Diagnosis, Management and Prevention of chronic obstructive pulmonary disease: 2018 Report. www.goldcopd.org
3. Jindal SK, Aggarwal AN, Gupta D. A review of population studies from India to estimate national burden of COPD and its association with smoking. *Indian J Chest Dis Allied Sci.* 2001;43:139-47.
4. Smith KR, Mehta S, Maeusezahl-Feuz M. Indoor air pollution from household solid fuel use. In: Ezzati M, Lopez AD, Rodgers A, Murray CJL, editors. Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors. Geneva: World Health Organization; 2004. pp. 1435-93.
5. Padmavati S, Pathak SN. Chronic cor pulmonale in Delhi. *Circulation*, 1959; 20:343-352.
6. Kalpana Balakrishnan, Sankar S, Padmavathi R, et al. Daily average exposures to respirable particulate matter from combustion of biomass fuels in rural households of Southern India. *Environmental Health Perspectives* 110 (11): 1-7 (2002)
7. Padmavathi Ramaswamy, Sankar Sambandam, Vijayalakshmi Thanasekaraan and Kalpana

Balakrishnan. Exposures to indoor air pollutants from household cooking fuels and linkages to health. *Chest (India Edition) Vol 3(4); 199 -200 (2011)*

8. Priscilla Johnson, Kalpana Balakrishnana, Padmavathi Ramaswamy et al. Prevalence of chronic obstructive pulmonary disease in rural women of Tamilnadu: implications for refining disease burden assessments attributable to household biomass combustion. *GHA.2011:4*
9. Balakrishnan K, Nigel B. Indoor air pollution quality issues associated with domestic fuel combustion in developing countries. Geneva: World Health Organisation; 2006. WHO Air Quality Guidelines Global Update; pp. 189-207.

Dr. Ajay Kumar Nair



Ajay Kumar Nair a, Jyothi Kakumanu a, John P John b, Seema Mehrotra c, Bindu M Kutty a

aDepartment of Neurophysiology; bDepartment of Psychiatry; cDepartment of Clinical Psychology; National Institute of Mental Health and Neuro Sciences (NIMHANS), Hosur Road, Bengaluru

Altering the internal environment on demand – meditation and wellbeing

Wellbeing can be considered to be a state of optimal functioning. From a physiological perspective, our functioning requires homeostatic set points and adaptive responses to environmental stimuli. In this talk, we refer to homeostatic set points as a way of discussing neuroplastic changes or trait changes that occur with prolonged practice of any behaviour whether or not that is conducive to the wellbeing of the organism. For example, when exposed to adverse environments or when presented with challenging stimuli, organisms generate state changes in the form of a stress response. This stress response is adaptive. However, it is possible, that chronic exposure to adverse environments can cause trait changes, i.e., the homeostatic set point gets shifted in a way that is maladaptive. Indeed, this is common in today's world, where due to chronic stress, adversities may be perceived even when none are present. This leads to

suboptimal functioning. Can we achieve the reverse, i.e., shift the set point towards optimal functioning? In other words, can we enhance wellbeing in a lasting manner?

Meditation could be one way of achieving this shift. A large body of literature suggests that meditation is associated with wellbeing gains. A nuanced evaluation needs to consider the school of meditation under study, multiple techniques within a meditative practice as well as diverse aspects such as conceptual understanding, regularity of practice, depth of prior experience, and application in practical life situations. Further, wellbeing is a construct with multiple facets that can be influenced by lifestyle and demographics.

We carried out two studies in Brahma Kumaris Rajayoga practitioners to examine the connection between wellbeing, proficiency and duration of practice (Nair et al., 2017; Nair et al., 2018). In study 1 (n=1009), we surveyed practitioners from different parts of India for their demographics, proficiency and subjective evaluation of progress in wellbeing. Proficiency was evaluated using a custom scale created in collaboration with the research wing of Brahma Kumaris. In study 2 (n=86, three groups based on length of practice – long term, short term and controls), we replicated the survey, assessed five facets of wellbeing using standard measures and evaluated state and trait effects of meditation practice using 128 channel EEG recordings. Specifically, we tested the ability of the meditation practitioners to shift between rest and soul conscious meditation on demand, under a variety of conditions. Thus, we enquired if Rajayoga meditators could quickly alter their mental states, in response to specific environmental demands.

We also carried out two studies on three groups of Vipassana meditation practitioners. These practitioners typically practice multiple meditation techniques in a structured sequence as taught by S.N. Goenka (Kakumanu et al., 2018a; Kakumanu et al., 2018b). Study 1 examined the neurophysiological state and trait effects of proficiency and duration of three different meditation techniques, while Study 2 examined neurocognitive differences in these groups. Thus, in the Vipassana studies, we enquired about the physiological changes that correspond to different meditation techniques within the same school of meditation practice. Further, we checked if differences in proficiency of meditation would lead to a state-trait interaction in cognitive processing that can be studied using event related potentials (ERPs).

In the Rajayoga wellbeing studies, Progress in wellbeing was strongly correlated with proficiency ($r=0.72$) and weakly correlated with duration (years) of practice ($r=0.16$). The progress in wellbeing construct was positively correlated with positive affect (PA), overall psychological wellbeing (PWB), and

overall spiritual religious and personal beliefs (SRPB) scores. Proficiency was negatively correlated with negative affect (NA) and positively correlated with PA, PWB, life-satisfaction (LS) and SRPB. Duration, on the other hand, was correlated only with some subscales of PWB and SRPB. Both long term and short term practitioners showed higher wellbeing as compared to controls.

The Rajayoga EEG study showed that long term meditators could reliably shift between rest and meditative states (indexed by theta power, 4-8 Hz) within one minute. Short term achieved state shifts (indexed by low-alpha power, 8-10 Hz) only in eyes closed condition, when examined over more time. The controls were unable to shift states.

The Vipassana EEG study showed that proficiency and duration of meditation experience in the practitioners result in state-trait increases in low-alpha (8–10 Hz) and low-gamma (30-40Hz) power during concentrative and mindfulness meditation, and theta-alpha (6-10 Hz) and low-gamma power during loving-kindness meditation. In the Vipassana ERP study, we found that distinct state-trait influences of meditation lead to graded differences in P3 EEG dynamics. Specifically, the more proficient meditators exhibited reduced theta synchrony, enhanced alpha desynchrony, and lesser theta-alpha coherence.

Overall, these studies show that yes, different meditation techniques alter physiology reliably. Further, the studies indicate that the homeostatic set points in the internal environments of the meditators are shifted towards wellbeing in a proficiency and experience dependent manner.

8. Symposium - Best Educational Practices - Student Engagement in Learning and Research

Dr. Vasudha Devi



Professor and Head
Department of Pharmacology
MMMM, MAHE, Manipal

Pharmacology education and self-determined learning: integrating theory into practice to facilitate the development of capacity for pharmacotherapy among medical students

Pharmacology curriculum is challenging for students as well as for faculty as drug information is continuously evolving so is the treatment guidelines. In addition, during pharmacotherapy, a doctor is expected to possess team work skills and use knowledge and skills in new and often uncertain clinical settings. Hence the undergraduate pharmacology curriculum must be designed and delivered considering these needs.

To what extent pharmacology curriculum help in developing a capacity for pharmacotherapy among undergraduate medical students is questionable. Teaching learning activities designed with such aim must provide the student an opportunity to encounter challenging unfamiliar situations, scope for collaborative learning with added autonomy over the whole learning process. The current reforms in medical education advocates andragogical approaches for delivery of, outcome or competency based curriculum. Andragogical methods are student centered, where the student identifies learning needs and strategies to meet these needs. Teachers as facilitators provide student with content and learning objectives and support them throughout the learning process. In a way, teacher has a control over the student learning to a larger extent without providing autonomy over learning in a true sense. Teaching learning activities developed in this direction are usually done in smaller groups, making them resource intense. Considering these drawbacks, the department of pharmacology at Melaka Manipal Medical College, MAHE, Manipal has designed and developed several learning activities which are conducted in larger groups. These activities not only provide autonomy to students over their learning but also an opportunity to

apply pharmacology concepts in unfamiliar situations. In addition, they provide scope for self-directed learning, creativity and collaborative learning. Unlike, other andragogical approaches like problem based learning and case based learning, where the facilitator is still in control of the process, in our activities teacher's role is only to assess students and provide descriptive feedback. More of such activities in a medical curriculum might inculcate skills which are essential for the development of capacity for pharmacotherapy and rational prescribing.

Dr Kirtana Raghurama Nayak



Professor & Head, Department of Physiology,
Kasturba Medical College, Manipal,
Manipal Academy of Higher Education, Manipal

Team based learning In Physiology for case and competency based learning

Continuous assessment in the form of Team based learning (TBL): The students are informed two weeks in advance the portions assessed with announcement on the Learning management System. All the topics covered in the TBL are introduced to students in lecture and subsequently concept based topics are also reinforced with case based learning in tutorials. Case based or application based Multiple choice questions (MCQ) with high difficulty index are prepared and validated by the subject experts from the department. During TBL, the students answer the MCQs first individually and then in teams of 5-6 students. The correct options to each question is explained by the faculty at the end of the session. The total score obtained by each student is a total of individual and team score. The answers to the questions are discussed by the facilitator at the end of TBL where the each group is given opportunity to appeal for the correct option chosen by them.

Three such TBLs are conducted during three teaching periods during the first year of the course and the scores are included in calculation of Internal assessment. The achievement of learning outcomes and the feedback of the students following the TBL have been satisfactory.

Dr. Bhagyalakshmi.K.



Professor and Head, Department of Physiology,
Kasturba Medical College-Mangalore,
Manipal Academy of Higher Education
Manipal, Karnataka, India

Task based learning in Physiology using standardized patient encounter

The basic sciences are essential and it gives the foundation for the future practice of medicine. But the preclinical period is spent in isolation from the patients and in the early years they are not exposed to clinical training. At the beginning of their student career, they lack the essential skills which is needed to handle the actual patients.

Task Based Learning (TBL) is strategy where students are exposed to standardized patient. Thus, TBL offers a bridge to fill this gap. In Task Based Learning, the students encounter a standardized patient which is useful to achieve in depth knowledge and develop wide range of essential skills. In TBL an array of tasks undertaken by a doctor are identified and are used as a focus for learning. Only the tasks which are likely to be encountered by the students during clinical attachments are chosen. It drives student learning because the learning related to a task in TBL occurs throughout preclinical, para clinical and the clinical years at an advanced level. The study guides in TBL encourages students to be responsible for their own learning and provides them with a framework. TBL may lead to more relevant and appropriate education as it helps them be better prepared for practice of medicine.

OBJECTIVES:

At the end of the task based learning session, the student should be able to:

- Apply the basic understanding of physiology for the tasks routinely encountered in the clinical setting
- Develop wide range of essential skills and attitude necessary for the management of patients

How do we plan for Task Based learning?

Specifying the tasks: As tasks offer focus for learning in TBL, we keep in mind two things before specifying

the tasks

1. The student should encounter it regularly during the clinical years
2. The task should offer good focus for learning by which the learner secures specific knowledge skills and attitudes

Study guides: In addition to this preparation of study guides is of prime importance as they provide the framework for TBL. Three study guides are prepared in advance

1. Student study guide:
2. Tutor study guide
3. Standardized patient guide

Training:

1. A staff development program for orientation to TBL should be done for the teachers.
2. Before session 1 of TBL, the Tutor should train the standardized patient with the help of standardized patient guide. TBL is better done in small groups and a facilitator guides each group during the session.

The role of staff:

The role of teacher in TBL is similar to the role of facilitator in Problem based learning.

During the implementation of TBL, the facilitators should encourage students to participate in discussions by asking thought provoking questions. They must discuss similar cases while boosting development of generic skills. The facilitator summarizes the key points and gives constructive feedback at the end of the session (necessary information for all of this is provided in the tutor study guide)

Implementation of TBL:

TBL takes place in two steps. In the first Session, the students encounter a standardized patient, the students do this in teams and try to evaluate the case. The second session takes place as a small group discussion. The students elect a leader. They present a summary of the case presented as a trigger. They discuss the learning issues relevant to the patient and the tasks performed.

Assessment:

The Assessment should reflect the aims objectives and contents of the module.

Formative assessment:

This is done using

1. Facilitator feedback
2. Standardized patient feedback

Summative assessment:

1. MCQ test: can be done by higher order MCQs covered the same content areas as the TBL
2. OSCE: objective structured clinical examination appropriate for the task

Evaluation:

1. Feedback form
2. Focus group discussion

Both students and teachers are helpful in evaluating the module

Role of TBL in the curriculum:

It will be better if TBL is added to and complements the already establishing curriculum. It will supplement the schedule of lectures, practical and small group teaching.

Dr Dhiren Punja



Dr Dhiren Punja
Department of Physiology
KMC, MAHE, Manipal

Introduction of Simulation with ALS Mannequin in I MBBS Physiology training

As a part of the first year physiology curriculum, a simulation session is conducted for medical students. This session involves students auscultating heart sounds and systolic, diastolic murmurs on a medium fidelity manikin. The manikin allows students to correlate the heart sounds with the carotid pulse that is palpable on the manikin

Prior to simulation, students are exposed to didactic lecture classes where they are taught about physiology of the cardiac cycle and the pressure volume loops. Students are acquainted with the pathophysiology alterations in cardiac cycle events occurring in valve defects such as stenosis and regurgitation, in small group tutorial sessions. Students before simulation would have also learnt to perform a cardiovascular system examination on healthy peers during physiology practical laboratory sessions. With this background, students are exposed to simulation with the objective that a hands on experience of auscultating heart sounds and murmurs on the manikin may allow

them to understand the clinical application of cardiac cycle physiology and associated pathophysiological alterations.

Various studies have reported the benefits of simulation for first year medical students. Feedback taken following our simulation exercise have indicated simulation helped students better understand the relevant topics previously covered in lecture classes and tutorials. Most students found simulation relevant to what they were already learning in physiology.

Dr Ganesh Kamath



Department of Physiology,
MMMM, MAHE, Manipal

Problem Based Learning at MMMC

Problem based learning (PBL) is a learner centered, pedagogical approach, which helps in improving problem solving skill and acquire new knowledge. PBL is a useful way of learning as compared to rote learning. The students brainstorm and present the problem by working in small tutorial groups (8 to 10 students) using appropriate learning resources. The brain storming session occurs first, where the small tutorial group consisting of a group leader, a scribe and other group members, brainstorm to understand the unfamiliar terms, bring out a hypothesis and come out with learning objectives based on the problem. A tutor (faculty) is present to facilitate this process and guide students to appropriate learning resources. The students are given sufficient time (1 to 2 weeks) for gathering information and self-study. The tutorial group meets again to share their findings and present their responses for each objective. The students are assessed and appropriate feedback is given by the tutor. PBL fosters active learning, helps build on prior knowledge, enhances lifelong learning skills, helps students develop generic skills, desired attitude for problem solving and fosters deep learning.

9. Symposia-Nutrition

Dr. Jamuna Prakash



Visiting Professor, International Union of Food Sciences and Technology, and Department of Food Science and Biotechnology, Zhejiang Gongshang University, China.

Former Professor, Department of Food Science and Nutrition, University of Mysore, Mysuru. India

Phytochemicals: Retention and Bioavailability from Processed Foods

Natural foods are known for the presence of many phytochemicals apart from the well known nutrients. These components are associated with plant pigments and dietary fiber. Consumption of such compounds such as polyphenols, carotenoids and dietary fiber offers health benefits including protection against cardiovascular diseases, cancer and other degenerative diseases. Similar to nutrients, they can also be influenced by processing techniques to which the foods are subjected. In some foods, such as cereals, a part of bran is removed which is rich in fiber resulting in loss of bioactive components. At the same time thermal processing can either increase or decrease the level of these constituents. In ready-to-eat processed foods, which are packaged and stored, there are possibility of change in these constituents depending upon the initial concentration and storage conditions. The question arises how much of these components are available for physiological function after absorption. The presentation would discuss the retention and bioavailability of bioactive components from different foods subjected to different processing techniques.

Prof. Kiranmai S Rai



Prof. Kiranmai S Rai PhD

Convener-APPICON 2018

Professor and Head, Dept of Physiology,

Research Coordinator

Melaka Manipal Medical College, MAHE, Manipal

Member of Interdisciplinary Research Advisory Group

[IRAG], MAHE Manipal-576104,

Karnataka, India

* Corresponding and Presenting Author-Email: kiranmai.rai@manipal.edu

Stress and essential nutrients: Outcomes on early brain development

Stress during fetal or early postnatal period has long lasting effects on outcome of brain development, particularly causing deficits in dendritic morphology of hippocampal neurons. Apical spine density in these neurons are dynamic structures important for spatial learning and memory abilities. Differences in the period of exposure to stress can have differential impact on dendritic cyto-architecture of developing neurons in vulnerable regions of hippocampus affecting learning, memory, behaviour and cognition. Choline and Docosahexaenoic acid [DHA] are neuronal membrane phospholipids and thus essential nutrients important to be regularly supplied during brain development. There are no studies showing the possible role of choline and DHA supplements on the outcomes of brain development specifically on the hippocampal neuronal apical dendritic spine density in pre vs postnatal stressed rats. Thus the present study was designed to analyse any differential outcomes in hippocampal CA1 & CA3 neuronal apical dendritic spine density in pre vs postnatal stressed rats and the role of choline and DHA supplementation during stress periods in attenuating these deficits. Two sets of experiments were performed for the differential analysis. In expt 1-Pups from dams either exposed/not to restraint stress were divided into NC, restraint stress [RS] & RS supplemented combination of Choline and DHA [RS +Ch+ DHA] groups. In expt 2-postnatal rat pups were subdivided into 3 groups-NC, Perinatal maternal separation stressed [PMSS]-pups separated from mothers for 6hrs/day from delivery to weaning & PMSS supplemented combination of Choline and DHA during the stress period [PMSS+ Ch+ DHA] groups. Institutional ethical clearance were obtained

for these studies. Results of apical dendritic spine density in hippocampal CA1 & CA3 neurons from both RS and PMSS pups were observed to be significantly reduced ($p < 0.01$, 0.001) as compared to the same in NC rat pups. Choline and DHA supplements during stress periods [RS vs PMSS] in pups significantly attenuated apical spine density deficits in both hippocampal CA1 & CA3 neurons when compared to the same in RS vs PMSS pups, although the extent of attenuation in apical spine density was significantly more ($p < 0.001$) in CA1 neurons of RS +Ch+ DHA pups & in CA3 neurons of PMSS+ Ch+DHA pups ($p < 0.01$). This study provides evidence that both RS & PMSS causes significant diminution in dendritic apical spine density of hippocampal CA1 and CA3 neurons. RS to dams during fetal growth period have a more drastic impact on developing CA1 and CA3 neuronal apical dendritic spine density compared to the same in MSS during perinatal period. Choline and DHA supplements provided during either RS or PMSS to rat pups significantly attenuates stress-induced deficits in CA1 and CA3 neuronal apical spine density. This was observed to be at a higher extent in CA1 of RS vs CA3 of PMSS rat pups. This differential rescue in apical spine density by choline and DHA supplements during exposure to early life stress reflects the need for these supplements during periods of dendritic spine development. This also implies sustained differential enhancement of rescue in spatial learning and memory abilities that may help to sustain and enhance cognitive behaviour in these pups.

Key-words: Stress, brain development, choline, DHA, Hippocampal CA1 and CA3 neurons, dendritic spines

Dr. Sneha Ambwani



Professor and Head, Pharmacology,
All India Institute of Medical Sciences,
Jodhpur (Rajasthan)

Correlation between Serum Levels of Vitamin D & Schizophrenia

Schizophrenia is a neuropsychiatric debilitating disorder of the brain & is characterized by symptoms like hallucinations, delusions, confused thinking, and disorganized speech. According to the World Health

Organization (WHO), it is the eight leading cause of the disability worldwide.

Prevalence of schizophrenia is widely (10-fold) different across geographic regions. It is highly prevalent in high latitudes and cold climates. The prevalence is also higher in black than Caucasian people. Moreover, schizophrenic persons tend to be born in the winter/spring seasons. Previous studies have shown that second-generation migrants compared with first-generation who migrate to colder climates are at higher risk of developing schizophrenia. These ecological findings might imply the role of vitamin D in the etiology of schizophrenia because the cutaneous production of vitamin D from sun exposure is less efficient at high latitudes, during winter, and in dark-skinned persons).

Low serum vitamin D concentrations may have an effect in the pathogenesis of schizophrenia, or schizophrenia and vitamin D deficiency may have a genetic co-occurrence.

Several epidemiological studies also found that the schizophrenic patients have lower serum levels of vitamin D than healthy controls & the individuals having the deficiency of vitamin D had 2.16 times greater odds of having schizophrenia compared with those who are having normal levels of vitamin D.

Recently, there has been increasing evidence which suggest the relationship between vitamin D receptors and mental diseases like major depression, bipolar disorder and schizophrenia. It has been reported that vitamin D3 receptors and 11 α hydroxylase, the enzyme responsible for active vitamin D in the human brain, were found in both neurons and glial cells in the human brain. Vitamin D may play an important role to regulate nerve growth factor and glial cell line-derived neurotrophic factor & may be neuroprotective. Vitamin D can protect the brain against reactive oxygen species via upregulation of antioxidant molecules, such as glutathione, in non-neuronal cells. Given that vitamin D as neuroprotective, may be effective to prevent new acute episodes in the course of schizophrenia.

It is well established that patients with mental disorders have a higher prevalence of modifiable risk factors for cardiovascular disease that may include obesity, hypertension, diabetes mellitus, and dyslipidemia & psychotropic medications used to treat this population also contribute to weight gain. Some of the studies have reported that the prevalence of MS is significantly higher & increase the mortality in patients with schizophrenia. Vitamin D deficiency is also associated with chronic inflammatory diseases, including diabetes and obesity, both strong risk factors for cardiovascular diseases (CVDs), including coronary artery disease, myocardial infarction, hypertrophy, cardiomyopathy, cardiac fibrosis, heart failure, aneurysm, peripheral arterial

disease, hypertension, and atherosclerosis. Atypical antipsychotic medications used in the treatment of schizophrenia also cause cardiovascular side effects such as arrhythmias and deviations in blood pressure & which may be worse in patients having low serum levels of vitamin D. Low vitamin D status has also been associated with impaired insulin sensitivity, insulin secretion, and β -cell function in several studies

So, we conducted a study to assess the correlation between the serum levels of vitamin D and cardio metabolic abnormalities in patients with schizophrenia.

Our study suggests the association of schizophrenia with vitamin D deficiency. Improvement in schizophrenia with vitamin D supplementation, might be a cost-effective treatment & to get the better therapeutic benefit.

Acknowledgement: The present study is a part of the intramural project funded by All India institute of Medical Sciences, Jodhpur.

Dr Sucharita Sambashivaiah



Professor, Department of Physiology,
St John's Medical College, Bangalore-34.

Email: sucharita@stjohns.in

Nutrition and Skeletal Muscle-Understanding the role in health and disease

Skeletal muscle is one of the most dynamic and plastic tissues of the human body. Skeletal muscle comprises approximately 40 % of total body weight and contains 50-75 % of all body proteins. Skeletal muscle plays vital role in both metabolic as well as mechanical function. Both metabolic and mechanical function depends on the amount of mass and how well it could perform its function. In general, muscle mass/function depends on the balance between protein synthesis and degradation and both processes are sensitive to factors such as nutritional status, hormonal balance, physical activity/exercise, and injury or disease, among others. Altered muscle metabolism plays a key role in the genesis of many common pathologic conditions including chronic

diseases. Nonetheless, the maintenance of adequate muscle mass, strength, and metabolic function has rarely, if ever, been targeted as a relevant endpoint. It is therefore imperative that factors directly related to muscle mass and strength be evaluated in all disease states. Nutrition is one of the key regulators of both mass and function. Especially role of protein quality and skeletal muscle health needs to be explored further.

Dr Suneeta Kalasuramath



Professor, Department of Physiology,
S. S. Institute of Medical Sciences & research centre,
NH-4, Bypass, Davangere-05, Karnataka, India

Email: sunivinu50@gmail.com,
mobile: 08884575021

Scenario and strategies to fight Iron deficiency anemia

Iron deficiency (ID) and Iron deficiency anemia (IDA) are serious public health problems. IDA arises when physiological requirements cannot be met by Iron absorption from diet. In India, 59% of the children (6 – 59 months), 53% of young women have anemia and 40-60% of women of child bearing age suffer from anemia, primarily due to ID. Such women are at threat to a negative Fe balance leading to poor iron status. The reasons being: high parity, menstruation, gastrointestinal blood loss because of intestinal parasitic infections, use of an intrauterine device, vegetarian dietary iron intake. Plant based diets commonly consumed in India contain loads of absorption inhibitors, like phytates (cereal based diets) and polyphenols (coffee and tea) by forming insoluble complexes.

Studies depict dietary iron intakes are less than 30% of the daily requirement among young Indian women. It is estimated that low consumption of iron (median: 13.7 mg/day per person) among women in India aged ≥ 18 years and 51–83% of pregnant women in India are deprived of the RDA of iron. Even though the body's homeostatic mechanisms conserve iron efficiently, ID still persist, especially when intake fails to meet physiologic needs or when stores become depleted

Prevention and management of IDA demands adequate iron intake and provision of bio available iron. Improving ascorbic acid intake through the consumption of ascorbic acid rich foods in the diet could be a culturally relevant and practical approach. Additionally, increased accessibility, availability and affordability to diverse foods along with education and knowledge regarding iron absorption enhancers and inhibitors are recommended.

10. Symposia- brain and Behaviour

Dr Laxmi T Rao



Professor, Department of Neurophysiology,
NIMHANS, Bengaluru-560 029;
Email: laxmi.nimhans@gmail.com

Anxiety and fear cognition after early life stress.

In this lecture, I am going to give an overview on the neurobiology of fear learning and memory in animals experienced stress during critical time window which is known as stress hypo responsive period (SHRP). It was well known that stress during SHRP causes increased anxiety. However, it is not clear, how increased anxiety in animals causes learning and memory. During this lecture, I will try to explain the anxiety induced impairment in fear cognition and discuss the fear learning-induced neural plasticity and subsequently the structural plasticity in the brain regions that are critically involved in the formation and inhibition of acquired fear memory - amygdala, hippocampus and medial prefrontal cortex.

We observed that early life stress due to maternal separation and isolation stress caused increased anxiety in an anxiety provoking environment. When these animals were exposed to classical fear conditioning, we found that these animals exhibited increased fear memory with fear generalization. Subsequently, the study found that the interactions between amygdala, medial prefrontal cortex and hippocampus was impaired during fear cognitive functions.

Further to explain the complexities involved in anxiogenic nature of animals after stress, comprehensive study analysis was taken up. Here we have recorded electroencephalograms (EEG)/ Local field potential (LFP) activities from these brain regions during and after learning tasks in animals having anxiety. I will share the research outcomes from my laboratory in this lecture discussing maternal separation and isolation stress induced anxiety on fear cognition as well as on the underlying mechanisms involved in altered fear cognition. I will also discuss the interactions between anxiety, fear cognition and attention in these stressed animals.

Dr Sajikumar Sreedharan



Department of Physiology,
National University of Singapore, Singapore

The p75 neurotrophin receptor is a necessary mediator of synaptic and behavioral changes induced by sleep deprivation

Sleep deprivation (SD) interferes with hippocampal structural and functional plasticity, formation of long-term memory (LTM) and cognitive function. The molecular mechanisms underlying these effects are not fully understood. We show that SD impairs synaptic tagging and capture (STC) and behavioral tagging (BT), two major mechanisms of associative learning and memory. Strikingly, mutant mice lacking the p75 neurotrophin receptor (p75NTR) are resistant to the detrimental effects of SD on hippocampal plasticity at both cellular and behavioral levels. Mechanistically, SD increased p75NTR interaction with phosphodiesterase (PDE4A5). p75NTR deletion preserved hippocampal structural and functional plasticity by preventing SD-mediated effects on hippocampal cAMP-CREB-BDNF and RhoA-ROCK2-LIMK1-cofilin pathways. We identify p75NTR as an important mediator of hippocampal structural and functional changes associated with SD, and suggest that targeting p75NTR could be a promising strategy to limit the memory and cognitive deficits that accompany sleep loss.

Dr Shobi Veleri [CSIR]



Roopasree O.J. and Shobi Veleri*
Biochemistry and Molecular Mechanisms Lab,
APTD. AcSIR.

CSIR-National Institute for Interdisciplinary Science
and Technology (CSIR-NIIST),
Thiruvananthapuram, Kerala 695019.

Genetic dissection of cilia genes gives molecular insights into neurodegenerative diseases

The fundamental cellular processes are mainly driven by proteins, which are encoded in genes. Cilia are present in almost all cells of human body. Cilia were regarded as vestigial organelles until recently research revealed their essential in human health. Cilia are essential for the development and functioning of multiple organs like brain, sensory organs, liver, kidney etc. The development and functioning of cilia depend on >1000 genes. The mutations in fundamental cilia-genes like Cc2d2a and BBS9 afflict ciliogenesis. This leads to multi-organ disorders called ciliopathies. The null mutation in Cc2d2a is associated with Meckel syndrome, a lethal disorder. On contrary, the missense mutation in C2 domain of Cc2d2a is associated with Joubert syndrome, where patients survive with blindness and mental retardation. How mutations in C2 domain led to these conditions are not known. Similarly, BBS9 is a core gene in BBSome complex, associated with Bardet Biedl syndrome. These patients suffer with mental retardation and blindness. BBS9 is also required in ciliogenesis but its function is not yet clear. We are investigating the function of C2 domain and BBS9 in cells capable of growing cilia by targeted knockdown of the transcripts to mimic the human mutations, using custom made shRNA. The insight obtained will be discussed.

Dr Pradeep Punakkal



Molecular Medicine, Division of Applied Biology,
Biomedical Technology Wing,

Sree Chitra Tirunal Institute for Medical Sciences
and Technology, Poojappura,
Thiruvananthapuram, Kerala, India-695012

NMDA receptor GluN2 subtypes control epileptiform events in the hippocampus

NMDA receptors (NMDARs) play a key role in synaptic plasticity, learning and memory and excitotoxicity. The role of NMDAR subtypes in various disease conditions is a new topic of interest. Epilepsy is caused by the change in excitatory to inhibitory ratio in the brain. The excitatory neurotransmission is mainly through the ionotropic glutamate receptors (AMPA, NMDA and Kainate). Here we studied the role of NMDAR subtypes in epileptiform activity in rat brain slices. We induced epileptiform activity in rat brain slices by perfusing artificial cerebrospinal fluid containing high potassium (7.5 mM) and lacks magnesium (HK-ACSF). We recorded epileptiform activity from CA1 and dentate gyrus areas of the hippocampus and studied the role of NMDAR subtypes in epileptiform activity in the rat brain slices. The latency for the epileptiform events were comparable between CA1 and dentate gyrus, and did not change within the age group we studied. Application of NMDAR antagonists reduced the epileptic events significantly in hippocampal slices; furthermore there was an area specific, subtype dependent and developmental attribution of NMDAR subtypes to the epileptiform activity.

Dr Preethi Hegde



Preethi Hegde^{1,2}, Laxmi T Rao²

¹ Department of Physiology,
D.A.P.M.R.V. Dental College, Bangalore

² Department of Neurophysiology, NIMHANS, Bangalore

Current affiliation: Department of Physiology,
D.A.P.M.R.V. Dental College, Bangalore, Karnataka,
India-560078. Email: preethihegd@gmail.com

Cortico amygdala interactions and fear extinction in Enriched Environment exposed Wistar Rats

Brain plasticity is a crucial to allow an organism to adapt to the change in the environment. Enriched environment (EE), a combination of enhanced social relations, physical exercise and interactions with non-social stimuli is known to induce plasticity in the brain. It is proven fact that EE has beneficial effect on cognitive functions and psychiatric disorders. In our study, classical fear conditioning was used as a model for one of the psychiatric disorder, Post Traumatic Stress Disorder (PTSD). To investigate the changes in the neuronal activity of the prefrontal cortex in the PTSD model, we recorded single unit activity in the Infra limbic Cortex (ILC) from Male Wistar Rats. The ILC firing rate was compared between control and EE exposed rats during the different sessions of the fear conditioning and extinction paradigm. Our result from the single neuron activity from ILC of the prefrontal cortex showed decreased spike firing with spontaneous recovery in the control rats, thus, supporting the role of prefrontal cortex on extinction of fear memory. Since the firing rate is reduced, the prefrontal inhibitory control over amygdala is reduced, leading to increased amygdala activity. Thus, this pathway may constitute part of the circuits involved in the regulation of extinction and suggesting that EE may be capable to avoid the spontaneous recovery of fear over time.

Kumari Anshu Jha



Kumari Anshu Jha, Shoba Srinath^b, Laxmi T Rao^a

^a Department of Neurophysiology;

^b Department of Child and Adolescent Psychiatry;
National Institute of Mental Health and Neuro Sciences
(NIMHANS), Hosur Road, Bengaluru

Valproate exposure in prenatal environment: effect on attentional functions

The effects of challenging environmental conditions on adult physiology and behaviour have received scientific attention. However, not many studies have explored the impact of prenatal environmental challenges that can result in long lasting influences on cognition and behaviour.

The brain goes through a series of complex and critical developmental stages before birth. Exposure to unfavorable elements during prenatal brain development acts as a predisposing factor for psychopathologies later in life. One such neurodevelopmental disorder is autism spectrum disorder (ASD). The ASD estimated prevalence of is 1.68% globally, and 1.6% in India as per the National Mental Health Survey (2015-16).

The etiology of ASD is not clearly known but evidences suggest that both genes and environment could play a major role in causing ASD. Exposure of different infections and medicines during pregnancy are major environmental risk factors for ASD. There are a number of environmental insult based rodent models for ASD. Among them, a widely used model is based on epidemiological studies that report high risk of ASD following prenatal exposure to the anti-convulsant and mood stabilizer drug valproate (VPA). The prenatal VPA model has been well-validated for core features of ASD- impaired social behaviour, repetitive activity and restricted interests. Moreover, many of the structural, molecular, and physiological aspects related to ASD have been reported in the VPA model.

Apart from the core features, attentional functions are known to be impaired in ASD. Problems in attention which is fundamentally involved for any learning and skill acquisition, found early in children with autism,

could be causing their behavioural symptoms. Disruptions in the inhibitory neurotransmitter system and improper communication between brain regions could explain these deficits. However, these hypotheses have not been suitably tested in animal models of ASD and thus the underlying mechanisms of attentional problems in ASD are not well understood.

We wanted to assess attentional functions in a prenatal valproate (VPA) exposure model of ASD in male and female rats and carry out behavioural, immunohistochemical and electrophysiological study to understand the underlying neural mechanisms of changes in attention in these rats.

After establishing the VPA model, we carried out a battery of behavioural experiments to assess social interaction, repetitive behaviour, anxiety, empathy, sensorimotor reflexes. We then performed a detailed evaluation of attentional functions in a sustained divided attention operant conditioning task. We then undertook a large sample study of preattentive functions in order to characterize diversity on the ASD spectrum. Additionally, we did a detailed evaluation of sensory and motor developmental milestones. Further, to understand the mechanisms underlying attentional deficits in ASD, we did an immunohistochemical evaluation of GAD67, GABA receptors $\alpha 1$ and $\beta 3$ in the orbitofrontal cortex (OFC) and the posterior parietal cortex (PPC) – two regions that are involved in reward and attentional processing. Finally, we carried out simultaneous spike and local field potential recordings in the OFC and PPC during rest and during attentional task performance.

As hypothesized, we found attentional deficits in both male and female VPA rats who also showed abnormalities in social approach and empathy (pro-social behaviour). We did not find any evidence of anxiety, motivational or motor deficits. These rats had reduced expression of: GAD67 in OFC, GAD67 and $\beta 3$ in PPC and increased expression of $\alpha 1$ in both regions suggesting disrupted GABAergic mechanisms. During attentional task, both OFC and PPC regions in VPA rats had reduced spike rates and gamma power and there was reduced coherence between these regions in theta, beta and gamma bands. Our results show that the prenatal VPA model exhibits robust attentional deficits attributable to dysfunctions in GABAergic system and functional connectivity between OFC and PPC regions.

Thus, prenatal exposure to Valproate, which has a temporary beneficial effect on the mother, can lead to long lasting negative consequences for the child. It is highly desirable that alternatives to this medication are used in women of child bearing age. Overall, our study underscores the need for safeguarding the prenatal environment from unfavorable influences.

11. Symposia - Real world evidence enabled patient access

Mr. Mahesh Vishwanath Iyer



Real World Evidence (RWE) - enabling data access

Much has been written of late about how RWE can be a game changer in healthcare - especially in the areas of treatment choice, reimbursement, or access to medicines. With the introduction of the universal healthcare policy through the Ayushman Bharat Yojana, this has become even more critical. And this has of course resulted in a lot of new research in analytics and modeling, to try and address how to analyze the really complex data that is an essential feature of the healthcare space. However, before we get to the analysis stage, the more important and pressing question one needs to address is the availability of quality data itself. Given the fragmented nature of the Indian healthcare ecosystem, how do we start to collect meaningful data at a patient level? How do we ensure that there are no gaps in the data that is collected through a patient journey? How do we store this collected data, and make it available in real time for those that need to have access to this data, at the same time ensuring that privacy and confidentiality is protected? The talk will try to answer some of these questions, focusing both on what is currently being done, and what could possibly be the way forward.

Madhur Garg



Real World Evidence (RWE) for accelerated patient access

The market access landscape has undergone a major shift from the traditional price-based to a value-based approach due to growing engagement of payers and patients, escalating healthcare costs with challenging reimbursement process. Real world data (RWD) derived from electronic health records (EHR), registry databases and medical claims can aid in understanding a drug's effectiveness in the real world, along with its cost effectiveness compared with other drugs on the market. RWE can provide insight into efficacy to effectiveness translation; accelerating initial submission and thus time to reimbursement decision, so that products can enter the market faster.

The scope of RWE in market access includes achieving optimal price and full reimbursement, favorable recommendation from HTA authority and inclusion in various formularies at hospital, regional and national levels. The current constraints of using and leveraging RWE can be mitigated by using technologies like big data machine learning and Blockchain technology. Linking and sharing RWD like EHR, real-time Internet-of-Things (IoT) data via Blockchain can be utilized for executing smart contracts, thus enabling risk sharing between the stakeholders to incentivize the right health outcomes in the health system. The talk will focus on use cases of real world evidence and how technology can help unlock the full potential of RWE to enable patient access.

APPI AWARDS

Prof. R.C. Shukla Oration Award

Dr. Vivek Sharma

Dean

Government Institute of Medical Sciences, Greater NOIDA, Uttar Pradesh

Mobile No. (+91) 9442529673, 8668117030

Email drviveksharma@yahoo.com

Assessment of autonomic functions and its association with telomerase level, oxidative stress and inflammation in complete glycemic spectrum—An Exploratory Study

Background: Telomeres are specialized regions found at the end of chromosomes that confer stability to the genome and are elongated by the actions of the enzyme called telomerase. Accumulation of oxidative stress and chronic inflammation are major contributors to telomere/telomerase dysregulation leading to pathophysiology of chronic disease progression from prediabetes to diabetes, CAD etc. Altered body composition in south east Asians, centripetal obesity and dysautonomia may also be implicated in diabetes progression.

Materials and methods: After obtaining Institute ethics approval, age, gender and BMI matched 28 subjects (12 Males & 16 Females) in the age group of 25-50 years were recruited across complete glycemic spectrum as follows: 1) Normoglycemics (controls) 2) Prediabetics and 3) Frank diabetics. We measured blood pressure (BP), short term heart rate variability, cardiac autonomic function test battery and biochemical parameters including lipid profile, adiponectin, malondialdehyde and telomerase level.

Results: BP was significantly higher in prediabetic and diabetic group as compared to control group and diabetic group had higher DBP than prediabetic group ($p < .001$). Time domain parameters (SDNN, RMSSD, NN50, pNN50) and frequency domain parameters (TP, VLF, LF, HF, and HFnu) were significantly lower, and LFnu and LF/HF ratio were significantly higher in prediabetes and diabetes as compared to control. Serum Adiponectin and HDL levels were significantly lower in diabetes than prediabetes and control, and prediabetes had significantly lower HDL than controls. Other lipid profile parameters (TC, TG, VLDL, LDL, non-HDL, TC/HDL, TG/HDL, LDL/HDL, AIP) were significantly higher in diabetes than prediabetes and control and prediabetes had significantly higher values than controls. MDA levels were significantly higher and TAS was significantly lower in diabetics than prediabetics and control group. Telomerase level was significantly higher in diabetes as compared to prediabetes ($p < 0.001$) and control ($p < 0.016$) while the values were comparable between prediabetes and

control group. Telomerase had significantly negative correlation with SDNN, HF, TP, HDL and adiponectin, and significant positive correlation with MDA, fasting insulin, HOMA IR, TC, and AIP.

Conclusion: Accumulation of oxidative damage, inflammation and autonomic dysregulation may be involved in Telomere / Telomerase dysregulation in diabetes and telomerase levels can be used as a cardio-metabolic marker of diabetes.

Keywords: Telomerase, adiponectin, glycemic spectrum, prediabetes, oxidative stress, type 2 diabetes, T2DM

BK Anand Research Prize

Dr. Kalpana Barhwal

Department of Physiology

All India Institute of Medical Sciences (AIIMS)

Sijua, Dumduma, Bhubaneswar,

Odisha-751019

EMAIL: drkalpana2009@hotmail.com

physio_kalpana@aiimsbhubhaneswar.com

CL Malhotra Research Prize

Dr. Sunil J Tripathi

PhD in Neurophysiology, NIMHANS

Department of Neurophysiology, National Institute of Mental Health & Neuroscience (NIMHANS) Post Box No.2900, Hosur Road

Bengaluru-560 029, Karnataka INDIA.

8951070985

tripathisunilj@gmail.com

Basolateral Amygdalar Inactivation Blocks Chronic Stress-induced Lamina-specific Reduction in Prefrontal Cortex Volume and Associated Anxiety-like Behavior

Sunil Jamuna Tripathi, Suwarna Chakraborty, B.N. Srikumar, T.R. Raju, B.S. Shankaranarayana Rao

Department of Neurophysiology, National Institute of Mental Health and Neuro Sciences Hosur Road, Bengaluru 560 029, India

Chronic exposure to stress causes cognitive deficits, anxiety and depression. Earlier studies have suggested that the prefrontal cortex (PFC) and basolateral amygdala (BLA) can differentially modulate the stress-induced alterations either by their action on hypothalamo-pituitary-adrenal (HPA) axis or via direct reciprocal connections between them. The PFC dysfunction and BLA hypertrophy following stress are known to cause anxiety and affective symptoms. Recent studies indicate that inactivation of BLA

projections to PFC remarkably decreases anxiety. However, the effect of BLA inactivation on stress-induced anxiety and associated volume loss in prefrontal (PrL) and anterior cingulate (ACC) subregions of PFC is not known. Accordingly, we evaluated the effect of BLA lesion or inactivation during chronic immobilization stress (CIS) on an approach-avoidance task and associated volume loss in the PFC. The stressed rats showed a significant volumetric reduction in layer I and II of the PrL and ACC. Interestingly, BLA lesion prior to stress prevented the volume loss in PrL and ACC. Further, BLA lesion blocked the anxiety-like behavior in stressed rats. However, in the absence of stress, BLA lesion increased the number of shocks as compared to controls. As BLA lesion produced an anticonflict effect, we performed temporary inactivation of BLA specifically during stress. Similar to BLA lesion, lidocaine-induced inactivation prevented the stress-induced volume loss and anxiety-like behavior. We demonstrate that inactivation of BLA during stress prevents CIS induced anxiety and associated structural correlates in the PFC. The present study extends the hypothesis of amygdalar silencing as a possible management strategy for stress and associated disorders.

Keywords: Chronic stress, Basolateral amygdala, Prefrontal cortex, Anxiety, Stereology

Acknowledgements: CSIR, DBT, NIMHANS

M L Gupta Research Prize

Dr Tripti Srivastava

Professor, Physiology

Convener, MCI Nodal centre for National Faculty Development

Jawaharlal Nehru Medical College

Datta Meghe Institute of Medical Sciences (Deemed University) Sawangi (Meghe)

Wardha (Maharashtra) India, 442001

Phone: +91-7152-287701-319 Extension

Ph. No: 09765404077

Email : drtriptisrivastava@gmail.com,

drtriptisrivastava@yahoo.co.in

Conceptualising physiology of arterial blood pressure regulation through the logic model

Dev Raj Bajaj Research Prize

Dr. Dibashree Timuli

Dibashree Tamuli

PhD Scholar,

Department of Physiology

All India Institute of Medical Sciences, New Delhi.

Email: dibashree@gmail.com; Ph: +918800941876

Autonomic Function Based Classification of Spinocerebellar Ataxia Type 1 and 2 Using Machine Learning Classifiers

Dibashree Tamuli¹, Anoop Kant Godiyal³, Manpreet Kaur¹, Ashok Kumar Jaryal¹, Achal Kumar Srivastava² and Kishore Kumar Deepak^{1*}

Departments of Physiology¹ and Neurology², All India Institute of Medical Sciences, New Delhi, India and Centre for Biomedical Engineering³, Indian Institute of Technology, New Delhi, India

Spinocerebellar ataxia (SCA) is a progressive neurodegenerative disorder characterized by autonomic dysfunction. SCA has multiple genetically classified subtypes, amongst which SCA1 and SCA2 are most prevalent in India. Autonomic function based characterization of SCA patients into respective subtypes has not been done. We have evaluated autonomic function - heart rate variability (HRV), systolic blood pressure variability (BPV), systolic baroreflex sensitivity (BRS) and composite autonomic severity score (CASS) in SCA patients (SCA1=31; SCA2=40). To evaluate the classification performance of the battery of autonomic function tests (AFT), linear discriminant analysis (LDA) and support vector machine (SVM) classifiers were used. The average classification accuracy for SCA subtypes were 80% by LDA and 70% by SVM. Interestingly, individually the autonomic function tests do not differ between SCA1 and SCA2 but when they are used together by classifier - a conclusive pattern to characterize the SCA subtypes emerges. This is the first study to classify SCA patients into their respective subtypes using a novel machine learning approach on their autonomic function profile.

Best Teacher Award

Dr. Shraddha Singh

Professor

Department of Physiology

K.G.M.U. Lucknow, UP, India.

E-mail: drshraddhasingh@yahoo.com

Mob.: +91-9415010703 Land Line: 0522-2789545

Sushila Thaker Prakruti Mandir Research Prize

Mr. Ram Kumar Gupta

Scientist – B

M.Sc. (Clinical Psychology & Yoga & Holistic Health)

Ph.D. Research Scholar

Patanjali Research Foundation. Patanjali Yogpeeth

Haridwar, India,

Email id-ramkumar.gupta@prft.co.in

Life Time Achievement Award

Dr B. K. Kapoor

Ex. Professor of Physiology

AIIMS New Delhi

bkkapoor1936@yahoo.com

Abstracts for R Srinivasan award for best PG paper

Electroencephalographic pattern in children with autism spectrum disorders

AW- RS01

Nissy Susan Varughese¹, V. S. Suma Devi¹, Manju George Elenjickal²

¹Department of physiology, ²Department of Paediatrics, Pushpagiri Medical College, Thiruvalla. Email: niz_susan@yahoo.co.in\

Background: In autism spectrum disorders (ASD), abnormal electroencephalogram (EEG) are reported without epilepsy. EEG studies in ASD may unfold autism pathophysiology.

Objectives:

1. To describe the EEG pattern of children with ASD
2. To compare the EEG pattern of children with ASD and epilepsy with that of ASD alone
3. To test the association between EEG pattern and clinical rating of ASD.

Methodology: Eighty-one children with ASD coming to the Child Development Centre in a tertiary hospital were included in the study. Detailed history, scores of clinical rating of autism (CARS), report of digital EEG was collected and analysed using SPSS.

Results: 37% of study population had EEG changes. Pattern of 66.7% of EEG were slowing and 33.3% were epileptic discharges with mean age higher in latter ($p < 0.05$). Among 14% who had epilepsy, 72.7% had EEG changes. In epileptic autistic 87.5% had epileptic discharges and in non-epileptic ASD 86% had slowing pattern. Mean age of former was higher ASD ($p = 0.001$). Though EEG changes had no correlation with clinical severity of autism; age and epilepsy had significant correlation ($p < 0.05$).

Discussion: EEG abnormality proves autism is a neural connectivity disorder. EEG changes shifted from slowing to epileptiform discharge with advancing age, eventually presenting as clinical epilepsy. High neural plasticity helps in targeted intervention.

Conclusion: 37% had EEG changes with 66.6% slowing & 33.7% epileptiform discharges. Commonest EEG changes in epileptic ASD was epileptiform discharges and in non-epileptic ASD was slowing. Clinical severity of autism increased with age & epilepsy.

Key-words: autism; electroencephalogram; epilepsy; brain

Nociceptive flexion reflex and subjective pain: A report of comparison

AW-RS02

Srishti Nanda, Suvercha Arya, Renu Bhatia

Pain research and TMS Laboratory, Department of Physiology, All India Institute of Medical Sciences (AIIMS), New Delhi, India - 110029
Email ID: srishtinanda03@gmail.com, suviarya@gmail.com, renuaiims28@gmail.com

Background: Nociceptive flexion reflex (NFR) is a clinically important neurophysiological measure to assess pain and to quantify the effect of intervention. Classical literature describes a precise coincidence of NFR threshold and subjective perception of pain (SP) in healthy participants. As a part of an ongoing study, we found results contrary to this notion.

Objectives : To determine the subjective perception of pain at nociceptive flexion reflex threshold in healthy volunteers, and to compare the same.

Methods: Thirty-one pain-free healthy participants were recruited after undergoing an extensive medical screening. Electromyography setup was done to acquire NFR from biceps femoris muscle using standard procedure. Throughout the experiment, the participants were asked to report SP. The electromyography records obtained at the NFR threshold (intensity at which NFR first appeared), and SP threshold (intensity at which participant first reported pain) were compared offline.

Results: On analysing, NFR and SP thresholds were found to be significantly different, and coincident in only 3 subjects. Latency, duration and area under the curve also differed significantly for the electromyography records obtained at the two thresholds.

Conclusion: Our results suggest that the relationship between NFR threshold and SP may not be as linear as previously reported. Notwithstanding the limitations, the present study underlines the need to revisit the physiological interpretation and uses of NFR.

Key-words: Pain assessment, Nociceptive flexion reflex, R-III reflex, EMG

Cortical Diaspora of Processing face and words as distractors during emotional interference – A quantitative EEG study

AW-RS03

Tanaya Batabyal, Suriya Prakash, Ratna Sharma, Prashant Tayade, Simran Kaur

Department of Physiology, AIIMS, New Delhi

Introduction: Emotional stream of information by virtue of their distractive nature affect behaviour. Differential processing of distractors in the brain have the ability to decrease the efficiency of cognitive control. This is encountered as an emotional interference.

Objective: Temporally map cortical areas differentially activated during emotional interference for word and face as distractors respectively.

Material and Methods: In the present study, 17 adults of either gender (25.61 ± 2.78 yr) performed two varieties of emotional interference task (face word and word face), wherein words and faces have acted like distractors. Simultaneously, single trial 128 channel

EEG was acquired during both the tasks. Further, cortical source activity was compared between the tasks in terms of current source density using sLORETA for 66 gyri.

Results: Sixty gyri had significantly higher and three had significantly lower activity in face word interference task as compared to word face interference task ($p < 0.05/66$).

Conclusion: Thus, the current study elucidated the role of areas associated with saliency network, dorsal attentional network, ventral attentional network during processing of word and face as a distractor in an emotional interference task. Further, it attempts to temporally map the probable role of cortical areas associated with neural processing of faces as a complex emotional stream of information and a potent distractor during an emotional face word interference task.

Key words: emotional interference; cortical sources; ventral attentional network; dorsal attentional network; saliency network

Lower activation of the right parahippocampal gyrus leads to perceptual reversals during binocular rivalry.

OR1

Angel Anna Zacharia, Simran Kaur, Ratna Sharma

Department of Physiology, All India Institute of Medical Sciences, New Delhi

Background: A growing body of evidence suggests that the ongoing brain activity before the arrival of any sensory stimulus is not meaningless, in fact, this can influence the response, including whether to have perceptual reversals or stability, during ambiguous figure perception. One way of investigating the pre-stimulus brain state is by analysing the EEG microstates and its neural generators.

Objective: The study was designed to investigate the pre-stimulus microstate and the associated neural generators preceding perceptual reversals, during binocular rivalry.

Methods: An intermittent binocular rivalry paradigm was designed using 18 congruent-incongruent picture pairs and administered in 60 right-handed subjects with a mean age of 26.84 ± 3.27 yrs. EEG was recorded using a 128-channel geodesic sensor net. EEG signals were band-pass filtered in 1-40 Hz and trials of reversals and stability were separated and segmented into 100 ms epochs before the stimulus onset. Microstate analysis was performed using cartool software. Results: Comparison of microstates maps for perceptual reversals compared to stability using Mann Whitney u test revealed that for Map 2, frequency of occurrences (Stability: 0.02 ± 0.08 ;

Results: 0.03 ± 0.005 , $p=0.0253$), as well as time coverage (Stability: 0.42 ± 0.14 ; Reversal: 0.47 ± 0.07 , $p= 0.0003$), was more before reversal. The estimation of the sLORETA inverse solution with statistical non-parametric mapping (SnPM) for pre-stimulus map 2 showed lower activation in right parahippocampal gyrus (MNI coordinates X, Y, Z; 10, -35, 0; $t=0.013$; $p=0.01$) preceding reversals.

Conclusion: Lower activation of the right parahippocampal gyrus leads to perceptual reversals.

Key-words: Binocular Rivalry, Microstate, EEG, Perceptual reversals

Lower Limb Peripheral Neuropathy in Patients with Chronic Obstructive Pulmonary Disease

OR2

Dipti Agarwal¹, Sushma Sood¹, Prem Parkash Gupta²

Departments of ¹Physiology and ²Respiratory Medicine, Post Graduate Institute of Medical Sciences, Rohtak, Haryana, India

Objectives: The present study was carried out to detect prevalence of lower limb peripheral neuropathy in stable patients with chronic obstructive pulmonary disease (COPD) and its correlation with (1) quantum of smoking, and (2) duration of illness.

Methods: The study group comprised of 30 male patients with COPD having age between 40 to 60 years, diagnosed as per GOLD guidelines. The study included 30 healthy male volunteers of age 40 to 60 years who served as the control group. The following nerves were tested for latency, amplitude and conduction velocity: for motor nerve conduction – common peroneal nerve; and for sensory nerve conduction – sural nerve.

Results: The amplitude, latency and conduction velocity of common peroneal nerve in COPD patients were not significantly affected. The amplitude and conduction velocity of sural sensory nerve in COPD patients were decreased and the latency was significantly increased in COPD patients. 5/30 COPD patients (16.67%) had sural sensory nerve conduction dysfunction beyond ± 2 standard deviation; sensory axonal type of peripheral neuropathy was observed. A strong inverse correlation was noted between quantum of smoking and duration of illness with amplitude and conduction velocity of sural sensory nerve. A positive correlation was noted between quantum of smoking as well as duration of illness and the latency of sural sensory nerve.

Conclusions: 16.67% of stable COPD patients had sensory axonal type of peripheral neuropathy involving lower limb. A significant correlation was noted between quantum of smoking as well as duration of illness and peripheral nerve deficit.

Key-words: Neuropathy, COPD, lower limb

EEG Spectral Correlates of Cognitive interference

OR3

Vinay Chitturi¹, Navdeep Ahuja¹, Simran Kaur² and Ratna Sharma²

¹Stress and Cognitive Electroimaging Laboratory (SCEL), ²Department of Physiology, AIIMS, New Delhi.

Background: Cognitive interference is the slowing down of mental processing by conflicting cognitive processes. Neural correlates of Stroop interference can help understand neurocognitive mechanisms of executive control and selective attention.

Objective: To study the cortical correlates of stroop interference as assessed through quantitative Electroencephalography (qEEG).

Methods: High density 128 channel EEG was recorded from 25 adult male subjects during stroop neutral and interference conditions. Twenty trials each of neutral and incongruent colour word stimuli were used while the subjects were instructed to respond to the colour of the stimulus. Artifact free segments of EEG were preprocessed in Netstation and EEGLAB followed by Time-Frequency analysis through continuous wavelet transform (cwt) in MATLAB to compute wavelet coefficients corresponding to spectral powers in theta, alpha, beta and gamma bands. Statistical analysis was done in MATLAB by Friedman test of repeated measures analysis of variance by ranks. A post-hoc Wilcoxon sign rank test was performed for the comparison between stroop neutral and interference conditions with alpha value of significance adjusted to 0.05/129.

Results: Theta and alpha band spectral power in left centro-parietal and occipital scalp regions was higher during stroop interference compared to neutral condition. Beta and gamma band powers exhibited significant increase in frontomedian and bilateral occipital regions.

Conclusion: Cortical processing of resolution of cognitive interference involves activation of cognitive domains like executive control and selective attention leading to increased power across selective EEG spectral bands across the cortex, predominantly in the right hemisphere.

Key-Words: QEEG, Cognitive Interference, Stroop, Wavelet transform.

Slow but steady wins the race? - Behavioural manifestation of ADHD during an n back visuospatial working memory task

OR4

Batabyal T¹, Sharma R¹, R Sagar², Kandasamy D³, Kumar V⁴, Kaur S⁵

¹Stress and Cognitive Electroimaging Laboratory, Department of Physiology, ²Department of Psychiatry, ³Department of Radiodiagnosis, ⁴Department of NMR, ⁵Department of Physiology, AIIMS, New Delhi

Background: Attention deficit hyperactivity disorder (ADHD) is the most common neurobehavioral disorder of childhood. Impairments in working memory create difficulties for children with ADHD in their cognitive, academic and social activities, thereby affecting their quality of life.

Objectives: To assess Visuospatial working memory (VSWM) in children with ADHD compared to age matched controls.

Methods: 15 ADHD children diagnosed using DSM V and 15 age matched controls, performed 40 trials of 1N back VSWM task wherein subject had to remember the position of the box and respond by matching the position of the current stimulus with the 1-back position. Response was made by pressing key "1" for "match" and key "2" for "Not a match" in response pad. Reaction time and accuracy percentage of each subject were logged and statistically compared.

Results: Fifteen ADHD children (11.73 ± 0.7713 yr, 13 males) and 15 age matched control (11.60 ± 0.7224 yr, 10 males) each performed 1nback VSWM. Interestingly, there was a significant difference ($p < 0.0001$) in reaction time (889.8 ± 16.16 vs 753.9 ± 13.60), however, there was no significant difference ($p = 0.9005$) in accuracy percentage (77 ± 3.030 vs 83 ± 1.985 , $t = 1.657$, $df = 24$) between ADHD and controls respectively.

Conclusion: ADHD subjects take longer time to perform a visuospatial working memory task but doesn't compromise on accuracy percentage. The neural compensatory mechanism associated with such a behavioural manifestation can be further explored using EEG connectivity and time frequency analysis on task data.

Key-words: Attention deficit hyperactivity disorder, visuospatial working memory, reaction time, accuracy percentage

Exploring emotional and cognitive interference conduct in ADHD children

OR5

Chaithanya Leon¹, Prashant T Tayade², Rajesh Sagar³, Ratna Sharma², Simran Kaur²

¹Stress and Cognitive Electroimaging Laboratory, Department of Physiology, ²Department of Physiology, ³Department of Psychiatry, AIIMS, New Delhi
email id: chaitanya.leon@yahoo.com

Background: Attention Deficit Hyperactive Disorder (ADHD) children have deficits in cognitive interference, thereby affecting goal directed "executive functions. Whether deficit in interference control is due to suppression in motor responses or due to cognitive suppression is controversial. Further, limited literature is present to demonstrate the effect of interference in emotional domain in ADHD.

Objectives: To assess the reaction time and accuracy in ADHD subjects compared to age matched healthy controls in emotional and non-emotional stroop interference task.

Methods: A paradigm with blocks of 20 trial consisting of color-word stimuli (non emotional task) of stroop

neutral(SN), stroop facilitation(SF) and stroop interference(SI) and 60 trials consisting of emotional stroop(ES) of word face(WF) and face word(FW) was performed. The response, accuracy and reaction time were logged.

Results: DSM-V diagnosed 15 ADHD children (11.73 ± 0.7 yr) and age matched control (11.60 ± 0.7 yr) each performed both the task. There was a significant difference ($p < 0.0001$) in reaction time between ADHD and controls in all the tasks.

Mean reaction time were FW (1126 ± 15.05 vs 1076 ± 13.81), WF (911.9 ± 12.16 vs 941.5 ± 11.25), SN (994.6 ± 24.55 vs 804.4 ± 14.11), SF (815.2 ± 17.61 vs 747.1 ± 17.54) SI (1105 ± 30.63 vs 815.0 ± 17.91). However, significant difference ($p < 0.01$) in accuracy percentage between ADHD and Controls (93.23 ± 1.284 vs 87.09 ± 5.424) was only found in WF.

Conclusion: Increased reaction time is a suggestive of executive function (EF) deficit. Behaviorally, all tasks elicited interference effect, with significantly slower RTs in ADHD. Accurate performance in each task reflects two different pathways for RT and accuracy thereby reflecting that ADHD kids take time in processing information but decodes the information correctly.

Key-words: Attention Deficit Hyperactivity Disorder, Color word stroop and emotional stroop, reaction time, accuracy percentage, executive function.

Cortical sources of verbal OM chanting: A qEEG study

OR6

Manorma Saini¹, Rupesh Samanchi¹, Asfa Ahmed¹, Simran Kaur¹, Ratna Sharma¹, Prashant Tayade¹

¹Department of Physiology, All India Institute of Medical Sciences, New Delhi

Background: Meditation is a process of self-regulating the mind and body. "OM" mantra is the most widely used meditation practice in India. Though, reports have been published pertaining to relaxation effect during Om chanting but there is paucity of literature with respect to the cortical areas activated/deactivated after verbal "OM" chanting.

Objectives: To study and compare the pre and post effect of verbal "OM" chanting on cortical sources as assessed by qEEG.

Methods: A paradigm was designed using E-prime for verbal chanting of "OM" and administered in 12 adult male subjects with a mean age of 27.5 ± 7.5 yrs. EEG was recorded using a 128-channel geodesic sensor

net. EEG signals were band-pass filtered in 1-70 Hz. Then eyes close pre and post verbal "OM" chanting 20sec data was segmented and pre-processed. Further, ICA was performed followed by source analysis using sLORETA.

Results: The post versus pre-verbal "OM" chanting showed current source density, higher at left inferior temporal gyrus ($F_{max} = 2.86$) and suprathreshold voxels ($\text{Log } F = 0.257$, $p = 0.03$) with higher activation was found at inferior frontal gyrus, sub-gyral, superior temporal gyrus.

Conclusion: Post-verbal "OM" chanting showed activation in the left inferior temporal gyrus, inferior frontal gyrus, sub-gyral and superior temporal gyrus. These areas function in multimodal processing and attentional networks.

Key-words: qEEG, Source analysis, sLORETA

Valence influences perception during binocular rivalry in patients with schizophrenia

OR7

Kanishka¹, Angel Anna Zacharia¹, Sunaina Soni¹, Navdeep Ahuja¹, Prashant Tayade¹, Simran Kaur¹, Mamta Sood², Ratna Sharma³

¹Stress and Cognitive Electroimaging Laboratory, Department of Physiology, ²Department of Psychiatry, ³Department of Physiology, AIIMS, New Delhi.

Background: Emotional deficits have been reported in patients with Schizophrenia. These deficits may also be present in the form of negativity bias, though the neural mechanisms allowing such alternations of perception in schizophrenia remains unexplored. Binocular Rivalry can be used as a behavioural task to investigate whether there is an effect of valence on perceptual alterations in schizophrenia.

Objective: The present study investigated the perceptual dominance of emotional pictures (positive, negative or neutral valence) in patients with schizophrenia.

Methods: Fourteen right handed patients with Schizophrenia (mean age = 30.33 ± 8.91 yrs) performed an intermittent binocular rivalry paradigm designed using emotional and neutral pictures by International Affective Picture System. The paradigm consisted of presentation of three types of trials i.e., positive vs neutral, negative vs neutral and negative vs positive pictures. Predominance ratio was calculated for each percept (750 trials per subject). One sample t-test was used for the comparison of predominance ratios of two contrasting pairs of stimuli at the significance level of $p < 0.05$.

Results: Negative (0.2871 ± 0.1111) and Positive (0.2881 ± 0.08877) pictures showed significant predominance ($p=0.0045$, $p=0.0019$ respectively) when compared with neutral pictures, while no significant difference ($p=0.7501$) was observed when compared between positive and negative pictures (0.01585 ± 0.1039)

Conclusion: In patients with schizophrenia, pictures with valence are preferred over neutral pictures. No preference was observed for negative or positive pictures over each other.

Key-words: Schizophrenia, Binocular rivalry, Valence, Predominance

Effect of 2-methylimidazole exposure on anxiety and social behavior in adult Zebrafish

OR8

Nivetha R, Sathya Narayanan G

Department of Physiology, Dr. ALM Post Graduate Institute of Basic Medical Sciences, University of Madras, Taramani, Chennai, Tamil Nadu.

Background: 2 - methylimidazole is used to make many other chemicals for drugs, photography, dyes, rubber, and agriculture. 2 - Methylimidazole has been identified as a by-product in foods and has been detected in mainstream and sidestream tobacco smoke. We studied the effects of 2-methylimidazole on anxiety and social behavior in zebrafish.

Objectives: To assess the effect of 2-methylimidazole exposure on anxiety and social behavior in adult zebrafish.

Methods: Adult zebrafish were divided into control and 2-methylimidazole group. Zebrafish were exposed to 2-methylimidazole with the concentration of 125 mg/L for 15 days. The stress and anxiety behavior were assessed by novel tank, light and dark tank, social preference tank and novel object task.

Results: Novel tank test showed a significant alterations and the fishes represented a stress and anxiety like behavior upon exposure to 2-methylimidazole. In light and dark experiment, 2-methylimidazole group showed significant decrease in time spent in the dark than control. In social preference, 2-methylimidazole group showed no significant change when compared with the control group. In Novel object recognition test, 2-methylimidazole group showed significant decrease in time spent near the novel object than control group.

Conclusion: Exposure to 2-methylimidazole has significantly altered the stress and anxiety like

behavior in zebrafish indicating its toxic effects on altering mood and inducing anxiety.

Key words: 2-methylimidazole, anxiety, behaviour

Cortical sources of visuospatial complexity in Hindi language: A QEEG Study

OR9

Ankit, Rupesh Samanchi, Simran Kaur, Ratna Sharma, Prashant Tayade

Department of Physiology, All India Institute of Medical Sciences, New Delhi

Background: Hindi language (Devanagari script) has visuospatially complex features which increases neurocognitive load on the brain cortical areas. However, there is no literature exploring cortical sources of visuospatial complexity of Hindi language using QEEG.

Objectives: To find out cortical sources activated during presentation of visuospatial complex versus visuospatial simple Hindi words without meaning through QEEG.

Methods: Ten healthy volunteers (23.7 ± 3.1 yrs.) silently read 30 simple and 30 complex (with vowels diacritics and ligature consonants) Hindi words in a visuospatial complex task. Continuous EEG data was recorded and segmented into 1 second epoch from stimulus onset. Source localization was performed using sLORETA. The activity of neural source generators involved with semantic processing of complex and simple Hindi words were statistically compared using statistical non-parametric mapping.

Results: The estimation of sLORETA inverse solution showed significant ($p < 0.05$) activation of inferior ($t = 0.502$, BA 46,13) and middle frontal gyrus ($t = 0.502$, BA 46) during complex word stimuli than simple words stimuli.

Conclusion: Our study showed activation of middle frontal gyrus with reading of the Devanagari script. This area may be involved in processing of complex visuospatial information while reading. The right inferior frontal gyrus is involved in top-down control of visual attention as well as visuospatial working memory while processing complex orthographic features.

Key-words: visuospatial complex task, visuospatial complex and simple words, QEEG, sLORETA, statistical non-parametric mapping

Auditory and visual P300 event-related potentials in early cognitive assessment of epileptic children and adolescents

OR10

Sangeeta Gupta, Ramji Singh, Abhilasha Mishra
Department of Physiology, AIIMS, Patna, Bihar.

Background: P300, an event related potential has been suggested to be valuable in the assessment of cognitive dysfunctions. Very few reports explore neuro physiological status at early stages in epileptics with a comparison of visual and auditory P300 measures.

Objective: The present study, hence attempts to appraise the cognitive status in epileptic patients earlier by visual and auditory P300 and to find their association with various risk factors.

Methods: P300 was recorded in 48 epileptic children in the age-group of 5-18 years and 50 age and sex-matched controls by a rare-frequent (oddball) paradigm. Mean auditory and visual P300 latencies and amplitudes were compared among epileptics and controls and among generalised and focal epilepsy by unpaired t test. Pearson correlation coefficient test was done for computing the correlation between risk factors and P300 responses. p value <0.05 was considered as significant.

Results: Statistically significant delay in P300 latencies and reduction in amplitudes (both visual and auditory) was found in epileptics as compared to controls and also among generalized and focal epilepsies. In generalized epilepsy, both visual and auditory P300 revealed significant delay while only auditory P300 delay was found in focal form. No significant correlation was obtained with risk factors. No significant difference was found in P300 responses among patients with and without antiepileptic treatment.

Conclusion: Visual and auditory P300 potentials have an important role in the evaluation of early cognitive dysfunctions in epileptic children. P300 responses are not influenced by antiepileptics while the type of epilepsy alters them.

Key-words: auditory, cognitive, epilepsy, P300, visual

Effects of fMRI-guided neural navigation based rTMS therapy on pain status in fibromyalgia patients

OR11

Vikas Kumar Tiwari¹, Bhawna Mattoo¹, Uma Kumar², Senthil S. Kumaran³, Renu Bhatia¹

Departments of Physiology¹, Rheumatology², N.M.R.³
All India Institute of Medical Sciences, New Delhi.

Background: Intractable widespread body pain is the chief complaint of patients with fibromyalgia syndrome (FMS) besides insomnia and cognitive impairments. A multidisciplinary approach is needed to address the wide spectrum of symptoms. This study utilized neuronavigation based repeated transcranial magnetic stimulation (rTMS) over the Dorso-Lateral Prefrontal Cortex (DLPFC) as a novel approach for pain management in FMS.

Objective: The aim of this study was to explore the effect of neural navigation based rTMS on pain status in FMS by subjective pain assessment tests.

Methods: Twenty-six patients diagnosed with primary Fibromyalgia based on the diagnostic criteria of American College of Rheumatology were recruited from the Rheumatology outpatient department, at AIIMS, New Delhi. The patients were randomized into sham (n = 13) and real (n = 13) rTMS groups following which they underwent a standardized fMRI-based Stroop test protocol to locate DLPFC. This was followed by 20 sessions of either real or sham rTMS therapy. The pre and post rTMS effects were compared using Numerical Pain rating scale (NPRS) and McGill pain questionnaires (MPQ) for subjective pain improvement.

Results: Study suggested significant subjective pain improvements. The NPRS scores were significantly lower in patients (p <0.0001) treated with real as compared sham (p = 0.29).

Conclusion: Neuronavigation based rTMS may be an effective alternative therapy for pain in patients with FMS providing targeted therapy over DLPFC.

Key-words: DLPFC, Neuronavigation, McGill, NPRS

Neuroprotective role of prophylactic dietary choline in minimizing hippocampal CA1 neurodendritic pruning in rodent model of ischemic brain injury

OR12

Sivakumar Gopalakrishnan¹ Kiranmai S Rai²

¹Department of Physiology, KMC, MAHE, Manipal,
²Department of Physiology, MMMC, MAHE, Manipal.
sivakumar.g@manipal.edu

Background: Ischemic brain injury (IBI) is the third leading cause of mortality in the world. Neuroplasticity

during post stroke period contributes significantly to functional recovery. Studies show that choline is an essential nutrient for brain development and neural repair subsequent to IBI. The neuroprotective role of prophylactic choline supplementation to adults in minimizing pruning of neurodendritic arborization subsequent to IBI is least explored.

Objective: To explore the neuroprotective efficacy of prophylactic choline supplementation in minimizing pruning of hippocampal CA1 neurodendritic arborization in rodent model of IBI.

Methods: Male Wistar rats (10 month old) were subdivided into 4 groups [n=8 /group]-Normal control [NC], Bilateral Common Carotid Artery Occlusion [BCCAO] induced IBI group, Sham BCCAO group and prophylactic choline supplemented BCCAO group, where choline was supplemented for 15 days prior and 30 days after BCCAO surgery. The rats of all groups were euthanized and their brains were processed for assessing dendritic arborization of CA1 hippocampal neurons.

Results: Dendritic arbors of CA1 neurons were observed to have significant dendritic pruning /loss ($p < 0.001$) in BCCAO rats compared to the same in NC rats. Prophylactic choline supplemented BCCAO rats were observed to have significantly lesser pruning ($p < 0.01$) and more neurodendritic arbors at both apical and basal dendrites of CA1 neurons compared to the same in BCCAO rats.

Conclusion: Prophylactic dietary choline supplementation to rats during IBI can effectively minimize neurodendritic pruning/ loss in hippocampal CA1 neurons.

Key-Words: Ischemic brain injury, Choline, CA1 neurons, BCCAO

Early impairment of psychomotor speed and sustained attention in young adult smokers

OR13

Pushpa K, Priyadarshini Bai

Department of Physiology, Shridevi Institute of Medical Sciences and Research Hospital, Tumkur, Karnataka.
dr.pushpahalesh@gmail.com

Background: Cigarette smoking represents a considerable public health burden globally. Smoking in older adults is associated with cognitive impairment and more rapid age-associated cognitive decline, but there is a paucity of studies in younger people. Hence the study was undertaken to know the effect of cigarette smoke on cognitive functions in young adults.

Objectives: To assess and to compare the cognitive performance in young adult smokers and non-smokers.

Methods: Study was conducted between thirty male smokers (study group) and age-matched (18-30 years) thirty male non-smokers (control group) based on inclusion exclusion criteria. Subjects of both groups answered self-reported questionnaire about smoking and personal history. Cognitive tests were done for both groups, scores tabulated and analysed.

Results: Study group showed significant reduction in psychomotor speed (p -value < 0.01), sustained attention ($p < 0.01$) and no significant changes in executive functions, short term and long term memory as compared to control group.

Conclusion: Prevention of early cognitive decline in smokers has to be the top priority so as to reduce the public health burden. Awareness has to be created among smokers about neurotoxic effects of cigarette smoke and increased risk of cognitive impairment.

Key-words: Cognitive impairment; neurotoxic effects; smoking

Effect of stress– induced tissue malondialdehyde (MDA) level in different tissues in selective subcortical lesioned Wistar rats

OR14

Nayanatara A K¹, Tripathi Y², Nagaraja HS³

¹Departments of Physiology, Center for Basic Sciences, Kasturba Medical College, Bejai, Mangalore, Manipal University, Karnataka, India, ²Department of Physiology, Santhosh Medical College, Ghaziabad, India, ³Discipline of Physiology and Pharmacology Faculty of Medicine, Health and Molecular Sciences, James Cook University, Australia. Email; nayanatara.arun@manipal.edu

Background: Stress is an unavoidable phenomenon. Stressful situations can lead to many physiological and psychological alterations. Subcortical structures are known to influence stress responses. The idea that the brain categorizes stressors and uses response pathways that vary according to the category has gained significant support in the recent years.

Objectives: The present study was designed to elucidate the possible role of amygdala and PVN nucleus on chronic physical and chronic psychological stress induced tissue lipid peroxidation level.

Methods Adult albino rats (150 - 250 g) of Wistar strain were divided into amygdala lesioned and PVN

lesioned groups. Each group (n=10) was further subdivided into lesioned control group and lesioned stress group. The lesioned stress group animals were subjected to chronic swimming and immobilization stress with bilateral lesions of nucleus of amygdala and PVN. MDA levels of heart, liver, kidneys were estimated.

Results: Exposure to chronic swimming stress in PVN lesioned groups showed a significant ($P < 0.001$) increase in the tissue lipid peroxidation level when compared to the amygdala lesioned swimming stress groups. Further, exposure to chronic immobilization stress in amygdala lesioned groups showed a significant ($P < 0.001$) increase in the tissue lipid peroxidation level when compared to the PVN lesioned immobilization stress groups.

Conclusion: Amygdala nucleus appears to play a potent role in minimizing the stress induced free radicals in liver, kidneys and heart during the exposure to the psychological type of stress Whereas, PVN nucleus appears to play an important role in minimizing physical type of stress.

Key-words: Effects of stress, Wistar rats, subcortical lesion

Lower activity in alpha and gamma bands at anterior cingulate in glaucoma

OR15

Rupesh samanchi¹, Suriya Prakash Muthukrishnan¹, Tanuj Dada², Ramanjit Sihota², Simran Kaur¹, Prashant T Tayade¹, Ratna Sharma¹

¹Department of Physiology, All India Institute of Medical Sciences, New Delhi, ²Dr Rajendra Prasad Centre for ophthalmic sciences, All India Institute of Medical Sciences, New Delhi

Background: Glaucoma is an optic neuropathy with loss of retinal ganglionic cells leading to neurodegeneration, as indicated by functional neuroimaging studies. A direct measure of neuronal activity through EEG with high temporal and spatial resolution could be used as a tool to explore the functional changes in brain in patients of glaucoma.

Objective: The study aimed to assess EEG spectral power changes and their underlying neural generators in patients with glaucoma.

Methods: EEG was recorded for 37 newly diagnosed bilateral primary open angle glaucoma patients and 32 age-matched controls using dense array EEG (128 channel, sampling rate of 1000 Hz). Pre-processing of data (Band pass of 0.3-100Hz, artifact detection and bad channel replacement) was performed followed by

independent component analysis using EEGLAB. DIPFIT algorithm was used to solve dipole locations of components. k-means clustering algorithm was used to cluster the components with residual variance $< 15\%$. Montecarlo/Permutation statistics with max correction and p-value < 0.05 .

Results: Twenty clusters were obtained from k-means clustering algorithm. Of which, five clusters with half of the components from each group were selected. The one cluster located at anterior cingulate gyrus had lower alpha and gamma spectral power ($\mu\text{V}^2/\text{Hz}$) in patients compared to healthy controls.

Conclusion: Lower activation of anterior cingulate gyrus in gamma and alpha frequencies could underlie the reported deficits in various cognitive domains in glaucoma. The reported EEG changes could be used to assess the possible neurodegenerative changes in glaucoma before the clinical manifestation.

Key-words: Glaucoma, EEG, gamma, alpha, neurodegeneration

Dose Dependent Aging Effects Of Oral D-Galactose In Wistar Albino Rats

OR16

Sriram BS, Ravichandra V, Rajendra Holla

Dept. of Pharmacology, K. S. Hegde Medical Academy, Nitte Deemed to be University
Email-ravi75chandra@yahoo.co.in.

Background: Subcutaneous administration of D-galactose is commonly used to produce aging model in rats. Very few studies have been done to establish aging models in rats by oral administration of D-galactose.

Objectives: To investigate and compare the aging effects of oral administration of D-galactose by analyzing cognitive, biochemical and histological parameters with control groups.

Methods: Male Wistar Albino rats of four months old were randomly divided into 6 groups each consisting of 6 rats. The first group received the vehicle served as control. The second group received galactose (120mg/kg) by SC route, while third, fourth, fifth and sixth groups received galactose 100, 120, 150 and 200 mg/kg respectively by oral gavage for 42 days. All the rats were evaluated for learning and memory using Hebb William & Radial Maze apparatus and plasma MDA, GSH levels were measured. One way ANOVA is used followed by Dunnett's multiple comparison as post hoc test.

Results: Hebb William and Radial Maze data showed significant impairment in learning and memory in all the five groups of rats. There was a significant increase

in MDA levels in all the five groups. GSH level in plasma was significantly decreased and lipofuscin pigmentation were increased in the liver in D-galactose 100 mg/kg oral group and D-galactose SC groups.

Conclusion: Orally D-galactose at 100 mg/kg produced aging effects comparable with that of subcutaneous galactose (120 mg/kg) while higher doses were less effective in producing aging changes.

Key-words: Aging changes, Oral and Subcutaneous D-galactose, Lipofuscin pigments

Deciphering the role of CB2 Cannabinoid receptor agonist β -caryophyllene against Intracerebroventricular colchicine induced cognitive deficit in rats

OR17

Madhavan Nampoothiri, Maushami Das, Surubhotla Raviteja, and KSR Pai

Department of Pharmacology, Manipal College of Pharmaceutical Sciences, Manipal Academy of Higher Education, Manipal, Karnataka, India-576104.
E-mail: madhavan1984@gmail.com

Background: Cannabinoid 2 receptor (CB2R) plays a major role in neuroinflammation-mediated variations in Alzheimer's disease (AD). β -caryophyllene (BCP) is a bicyclic sesquiterpene found as a primary component of *Cannabis sativa* L and hemp. However, the influence of BCP on chronic animal models of AD has not been explored previously.

Objectives: This study was designed to evaluate the effect of β -caryophyllene (BCP) in colchicine-induced cognitive deficit in male Wistar rats.

Methods: Cognitive impairment was induced using intracerebroventricular (ICV) injection of colchicine at a dose of 5 μ g in 15 μ l of artificial cerebrospinal fluid. Two doses of BCP (10mg/kg and 20mg/kg) was administered for twenty-five days. To assess the spatial memory, Morris Water Maze test was performed and locomotor activity was evaluated by actophotometer. Acetylcholinesterase (AChE) activity, catalase (CAT), glutathione (GSH), and lipid peroxidation (LPO) was measured in the hippocampus and frontal cortex.

Results: The higher dose of BCP (20mg/kg) significantly antagonized the colchicine induced cognitive impairment evidenced by improved escape latency in the water maze task. BCP (20mg/kg) significantly reduced hippocampal AChE activity, enhanced catalase activity and GSH level in the hippocampus and frontal cortex. Further, lipid peroxidation in the hippocampus and frontal cortex was significantly reduced by BCP (20mg/kg) against colchicine insult.

Conclusion: To conclude, the present study proposes that CB2R agonist, β -caryophyllene might prevent

oxidative stress leading to cognitive impairment in the AD.

Key-words: cannabinoid 2 receptor; Alzheimer's disease; β -caryophyllene; colchicine

Aqueous humor metabolomic profiling of glaucomatous patients

OR18

Gowtham.L¹, Nabanita Halder¹, Tanuj Dada³, Rama Jayasundar², Baskar Singh⁴, Velpandian T¹

¹Ocular pharmacology & pharmacy, All India Institute of Medical Sciences, New Delhi, India.

²Department of NMR, All India Institute of Medical Sciences, New Delhi, India.

³Department of Ophthalmology, All India Institute of Medical Sciences, New Delhi, India.

⁴Department of Biophysics, All India Institute of Medical Sciences, New Delhi, India.

Email: gowthamkpm@gmail.com

Background: Intraocular pressure is primarily regulated by the endogenous metabolites which maintain the homeostasis of aqueous humor dynamics. Therefore, understanding the metabolic profile of aqueous humor is expected to explain pathophysiology, diagnosis (via biomarkers) and helps optimizing the pharmacological drug management involved in glaucoma.

Objective: To determine variations in the levels of neurotransmitter (glutamate, GABA and acetyl choline) and autocoid (histamine and 1-methyl histamine) metabolites of glaucomatous patients versus control (age matched cataract patients).

Methods: Institutional human ethics committee approval was obtained. This preliminary case control study involved with two glaucomatous study groups of primary open angle and primary angle closure glaucoma with control. six patients were recruited for each group according to the inclusion and exclusion criteria. Aqueous humor (70 to 100 μ l) was collected by paracentesis during the surgery which was stored at -80°C within 1 hour. A sensitive Liquid chromatography tandem mass spectrometry method was developed and metabolites were detected through electrospray ionizer using multiple reaction monitoring operated in positive ion mode. The developed method is validated according to the USFDA guidelines.

Results: We found significant elevation in the levels of both excitatory (glutamic acid) and inhibitory neurotransmitters (GABA) in both of the glaucomatous patient group in comparison to the cataract group. Interestingly, concentrations of acetyl choline,

histamine and 1-methyl histamine of glaucomatous group were significantly declined.

Conclusion: This finding suggests that the impaired levels of neurotransmitter and autocooid metabolites may play an important role in altering the homeostasis of aqueous humor dynamics and contribute disease pathogenesis.

Key-words: Metabolomics, Neurotransmitters, Histamines, Aqueous humor, glaucoma

A correlation study of structural, physiological and biochemical markers of arterial stiffness in apparently healthy individuals

OR19

Manisha Kar¹, Aparna Menon¹, Madhuri Panigrahi¹, Amit Singla², N Deep Bag², S. C. Mahapatra¹

¹Department of Physiology, AIIMS Bhubaneswar, Odisha, ²Department of Radiology, AIIMS Bhubaneswar, Odisha

Background: Arterial stiffness is a major contributor to cardiovascular disease (CVD) and its early detection will help to prevent CVD. Brachial-ankle pulse wave velocity (baPWV) is a relatively new, reproducible and simple non-invasive measurement of arterial stiffness. More studies are required to validate its use in clinical setting. Serum osteoprotegerin (OPG) is emerging as a biochemical marker of arterial stiffness. Carotid intima media thickness (CIMT) is a proven structural marker of arterial stiffness. In this context, the present study intended to examine the relationship between structural, functional and biochemical markers of arterial stiffness.

Methods: It was a cross-sectional, pilot study. 52 male subjects and 14 female subjects of age group 30 - 60 years or more were recruited. The anthropometric data and physiological parameters such as central SBP and DBP, augmentation index (AI%), peripheral SBP and DBP, Heart rate (HR), baPWV were recorded. The blood samples were collected for analysis of lipid profile and serum OPG level. CIMT of the subjects were ascertained by trained radiologist. The data was analyzed using SPSS version 20.

Results: Males had significantly higher values with respect to height ($p < 0.01$), serum cholesterol ($p < 0.05$) and serum LDLc ($p < 0.05$) than females. Females had significantly higher values with respect to BMI ($p < 0.01$), AI% ($p < 0.01$) than males. AI% and serum LDLc were significantly higher in males (60 years) ($p < 0.05$) than other age groups. baPWV

($p < 0.05$) and CIMT ($p < 0.01$) were significantly higher in females (> 60 years) than other age groups. Spearman correlation analysis showed that CIMT and serum OPG level were major factors influencing baPWV in male and female subjects. Linear regression analysis revealed that CIMT, serum OPG level and peripheral SBP were positively associated with baPWV in males. AI%, HR, serum LDLc and age were positively associated with baPWV in females.

Conclusion: In male subjects, CIMT and serum OPG level can influence the value of baPWV strongly and in female subjects, AI (%), heart rate and age can influence the value of baPWV strongly.

Key-words: Arterial stiffness, cardiovascular disease, serum osteoprotegerin, carotid intima media thickness.

Screening of inter-arm difference in blood pressure and ankle-brachial index by using Automated Oscillometric device in apparently healthy building construction workers

OR20

Manish Verma, Vibha Gangwar, Rajani Bala Jasrotia, Nitin Ashok John

Dept. of Physiology, Dr. RMLIMS, Lucknow

Background: Inter-arm blood pressure difference (IAD) has received increased attention recently since it has been found to be associated with peripheral vascular disease (PAD). PAD is a risk factor for future cardiovascular events and mortality and it is associated with reduced arterial pressures in legs. Doppler-assisted measurement of ABI is the accepted non-invasive gold standard for diagnosing PAD. Oscillometric blood pressure measurement device can also be used as automated tools for simplified ABI-measurements rather than pinpoint detection of a vessel by a Doppler probe.

Objective: The purpose of present study is to see the pattern of inter-arm difference in blood pressure and also validate oscillometric ABI measurement by assessing and comparing the results with the current gold standard of Doppler assisted measurement of ABI in primary care setting.

Methods: Inter-arm difference in blood pressure and ABI was measured in 50 building construction workers with age group between 20- 40 years using Automated Oscillometric device Microlife watch BP office (model- Twin200 AFS), Switzerland with appropriate cuff size for arm and leg circumference. Doppler ABI measurements were made with a commercially available HI-dop (BT-200) vascular Doppler in all building construction workers.

Results: Increased systolic inter-arm difference was present in significant number of participants. Oscillometric measurement of ABI was performed significantly faster than Doppler-assisted ABI. Correlation between Oscillometry and Doppler ABI was good overall.

Conclusion: In primary care setting, blood pressure should be actively measured in both arms. Oscillometric ABI is feasible and operator-independent.

Key-words: Inter-arm Blood Pressure Difference, Ankle-Brachial Index, Automated Oscillometric Device, Vascular Doppler

Dynamic cerebral autoregulation during Head down tilt

OR21

Shivangi, Kavita yadav, Dinu S Chandran, Ashok Jaryal, H N Mallick, Kishore Kumar Deepak
Department of Physiology, All India Institute of Medical Sciences, New Delhi

Background: Six degree of Head down tilt (HDT) is commonly used as model of weightlessness or ground based simulated microgravity environment in humans. Exposure to microgravity causes cephalad fluid shift that may alter cerebral autoregulation. There are few studies which suggest that impaired cerebral autoregulation is possibly responsible for the postflight orthostatic intolerance. However, dynamic cerebral autoregulation (dCA) responses during 6° HDT have been scarcely studied.

Objective: To evaluate the effect of acute 6° HDT position on dynamic cerebral autoregulation in humans.

Methods: Twelve healthy subjects (age 27 ± 3.5 years) underwent recording of middle cerebral artery blood flow velocity (CBFV) by transcranial Doppler (TCD) and non invasive continuous blood pressure (Finapres) during five minutes of supine rest and 6° HDT position. dCA was estimated by transfer function analysis between mean mCBFV and mean arterial blood pressure (mABP).

Results: The transfer function analysis was done between spontaneous changes in mCBFV and mABP in very low frequency (0.02-0.07Hz), Low frequency (0.07-0.15Hz) and High frequency (0.15-0.4Hz) ranges. mCBFV was not significantly changes during 6° HDT compared to supine [$54.48 \pm$ vs 58.19 ± 18.33] and mABP was significantly reduced during HDT vs supine [$69.25(64.27-81.39)$ vs $75.22(71.73-85.92)$]. There was no significant

difference between 6° HDT vs supine position in VLF, LF and HF ranges in coherence [$0.56(0.48-0.72)$ vs $0.48(0.40-0.64)$; $0.64(0.51-0.72)$ vs $0.64(0.60-0.72)$ and $0.53(0.44-0.57)$ vs $0.46(0.40-0.061)$ respectively], gain [$0.68(0.50-1.08)$ vs $0.66(0.55-0.92)$; $0.95(0.74-1.25)$ vs $0.83(0.77-1.20)$ and $1.45(1.19-1.53)$ vs $1.18(0.93-1.39)$ respectively] and phase [$1.25(0.90-1.48)$ vs $0.77(0.22-1.33)$; $0.51(0.36-0.69)$ vs $0.41(0.22-0.61)$ and $(-0.22(-0.42-(-0.18)))$ vs $-0.11(-0.20 - (-0.04))$ respectively] between mCBFV and mABP.

Conclusion: Our results suggest that cerebral autoregulation is preserved during short term exposure to 6° head down tilt.

Key-words: cerebral blood flow velocity, arterial blood pressure, Head down tilt

Can arterial stiffness increase independent of lipid profile in Coronary Artery Disease?

OR22

Damacharla Balakrishna¹, B. Sowjanya¹, P. Rama Mohan², John Preetham Gurja³

¹Dept.of Biochemistry, ²Dept.of Pharmacology, ³Dept.of Physiology, Narayana Medical College, Nellore, AP.

Background: Coronary Artery Disease (CAD) is leading cause of death and has become an epidemic in India. In the last decade CAD related mortality has increased to 23% from 17% according to the report of registrar general of India. Atherosclerosis & CAD are often associated with arterial stiffening which in turn increases the propensity to develop left ventricular hypertrophy, decreased coronary perfusion pressure, sub endocardial ischemia and subsequent development of atherosclerosis. Wide body of literature suggest a strong association between increased lipidemia with arterial stiffness. However, arterial stiffness may be independent of hyperlipidemia. Therefore, the present study aimed to assess the association between arterial stiffness and lipid profile in CAD patients.

Objective: To evaluate the association between arterial stiffness and lipid profile in CAD.

Methods: This cross-sectional study recruited 150 angiographically proven CAD cases and 150 age matched healthy control participants after obtaining informed written consent. Pulse wave analysis of Augmentation Index (AIX) and Subendocardial viability ratio (SEVR) was carried out in all the participants using SphymgoCor (EM3), AtCor Medical Pty Ltd, Australia as per the manufacturers protocol. Lipid profile parameters were measured using Humastar fully automated analyzer.

Results: The present study finds a significant increase in AIX [$P < 0.0001$] and decreased in SEVR [$P < 0.0001$]. There was no significant difference in lipid profile between cases and controls.

Conclusion: The results suggest that lipid profile may not necessarily mirror the arterial stiffening. Therefore, arterial stiffness may serve as an independent risk predictor of CAD.

Key-words: coronary artery disease (CAD), arterial stiffness, (AIX), subendocardial viability ratio (SEVR), lipid profile in CAD

Methods to improve insights into intra-arterial blood pressure monitoring

OR23

Farhan Adam Mukadam¹, K Subramani², Syrpailyne Wankhar³, Sathya Subramani¹, Suresh Devasahayam³
¹Department of Physiology, ²Division of Critical Care, ³Department of Bioengineering CMC, Vellore

Background: One of the key parameters monitored in any critical care setting is the intra-arterial blood pressure (iBP). Despite the richness of the data in continuous measurement of blood pressure, the value extracted from the pressure waveform in standard instruments is just a moving average of peaks and troughs.

Objective: To improve the understanding of the cardiovascular status of a patient with the analysis of the blood pressure waveform morphology, spectrum of frequencies and the other features.

Methods: Fifty-one patients with an intra-arterial line in the Surgical Intensive Care Unit (SICU) at CMC, Vellore were recruited. The patients were spontaneously breathing, hemodynamically stable and cleared for transfer to wards. After taking consent, their iBP was recorded on the CMC data acquisition system (CMCdaq). Analysis algorithms were implemented in MATLAB 2018a.

Results: The portrayal of beat-to-beat variability using an updating ensemble of individual waveforms added more information to the states of the arterial pressure waveforms, past and present. The blood pressure variability showed clustering into groups of high and low variability independent of the absolute values.

Conclusion: To enrich our understanding and perhaps make prognostic and therapeutic associations, feature extraction of the iBP needs further development. To be of any clinical value, data needs to be recorded with high fidelity. This can be achieved through the

incorporation of a periodic logging of the dynamic response of the system.

Key-words: intra-arterial blood pressure, hemodynamics

Change in forearm vascular resistance during non-hypotensive hypovolemia; Role of low pressure baroreceptors

OR24

Yadav Kavita¹, Shivangi¹, Chandran S Dinu¹, Akanksha¹, Jaryal Ashok Kumar¹, Coshic Poonam², Deepak K K¹

¹Department of Physiology, ²Transfusion Medicine (Blood Bank), All India Institute of Medical Sciences, New Delhi

Background: During mild hypovolemia, the blood pressure remains constant and one of the mechanism involves an increase in peripheral vascular resistance. However, the stimulus responsible for vasoconstriction remains unclear. Blood donation which involves a blood loss of 450 ml can be used as a model to study these cardiovascular responses.

Objective: To evaluate the role of low-pressure baroreceptors in the forearm (brachial) vasoconstrictor reflex response to mild hypovolemia.

Methods: The study was performed on 8 healthy male blood donor (age 30 ± 5 years; height 170 ± 5 cm). In the present study beat-to-beat blood pressure and forearm brachial artery diameter and velocity using ultrasound doppler were recorded for 1 minute before the start of blood donation, during the course of blood donation and 5 minutes after the completion of blood donation. Forearm vascular resistance was calculated offline by dividing brachial blood pressure (systolic)/brachial blood flow.

Results: 450 ml of blood loss results in no significant change in blood pressure during and after blood donation. However, there is a significant decrease in forearm blood velocity in post donation period (29.96 ± 5.28) as compared to baseline (35.88 ± 4.85 ; $p = 0.0002$) and a significant increase in forearm vascular resistance in post donation period (30.64 ± 12.18) as compared to baseline (24.83 ± 11.40 ; $p = 0.0025$).

Conclusion: The mild hypovolemia of 450 ml increases the forearm vascular resistance without significant change in the arterial blood pressure; possibly through low-pressure baroreceptors.

Key-words: baroreflex; low volume receptors; forearm resistance; blood donation

“O”- Endurimeter: Innovative instrument designed for the testing muscle endurance in experimental animals

OR25

Syed Shariq Naeem¹, Yasser Rafat², Waseem Rizvi¹, Shahpar N. Khan³, K. K. Depak⁴

¹Department of Pharmacology, JNMC, AMU, Aligarh (UP), ²Department of Mechanical Engineering, ZHCET, AMU, Aligarh (UP), ³Interdisciplinary Biotechnology Unit, AMU, Aligarh (UP), ⁴Department of Physiology, AIIMS, New Delhi
Email: syedshariq1@gmail.com

Background: Sports medicine is an upcoming field. Maintaining endurance of the muscles and treating any problem arising out of the muscle damage is of paramount importance. The lack of basic models for testing and treating muscle damage or quantifying muscle endurance in animals is one of the reason for the absence of efficacious medicines in this field.

Objective: To design and test innovative instrument “O”- Endurimeter for evaluating muscle endurance in the experimental animals (rat)

Methods: The study was passed by the Institutional Animal Ethics Committee. Male albino rats weighing 150 ± 25 g were used in the preliminary study. The animals run on the circular board assisted by a block attached to a motor. The block revolving in the circular compartment makes the rats run. The speed of the block and the times as well as distance ran by the rat can be modulated as per protocol. The rats were exercised for 15 minutes per day for 6 days a week for a period of 4 weeks.

Results: The preliminary data suggests that there is a 27% increase in the distance covered by the rat.

Conclusion: “O” Endurimeter can be a viable alternative to the treadmill for testing muscle endurance in experimental animals which can give more control on the animals behaviour.

*Study is a part of project sponsored by Department of Science and technology, Govt of India.

Key-words: Muscle endurance, Endurance testing, Instrument development

Effect of SGLT1 inhibition on ischemic-reperfusion injury in heart

OR26

Abhinav Kanwal¹ and Sanjay K Banerjee²

¹Department of Pharmacology, Manipal College of Pharmaceutical Sciences, Manipal Academy of Higher Education, Karnataka-576104, India, ²Drug Discovery

Research Center, Translational Health Science and Technology Institute, Faridabad-121001, India
Email: Abhinav.kanwal@manipal.edu

Background: Prevalence of cardiac ischemia is rapidly increasing day by day in the world. Among all, ischemic heart disease has been shown to be the most prevalent in the 21st century. Restoration of blood supply to the myocardium during ischemia reperfusion leads to the cell damage. This study investigated the effect of phlorizin, SGLT inhibitor, in cobalt chloride (CoCl₂) induced hypoxia on myocardial apoptosis.

Objective: The main objective was to find the effect of SGLT1 inhibition on ischemic reperfusion injury using phlorizin

Methods: We took three different models i.e ex-vivo I/R model, CoCl₂ induced hypoxia in SGLT1 overexpressed H9C2 cells and SGLT1 knockdown neonatal cardiomyocytes by siRNA. Three main groups were Control, I/R and I/R + PZ groups.

Results: Significant decrease in antioxidant parameters in I/R and I/R + PZ group. Gene expression and microscopy studies also have shown more depolarization in cell membranes in hypoxia as well as hypoxia + phlorizin groups among all the three models along with pyknotic and condensed nuclei. Flow cytometry studies shows more cells in early and late apoptotic phase in hypoxia group as well as phlorizin treated hypoxia group. More apoptosis has been seen in phlorizin treated cardiomyocytes which were knocked down by SGLT1 siRNA.

Conclusion: The blunted effect of phlorizin has been seen in I/R injury. Inhibiting SGLT1 has any effect on other glucose transporters have to be seen. In conclusion, phlorizin doesn't show any preventive effect in this study and inhibiting SGLT1 or knocking out SGLT1 is not a preventive approach in ischemia reperfusion injury.

Key-words: SGLT1, Ischemia-reperfusion injury, Phlorizin, Apoptosis, Hypoxia

Effect Of Myristica Fragrans Extract On Body Weight, Lipid Profile, Hepatic And Renal Systems In Experimental Obese Rats

OR27

Yakaiah Vangoori, Anusha Dakshinamoorthi.

Dept of Pharmacology, Sri Ramachandra Medical College & Research Institute, Porur, Chennai.
Email: drdanusha@gmail.com

Background: Obesity has been termed as “New World syndrome” can induce insulin resistance, BP, and dyslipidemia. It can be treated by reducing lipid levels.

Myristica fragrans was used traditionally to decrease appetite.

Objectives: To evaluate the effect of Myristica fragrans extract on Body weight, Lipid profile, Glucose, Liver function and Renal function.

Materials & Methods: 30 rats (150- 160g) were taken and divided into 6 groups and 6 rats each. Obesity was induced by giving fat diet and treated with extract and standard drug. For all the rats, body weight, normal lipid profile, Glucose levels, LFT, RFT was done before starting the study and after completion of study period (10 weeks).

Results: Treatment with extract of Myristica fragrans significantly ($p < 0.05$) and dose dependently reduced TC, TG, LDL, VLDL, but increased the levels of HDL when compared to obese control rats. Body weight and Glucose levels were also significantly ($p < 0.001$) reduced. There was no effect on Hepatic and Renal functions in treatment groups.

Conclusion: Tetrahydrofuran is one of the active compounds present in the Mace can prevent weight gain by stimulating AMPK enzyme in differentiated C2, C12 cells. This could be beneficial to the obesity and to treat associated complications.

Key-words: Mace, Body weight, Obesity, Glucose, LFT, RFT

Effect of isometric exercise on cardiovascular changes in normotensive healthy adults with or without parental history of hypertension

OR28

Ashwathy V T, Jyothi S

Department of Physiology, Adichunchanagiri Medical College, B G Nagara, Karnataka.

Background: Family history is considered as a strong risk factor for hypertension. An exaggerated cardiovascular response to exercise is suggested as a precursor of hypertension. Present study was taken up to evaluate the difference in the cardiovascular response to exercise in subjects with or without parental history of hypertension.

Objective: To compare the effect of isometric hand grip (IHG) exercise on pulse rate (PR) and blood pressure (BP) in normotensive healthy adults with or without parental history of hypertension.

Methods: This study was performed on healthy adults of age between 17-19 years. The study group consisted of 10 subjects with parental hypertension and control group consisted 20 subjects. IHG Exercise training was

done by using Hand grip spring dynamometer, which consists of 3 minutes of IHG exercise at 30% of maximum voluntary contraction. Subject's PR and BP were measured at baseline, during the exercise, immediately after exercise, 3 minutes and 5 minutes after exercise.

Results: There was a significant difference in the diastolic blood pressure (DBP) during exercise (83.25 ± 9.4 Vs. 74.6 ± 4.6 , $p < 0.05$), PR (78 ± 4.5 Vs 73.8 ± 3.3 $p < 0.05$) and DBP (73.25 ± 4.1 Vs. 67 ± 2.5 $p < 0.05$) at 5 minutes after exercise between the groups.

Conclusion: The DBP response to exercise was increased in subjects with family history of hypertension. Pulse rate and DBP was higher at 5 minutes after exercise in subjects with family history of hypertension showing increased recovery time required in these subjects.

Key-word: isometric handgrip exercise, hypertension, cardiovascular changes

Comparative study of effect of isotonic exercise on cardiovascular parameters in normotensive young adults with and without family history of hypertension

OR29

Jyothi S, Ashwathy V T

Department of Physiology, Adichunchanagiri institute of medical sciences, B G Nagara.

Background: Cardiovascular diseases remain one of the leading causes of death with hypertension being one of the major health problems in adults. The first degree relatives of essential hypertension are known to be at a higher risk for development of hypertension. The people who have family history of hypertension have been shown to possess different vascular abnormalities which put them at the danger of developing various cardiovascular diseases and may result in untimely death if not diagnosed and treated properly.

Objective: To compare the effects of isotonic exercise on cardiovascular parameters among normotensive adults with and without parental history of hypertension.

Methods: Thirty normotensive adults took part in the study of whom 10 had parental history of hypertension. Baseline blood pressure (BP) and pulse rate (PR) were measured for all the participants. They performed the Harvard step test for 3 minutes. The BP and PR were measured immediately after stopping the exercise and again at the end of 3 minutes and 5 minutes after stopping exercise.

Results: The t test was applied and $p < 0.05$ was considered significant. The PR measured immediately after stopping exercise was significantly higher in the group with parental history (92.25 ± 8.32) compared to the group without parental history (84.7 ± 8.20).

Conclusion: The group with parental history of hypertension in comparison with the group without parental history had high PR measured immediately after stopping exercise, probably indicating increased sympathetic activity.

Key-words: Harvard step test, hypertension, family history

Effect of body fat percentage on ventricular function and aerobic endurance in response to submaximal treadmill exercise in adult males

OR30

Afreen Begum H Itagi, C.C.M. Medical College, Durg.

Background: Body Fat Percentage (BF%) is major risk factor in chronic diseases. Abnormal changes in Cardiac and Aerobic responses to exercise indicate the alteration in autonomic activity.

Objective: To determine the relationship of BF% with ventricular functions and aerobic endurance before and after submaximal treadmill exercise.

Methods: Thirty males with higher Body fat percentage (BF%) & 30 males with normal BF% between age group 18-45 yrs were selected as cases and controls respectively. Computerized ECG system with Niviqure software was used. Heart Rate (HR), QT, and QTc, were measured pre and post submaximal treadmill exercise (i.e after exercise immediately, at 1 min & 5 mins). After complete recovery, treadmill test was repeated again till maximum predicted HR is achieved and test time (T) is noted to assess VO_{2max} using predicted equations. Appropriate Statistical tests were applied and $p \leq 0.05$ was considered significant.

Results: Resting HR ($p < 0.05$) and QT, QTc ($p < 0.001$) were significantly higher in Cases when compared to controls. Immediately & 1min after exercise HR, QT, & QTc were significantly ($p < 0.001$) higher in cases, whereas VO_{2max} was significantly lower in cases when compared to controls ($p < 0.001$).

Conclusion: Individuals with higher BF% had elevated resting HR and increased responses to steady exercise which could be due to alteration in autonomic functions with sympathetic hyperactivity. Delayed rate of decrease in HR after exercise was also observed in adults with higher BF% which indicates the risk of developing cardiovascular diseases.

Key-words: Body Fat Percentage; Treadmill exercise; Ventricular functions; Aerobic capacity; Sympathetic hyperactivity

Oxygen uptake and heart rate kinetics of Indian elite rowers during 2K rowing

OR31

Arnab Das¹, Malay Mandal¹, Alak Kumar Syamal², Pralay Majumdar¹

¹Department of Exercise Physiology, Sports Science, Sports Authority of India, Bangalore, India,

²Department of Physiology, Hooghly Mohsin College, Burdwan University, West Bengal, India.

Background: Competitive rowing involves abrupt transitions from rest phase to high-intensity exercise. Successful rowers cope up with the rapid increase in energetic demand requires a high level of coordination between the cardio-respiratory and muscular systems.

Objectives: The present study was aimed to characterize the kinetics of cardio-respiratory parameters of elite rowers during 2K rowing and to compare the response categorically.

Methods: 16 lightweight category (LWC) and 11 open category (OC) elite male rowers attending National camp were included in the study. Pulmonary gas exchange and HR during 2K rowing ergometer test was determined breath-by-breath by Metamax 3B portable metabolic gas analyzer and Polar HR monitor, respectively.

Results: No significant difference was observed in the HR kinetics during 2K rowing between the groups. It was observed that split relative VO_2 after 1000m ($p < 0.01$), 1500m ($p < 0.05$) and 2000m ($p < 0.01$) was significantly less in OC rowers than LWC. Split VE after 1500m ($p < 0.05$) and 2000m ($p < 0.01$) and split RER at 2000m ($p < 0.05$) were significantly high in OC. Percentage change in absolute and relative VO_2 , VE and RER after every 500m also showed no significant difference among the groups. OC rowers had taken significantly less time ($p < 0.05$) to complete first 500m, 500m to 1000m and last 500m distance than LWC rowers.

Conclusion: This detailed insight of rower's physiological responses categorically will help to determine the physical working capacity of each rower, predicting physiological potentialities and provided a database for developing a representative physiological profile of the successful rowers.

Key-words: lightweight category, open category, VO_2 , VE, RER

Comparison of cardio-pulmonary function, aerobic fitness, cognition, and autonomic function between athlete and non-athlete adolescent boys-A cross sectional study

OR32

Senthil Kumar Subramanian¹, Vivek Kumar Sharma², Gopal Krushna Pal³, Vinayathan Arunachalam⁴, Bharathi Balakumar⁵, Rajathi Rajendran⁶, Archana Gaur⁷

¹Department of Physiology, AIIMS, Mangalagiri, AP, ²Department of physiology, Government Institute of Medical Sciences, Greater Noida, Gautam Buddha Nagar, U.P-201310. India, ³Department of Physiology, Jawaharlal Institute of Postgraduate Medical Education and Research, Karaikal, Pondicherry, India, ⁴Jawahar Navodaya Vidyalaya, Kalapet, Pondicherry, India, ⁵Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry, India, ⁶Department of Physiology, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry, India, ⁷Department of Physiology, Chengalpattu Medical College, Chengalpattu, Tamil Nadu, India.

Background: Physical activity-cognition coupling has been observed early in infancy which gets further strengthened in the adolescence. Demands of athletic level training include coordinated complex movements, team participation, precise response and pre-empting unnecessary stimuli. Review of literature shows no consensus about the effectiveness of athletic training on executive functions including sensory-motor processing, attention span, mental flexibility, strategic analysis.

Objective: To study the cardio-pulmonary function, aerobic fitness, cognition, and autonomic function between adolescent athlete and non-athlete boys.

Methods: Thirty boys (10-19 years) participating in aerobic sports and have physical conditioning training for at least one year, were recruited as athletes and controls were age-matched non-athlete boys. Following parameters were recorded: 3Cardiopulmonary function, aerobic fitness, Eurofitness test battery, Autonomic function battery, Neurocognitive test battery.

Results: Heart rate and blood pressure were comparable. Peak expiratory flow rate, maximum inspiratory and expiratory pressure, derived VO₂max were higher in athletes. European fitness test parameters were better in athletes. Parasympathetic activity (RMSSD, SDNN, NN50, Total power, HF power, HFnu, 30:15 ratio, EI ratio) were higher and sympathetic activity (LFnu, LFHF ratio) were lower in athletes. Baroreflex sensitivity was higher in athletes. Time taken to complete the letter cancellation test and trail making test B was less in athletes. Athletes

recognition reaction time was less for both auditory and visual stimuli. There was trend toward decreased latency for cognitive evoked potentials.

Conclusion: Athletic level physical conditioning training-induced cognitive loading may improve neuro-effector communication, cognitive processing and autonomic functions that may prove beneficial to the adolescents' mental health.

Key-words: heart rate variability, event related potentials, cardiorespiratory fitness, peak expiratory flow rate, Eurofitness test

Faster skeletal muscle fatigability was associated with greater proportion of glycolytic muscle fibres among healthy Indians

OR33

Sreenath N, Pranathi R, Nidhi S, Kuriyan R, Sucharita S
Department of Physiology, St John's Medical College, Bangalore

Email id: sreenathneettiyath@gmail.com

Background: Skeletal muscle fatigability is of concern across ages in health and disease. Fibre type proportion plays a key role in the onset of muscle fatigue but there are no techniques to measure non-invasively. Non-invasive assessment of muscle power and strength is used to determine skeletal muscle fibre typing. Skeletal muscle fibre (Type 1, Oxidative and Type 2, Glycolytic) typing has importance in sports medicine and chronic disease state.

Objectives: (i) To derive skeletal muscle fibre types from muscle strength and power among healthy Indian male population (ii) To compare the skeletal muscle fibre types between fast and slow fatigue groups.

Materials and methods: 24 healthy males aged 18-59 years were recruited. Subjects underwent anthropometry, muscle mass (whole body potassium counter), muscle strength, fatigue and power assessment (Isokinetic dynamometry). Strength, power assessed at various angular velocities. Type 2 fibre calculated as a percentage. Type 1 derived as 100-Type 2 fibres. Physical activity assessed using a validated questionnaire. Subjects were grouped into fast fatigable and slow fatigable groups based on fatigue test (median relative torque).

Results: Fast fatigable group older than slow fatigable group ($P < 0.01$). Fast fatigable group had significantly greater Type 2 fibres (26.1 ± 3.3 %) compared to slow fatigable group (16.4 ± 3.4 %). Body cell mass, the metabolically active tissue was significantly higher in slow fatigable group. There was significant negative correlation between Type 2 fibres (%) and body mass index ($r = -0.46$, $P = 0.02$) after controlling for age.

Conclusion: Faster fatigability is associated with greater Type 2 fibre proportion among healthy Indian males.

Key-words: Fibre, Types, Skeletal, Muscle, Fatigue

Sex differences in relationship between components of metabolic syndrome and lung function

OR34

Nabamita Nath, Dipayan Choudhuri

Endocrinology & Reproductive Physiology Laboratory, Department of Human Physiology, Tripura Central University, Suryamaninagar, Tripura.
Email: nabamita.nath5@gmail.com

Background: A link between components of metabolic syndrome and lung function parameters has been observed in several cross-sectional and longitudinal studies. The relationship is influenced by racial, life style factors and sex difference.

Objectives: The study evaluated sex differences in relationship between components of metabolic syndrome and pulmonary function parameters in young adults.

Methods: The study was conducted among 164 male and 183 female subjects (18 – 25 years) from Tripura. The metabolic syndrome components (Waist circumference, serum TG, HDL-C, systolic and diastolic blood pressure, fasting blood sugar) were evaluated according to NCEP ATPIII criteria. Pulmonary function parameters evaluated in the subject included FEV1, FVC and FEV1/FVC%. Linear regression analysis was conducted to assess the association between metabolic syndrome components and parameters of pulmonary function.

Results: Metabolic syndrome components like WC, SBP showed lesser values ($p < 0.01$) and BMI, DBP, HDL-C had higher values ($p < 0.01$) in females in comparison to male. As well as pulmonary function parameters were also significantly lesser ($p < 0.01$) in females. In both male and female, lung function parameters showed lesser values in subjects with metabolic syndrome FVC -3.41 ± 0.27 (M), 3.12 ± 0.17 (F); FEV1 -2.70 ± 0.26 (M), 2.70 ± 0.17 (F); FEV1/FVC% -77.89 ± 1.57 (M), 86.51 ± 0.74 (F) in comparison to subjects without metabolic syndrome FVC -3.57 ± 0.28 (M), 3.25 ± 0.22 (F); FEV1 -2.92 ± 0.30 (M), 2.84 ± 0.20 (F); FEV1/FVC% -81.54 ± 2.76 (M), 87.33 ± 0.22 (F). Pulmonary parameters showed significant negative correlation ($p < 0.01$) with BMI and WC in both male and female subjects. TG varied significantly negatively with FEV1, FVC, and FEV1/FVC% in both male and female but HDL-C varied significantly positively in female subjects.

Conclusion: The findings suggest a sex specific association analysis of lung function parameters and components of metabolic syndrome is necessary to evaluate the relationship.

Key-words: Metabolic syndrome, Lung function, Sex difference

A study to quantify & compare stress levels & lipid profile in working & non- working women of Bangalore

OR35

Sneha G Deshapande, Girija B

Department of Physiology, Bangalore Medical College & Research Institute, K R Road, Fort, Bengaluru

Background: Dyslipidemia is prevalent worldwide. Mental stress & sedentary life style being major risk factors. Among working women lack of sleep, long working hours, commuting, meeting deadlines amount to physical stress that is part and parcel of job commitment. In non-working women there is availability of house help at hand & online facilities which reduce their physical activity. Many family issues & odd working hours may add to stress in them. Present study intended to quantify stress levels & compare it with lipid profile in working & non-working women.

Objectives: To quantify stress levels & lipid profile in working & non- working women and to compare stress & lipid profile in working & non-working women.

Methods: The study is done on 60 working & non-working women of banglore in age group of 20-40 years. Subjects with history of DM, HTN, CVD, thyroid disease were excluded. Informed consent was taken from all participants. After general examination & history taking -Stress score was assessed with perceived stress scale questionnaire. Lipid profile was assessed with 2ml venous sample after 8hrs of fasting. Students't' test is used for statistical analysis.

Results: Stress levels, LDL & Total cholesterol levels are significantly higher in working women. HDL levels were lower in same with P value of < 0.05 .

Conclusion: Dyslipidemia found in working population may be due to increased stress score in them.

Key-words: Working women, Non-working women, stress levels, lipid profile

Correlation between Body Mass Index and Sleep Pattern & Duration among Medical Students

OR36

Ajay Sharma U¹, Kasturi K K¹, Revathi Devi M L¹, Manjunath S N²

¹Dept of Physiology, ²Dept of Community Medicine, MMCRI, Mysore

Background: Obesity & its associated risks are a leading public health concern. Sleep deprivation is speculated to boost appetite. Medical students are prone to sleep deprivation.

Objectives: To study the correlation between Body Mass Index(BMI) and sleep pattern & duration among the study population using Pittsburgh Sleep Quality Index(PSQI) and also to study the sociodemographic profile of the study population.

Methods: Medicals students (n=247; males=133 & females=114) of age group 18-23years were properly examined to exclude those suffering from any major diseases, psychiatric problems, alcoholics or sleep medication. Height & weight were examined to calculate BMI and it was graded according to ICMR guidelines. Sleep quality & duration was assessed by a self-report questionnaire, PSQI. Pearson's correlation was used to find the association among parameters.

Results: 41.3%(102) had overweight BMI of ≥ 23 ; 38.1%(94) had poor sleep quality with PSQI score > 5 and 43.3%(107) are sleep deprived with sleep duration 5-6 hours. Analysis showed highly significant negative correlation between BMI & sleep duration with P value < 0.01 and also highly significant positive correlation between BMI & PSQI score with P value < 0.01 .

Conclusions: It was found that with increase in BMI there is decrease in sleep duration as well as reduction in sleep quality which again leads to obesity as a vicious cycle. Hence proper education about sleep and life style modification is needed to medical students to prevent obesity and its associated comorbidities among them.

Key-words: sleep duration; sleep pattern; BMI; PSQI; medical students

Association of some anthropometric indices and blood pressure among females in Ranchi Jharkhand

OR37

Geetanjali Kumari Poonam Singh

Department of Physiology RIMS, Ranchi

Background: Obesity is one of the main culprit in the development of hypertension, present study was conducted to establish relationship between BMI, WAIST HIP RATIO AND BP among perimenopausal women in and around Ranchi city of Jharkhand

Objective: The objective of this study was to determine the blood pressure and body dimensions and to find out the prevalence of hypertension in overweight and obese perimenopausal women in Ranchi, as this area has not been explored much regarding such studies.

Materials and Method: The study involved 300 female subject between age group 43yrs to 47yrs. After obtaining their anthropometric indices BMI was calculated. BP was recorded by auscultatory method using sphygmomanometer in 3 settings.

Results: Mean values of all the measurements, that is, height, weight, systolic blood pressure (SBP), and diastolic blood pressure (DBP) were higher among the female of age group 43 to 47 yrs. Body mass index (BMI) and fat percentage was found to be higher among these females. There was a significant positive correlation between BMI, and blood pressure both SBP as well as DBP

Conclusion: Prevalence of prehypertension among overweight/obese suggested an early clinical detection of prehypertension and intervention including life style modification, particularly weight management.

Key-words: body mass index, blood pressure (SBP and DBP), obesity, prehypertension

Correlation between body mass index, waist hip ratio and random blood sugar level in apparently healthy adults in Jharkhand population

OR38

Archana, Poonam Singh

Department of Physiology, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand

Background: Obesity is the most important environmental factor causing insulin resistance. High WHR is associated with an increased risk of type 2 diabetes. This study was undertaken to assess the relationship between BMI, Waist Hip ratio and Random blood sugar. No such study was done previously in this population.

Method: This cross-sectional study included 320 apparently healthy adult male and female individuals. Random blood samples were collected to measure blood sugar level using glucometer. BMI and Waist Hip ratio of these individuals were measured.

Results: The mean BMI between 18 to 25yrs of age was 20.13 ± 3.11 . The mean BMI between 25 to 60yrs of age was 25.48 ± 3.79 kg/m² in male and 25.98 ± 5.95 in female. There was a positive but non-significant correlation between blood sugar level and BMI among female ($r = +0.2885$, $p > 0.05$) and in the

male ($r = 0.1190$, $p > 0.05$) and also positive but non-significant correlation between Random blood sugar and waist Hip ratio among female ($r = 0.1256$, $p > 0.05$) and in the male ($r = 0.1593$, $p > 0.05$).

Conclusion: BMI and WHR had a positive correlation with RBS. The population of Jharkhand is therefore at risk of diabetes mellitus with increasing age.

Keywords: body mass index, obesity, random blood sugar, waist hip ratio

Oxidative stress and cellular aging biomarkers in diabetes mellitus patients with and without insulin therapy

OR39

Shailaja Moodithaya¹, Shruthi Suvarna H I², Raghava Sharma³, Amrit M. Mirajkar⁴

¹Department of Physiology, K.S.Hegde Medical Academy, Nitte (deemed to be) University, Mangalore, ²Department of Physiology, A. J Institute of Medical Sciences and Research Centre, Mangalore, ³Department of General Medicine, ⁴Department of Physiology, K.S.Hegde Medical Academy, Nitte (deemed to be) University, Mangalore.

Background: Diabetes mellitus leads to premature aging and significantly impairs the quality of life. Insulin is a growth promoting hormone and it has also been postulated that high insulin levels are one of the most significant causes of aging. Lifespan is regulated by genes controlling the activity of metabolism, antioxidant system, DNA repair, cellular senescence and cell death. Biological age of an individual is more indicative of his health than the chronological age.

Objectives: To compare oxidative stress and cellular biomarkers of aging between, Type 2 Diabetes Mellitus (T2DM) patients under oral hypoglycemic drugs, T2DM patients on insulin therapy and age matched healthy controls.

Methods: A total of 150 subjects, T2DM patients under oral hypoglycemic drugs ($n = 50$), T2DM patients on insulin therapy ($n = 50$) and age matched healthy controls ($n = 50$) participated in the study. Oxidative stress markers like Malondialdehyde and total antioxidants as well as cellular ageing markers like percentage of DNA damage, tail length and olive tail movement were evaluated. Data were analyzed using one way ANOVA with Tukey's Post-hoc test.

Results: Analysis of the study showed that the T2DM patients exhibited accelerated aging compared to the healthy controls as assessed by oxidative stress and cellular aging biomarkers. Further, T2DM patients on insulin therapy and oral drugs showed significant higher biological age compared to patients only on oral hypoglycaemic drugs.

Conclusion: T2DM impairs the chances of successful aging as assessed by cellular and oxidative stress aging biomarkers. Further, T2DM patients on insulin therapy exhibit accelerated aging compared to age matched T2DM patients without insulin therapy.

Key-words: aging, DNA damage, oxidative stress, Type 2 Diabetes Mellitus

Serum Interleukin -18 versus Serum NGAL in early detection of Contrast Induced Nephropathy

OR40

Mujahid Mohammed¹, Shobha Mohammed²

¹Department of Physiology, ²Department of Biochemistry, Maheshwara Medical College and Hospital, Isnapur, Telengana

Background: Contrast-induced nephropathy (CIN) is a complication which is underestimated in clinical practice after contrast induction in diagnostic and therapeutic procedures. CIN is the third leading cause of hospital acquired Acute Kidney Injury (AKI). Uses of these opaque iodinated contrasts are increased in day to day clinical practice but its contraindications on kidney are neglected. In recent years novel biomarkers like KIM 1, NGAL, Cystain C, IL-6 and IL-18 have marked their presence in identifying (AKI) on contrast exposure. Recently, IL-18 and NGAL emerged as novel biomarkers in identifying CIN. But early detection of CIN has become a challenging task.

Objective: To investigate whether serum IL-18 may be an early diagnostic biomarker than serum NGAL in CIN.

Methods: We performed animal studies on adult male Wistar rats with a dose of 0.6 mL of Iohexol (350 mg I /mL) iodinated contrast given intraperitoneally to 30 rats. 5 groups comprising of 6 rats were formed, in ascending order, as per the duration of sample collection 3, 6, 12, 24 and 48 hours and a control group of 6 rats, which has received 0.6 mL of normal saline intraperitoneally. Blood samples were drawn before and after the contrast induction by bleeding retroorbital plexus. Serum analysis was done for IL-18 and NGAL. Biochemical analysis was performed with available standard ELISA kits of serum IL-18 and serum NGAL.

Results: Data presented as mean \pm SEM and was statistically significant with serum IL-18 when compared to serum NGAL. Early raise in serum IL-18 was observed at 3 hours, found to be 48% increase and at 6 hours 100% increase, but rise in NGAL was 50% at 6 hours. Elevated levels of NGAL was observed at 6 hours after contrast induction. But rise in serum IL-18 was found to be early at 3 hours, which was statistically significant with t'test(2.18) and P value < 0.05 . Graphpad Prism (Version 7) was used for statistical analysis.

Conclusions: Current study demonstrate early rise in serum IL-18 levels, suggesting early ischemia of renal tubular tissue and gives good reflection towards severity of damage caused due to contrast induction, probably due to oxidative stress. Generally, an increase in serum IL-18 levels indicate ischemic renal tissue injury, injury to heart, brain, inflammation and T cell mediated immunity. These findings suggest that IL-18 may be clinically useful as an early diagnostic biomarker of CIN over NGAL, after the radiological procedures required iodinated contrast media.

Key-words: Acute Kidney Injury, Contrast Induced Nephropathy, Interleukin-18, Iohexol, Neutrophil Gelatinase Associated Lipocaline

Molecular characterization of functional domain in CC2D2A associated with ciliopathy

OR41

Roopasree O. J. and Shobi Veleri

Biochemistry and Molecular Mechanisms Lab, APTD, CSIR-National Institute for Interdisciplinary Science and Technology (CSIR-NIIST), Thiruvananthapuram, Kerala, INDIA - PIN 695 019. AcSIR, New Delhi

Background: Cilia are microtubule-based hair-like organelles that extend from the surface of almost all cell types of the human body. They are involved in numerous physiological and developmental processes. Many proteins are involved in biogenesis of cilia. Mutations in genes encoding these proteins cause multi system disorders called ciliopathies. CC2D2A is a gene localized in basal body. It is required for the cilia assembly. CC2D2A contains 2 coiled coil domains and a C2 domain. Mutations in the gene encoding CC2D2A cause ciliopathies like Meckel and Joubert syndromes. Null mutations in CC2D2A result in lack of protein, thereby lack of cilia, as in Meckel Gruber syndrome (MKS), a lethal ciliopathy. Missense mutations in CC2D2A result in abnormal cilia and are associated with Joubert syndrome (JBS). The patients with JBS survive with blindness and mental retardation. Most of the mutations in C2 domain of CC2D2A are known to affect the function of photoreceptors and brain. However, the role of C2 domain of CC2D2A is not clear.

Objectives: To decode the function of C2 domain in CC2D2A in cilia forming cells IMCD-3.

Methods: Mutations in human are simulated by gene knockdown, using custom made shRNA, in cilia forming IMCD3 cells. The effect of gene knockdown was analysed by immunofluorescence and western blot using antibodies specific to cilia and CC2D2A.

Results: IMCD3 cells culture was established. Immunostaining of cilia and basal body markers were analysed using standard primary antibodies. Custom made anti-CC2D2A, specific for C2 domain, raised in rabbits, is being tested on cells and growing cilia and for western blotting.

Conclusion: The preliminary research indicates that C2 domain is necessary for cilia function. Further data will be presented.

Key-words: Meckel-Gruber syndrome; MKS; Joubert syndrome; JBS; CC2D2A; ciliopathy

Running the Khardung-La Challenge, an ultra-marathon at high altitude, causes pulmonary interstitial edema in acclimatized lowland runners

OR42

VK Sashindran¹, SP Singh¹, Dharmendra Kumar¹, Arijit Ghosh¹, Arjun Vinod¹, Debashish Ghosh², Rachit Sharma², Khushboo², Anupam Ghoshal², Tashi Thinlas³, P Solanki², Anirban Bhattacharya⁴

¹Armed Forces Medical College, Pune, India, ²153 General Hospital, Leh, India, ³Sonam Norboo Memorial Hospital, Leh India, ⁴High Altitude Medical Research Centre, Leh, India.

Background: Physical exertion at high altitude (HA) may precipitate acute HA illness even in the well acclimatized. The Khardung-La challenge is 72 Km ultra-marathon run from 13,500ft, 32 Km uphill to 17,600ft, finishing at 11,500ft.

Objective: To seek evidence of clinical/sub-clinical HA pulmonary edema in runners after the Khardung-La challenge.

Methods: Seventeen acclimatized lowland runners (ALLR) and six native highland runners (NHLR) were studied before and after the ultra-marathon in 2017. Nineteen acclimatized lowland non-runners (ALLS) matched for stay at HA and fifteen NHL non-runners (NHLS) served as controls. Detailed history was obtained, clinical examination, funduscopy, chest ultrasound, dynamic spirometry done and blood Haemoglobin measured. Athletes were studied 96-72 hours before (Pre) and between 4-6 hours after completing the race (Post). Controls were studied at corresponding time points.

Results: No athlete or control had clinical acute high altitude illness Pre or Post-run. Body weight (70.06 ± 8.36 vs 71.29 ± 8.9 Kg, $p=0.0016$), SpO₂ (88.41 ± 2.92 vs $90.77 \pm 2.22\%$, $p=0.0113$) and FVC (3.98 ± 0.99 vs 4.35 ± 0.98 Litres, $p=0.0012$) were lower, heart rate significantly higher (88.65 ± 10.71 vs 75.42 ± 9.22 bpm) and comet score insignificantly higher 'Post', compared to 'Pre', in the ALLR, whereas

ALLS had significantly reduced heart rate (81.53 ± 10.04 vs 88.21 ± 14.95 bpm) and increased SpO₂ (90.89 ± 2.13 vs 89.00 ± 2.08 %). NHLR had a significantly higher heart rate (84.00 ± 9.84 vs 67.83 ± 6.49 bpm) but other parameters were unchanged.

Conclusion: Reduced arterial oxygen saturation, 4-6 hours after completing ultra-marathon, coupled with increased comet score and reduced FVC, suggests the possibility of pulmonary interstitial edema in acclimatized lowlander runners post-run.

Key-words: high altitude, ultra-marathon, interstitial edema, acute high altitude illness

Effect of sympathetic activation on gastric motility and its association with heart rate variability, in healthy subjects

OR43

Kiran Prakash, Amandeep Thakur, Anita S Malhotra
Department of Physiology, Government Medical College and Hospital, Sector 32, Chandigarh, PIN – 160030

Background: Autonomic nervous system (ANS) has the significant effect on gastrointestinal motility. Autonomic alterations have been found to be associated with gastric dysmotility in many diseases. There are few studies in which association of autonomic dysfunction with gastric dysmotility has been explored, and very few had been carried out in healthy individuals. To the best of our knowledge and search, there is no study where ANS has been challenged by 'cold-pressor test' (CPT) and gastric motility studied.

Objectives: The present study explored the effect of sympathetic activation by 'cold-pressor test' on gastric motility assessed by electrogastrography (EGG), in healthy subjects.

Methods: Recording EGG, ECG and beat-to-beat blood pressure was carried out in 14 healthy subjects during the test protocols. Baseline recording was carried out for 30 minutes. Afterwards, CPT was performed by asking the subjects to immerse their hand in the cold water (10°C) for 1 minute. EGG was analysed in the terms of cycles per minute. Heart Rate Variability (HRV) was analysed from the ECG recordings.

Results: Significant correlation was found between baseline-EGG-frequency and body mass index ($r=0.590$; $p=0.026$), waist circumference ($r=0.591$; $p=0.026$) and 'ratio' of HRV ($r=0.581$; $p=0.029$). However, EGG-frequency during CPT was significantly correlated with the SDNN ($r=-0.533$; $p=0.050$), LF ($r=-0.591$; $p=0.026$) and NN50 ($r=-0.558$; $p=0.038$) component of HRV. EGG-frequency was found to be significantly decreased ($p=0.023$) during CPT.

Conclusion: Gastric motility decreases during sympathetic activation by CPT in healthy subjects. EGG-frequency is significantly correlated with anthropometric parameters and HRV components.

Key-words: electrogastrography, heart rate variability, autonomic nervous system

Smooth muscles excised from pre-atretic part of jejunal atresia showed cholinergic and histaminergic contractions in vitro but definitive fibrosis in histopathological evaluation

OR44

Preeti Tyagi¹, Maloy B. Mandal², Ajay N. Gangopadhyay³, Shashikant C. U. Patne⁴

¹Department of Physiology, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi,

²Department of Physiology, ³Department of Pediatric Surgery, ⁴Department of Pathology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh

Background and Objectives: Study was aimed to assess the contractile and Histopathological status of smooth muscles of pre-atretic part of jejunal atresia to resolve debatable issues related to mechanisms of persistent dysmotility after surgical repair.

Methods: A total of 34 longitudinally sectioned strips were prepared from pre-atretic dilated part of freshly excised 8 jejunal atresia type III cases. Spontaneous as well as acetylcholine- and histamine-induced contractions were recorded in vitro by using organ bath preparations. Chemically evoked contractions were further evaluated after application of atropine (muscarinic blocker), pheniramine (H1 blocker), and lignocaine (neuronal blocker) to ascertain receptors and neuronal involvement. Histological examinations of strips were made by using Masson trichrome stain to assess the fibrotic changes.

Results: All 34 strips, except four showed spontaneous contractions with mean frequency and amplitude of 5.49 ± 0.26 /min and 24.41 ± 5.26 g/g wet tissue respectively. The response to ACh was nearly twice as compared to histamine for equimolar concentrations (100 M). ACh (100 M) induced contractions were attenuated (by 60%) by atropine. Histamine (100 M)-induced contractions was blocked by pheniramine (0.32 M) and lignocaine (4 M) by 74% and 78%, respectively. Histopathology showed varying degree of fibrotic changes in muscle layers.

Conclusions: Pre-atretic dilated part of jejunal atresia retains functional activity but with definitive histopathologic abnormalities. Excision of a length of pre-atretic part and early stimulation of peristalsis by locally acting cholinomimetic or H1 agonist may help in reducing postoperative motility problems in atresia patients.

Key-words: Intestinal atresia, smooth muscle contraction, fibrosis

A descriptive analysis of retention of applied clinical physiology principles among dental interns in a southern teaching tertiary care centre and hospital

OR45

Mythili Bai K¹, Madhavrao C²

¹Dept. of Physiology, ²Dept. of Pharmacology, AIMSR, Kerala

Background: The knowledge gained from basic sciences forms the foundation for clinical practice. Data from literature search has revealed that long term retention of basic science knowledge is about two third to three-fourth after one year and still lower after subsequent years.

Objectives: To study the retention of applied clinical physiology principles and attitudes towards physiology learning among dental interns in a southern teaching tertiary care centre and hospital

Methods: This study was carried out after obtaining the approval from the IRB. The target population of the study were dental interns. It was a questionnaire based study. Questions that defined the different objectives of the study were prevalidated. The obtained data was expressed in descriptive statistics.

Results: It was seen that, most of the questions related to the different domains of applied clinical Physiology principles were answered wrong by more than half of the study participants. However most of the study participants [more than 73.5%] had positive attitude towards opportunities for updating their knowledge in the field of Physiology. Also 83.75% of study participants were of the opinion that physiology is an important basic preclinical science, which helps in better understanding of clinical concepts in their professional period.

Conclusions: This study concluded that, there was a poor retention of applied clinical physiology principles among dental interns. However students had positive attitude towards the utility of physiology in clinical training. Hence there is a need to update physiology during the professional period through various teaching and learning strategies.

Key-words: Clinical Physiology, Dental, Interns, Tertiary Care Centre, Students

Students' perceptions on the importance of 'doing' hematology experiments in Physiology practical work during Medical training – reflection from a single medical College in South India

OR46

Savitha D, Taniya Anto

Department of Physiology, St John's Medical College, Bengaluru, Karnataka

Background: Although 'hands-on experience' of hematology practical work has been an integral part of Physiology education, the students' perception on the importance of the same has remained largely unexplored.

Objectives: To explore students' perception on the importance of 'doing' hematology experiments in Physiology course.

Methods: The first-year medical students of 2017-18 batch (n = 150) filled a semi-structured questionnaire at the end of routine hematology practical classes. The questionnaire captured their perception on the importance and objectives of 'doing' hematology practicals on their 'own' blood, the assessment of the same and its value in medical training.

Results: Some of the students were aware of the objectives (52%) while the others did not respond. Students opined that 'doing' practicals individually by 'pricking themselves' was a 'necessary' part of Physiology teaching (n = 126, 86%; 43M, 83F). They felt that it not only improved their knowledge (n = 120, 82%; 39M, 81F) and fine motor skills (n = 107, 73%; 41M, 69F) but also moulded their attitude (n = 101, 69%; 41M, 60F) gearing them to become 'empathetic' and 'confident' doctors. They opined that few practicals were 'unnecessary / outdated' and needs attention.

Conclusion: Students opined that performing hematology practicals improved their knowledge, skill and attitude while they suggested few modifications in the practical curriculum.

Key-words: Doing hematology practicals, hands-on experience, physiology, students' perception

Evaluation of the efficacy of OSPE and conventional method of practical examination in relation to theory marks

OR47

Bonti Bora

Department of Physiology, FAAMC, Barpeta.

Background: The most important underlying concept of OSPE method is that it can help to test the competence of a doctor rather than merely his

knowledge. Theory and other conventional examinations tend to examine knowledge component almost to the exclusion of competence component apart from being largely subjective. Practical skill plays a role in assessing the applied part.

Objectives: Introducing OSPE for the assessment of practical skills in physiology examination for undergraduate students and compared it with conventional practical examination (CPE).

Methods: A cross sectional study was done among the 40,1st year MBBS students of 2017 batch in FAAMC. In 1st semester examination those who got top 20 positions in theory marks, the practical marks (CPE) were taken from them. During test examination instead of CPE, OSPE was introduced and the marks obtained in the OSPE were noted of top 20 theory marks holder in the test examination, and the two set of marks are compared.

Results: The difference are found to be statistically significant ($p < 0.001$). The number of students achieving $> 80\%$ marks was also significantly higher with OSPE.

Conclusion: OSPE is a feasible and skill enhancing tool for the assessment in practical examinations for undergraduate students.

Key-words: OSPE, CPE, Assessment, Practical

To assess the impact of peer feedback on clinical skills training in Physiology

OR48

Ravikiran Kisan¹, Swapnali²

¹Department of Physiology, ²Department of Biochemistry. Kodagu Institute of Medical Sciences, Madikeri.

Background: Students fail to show adequate clinical skills in clinical physiology practical. But at the end of first year, students are expected to know how to perform clinical examination in a healthy subject. It can be overcome by telling about the strengths and weaknesses of his/her clinical skill performance and ways to rectify them.

Objective: To compare clinical skills performance of second term medical students with and without peer-feedback in clinical physiology practical.

Methods: Study was conducted in the Department of Physiology. 120 first year MBBS students were randomly divided into 2 groups – Group 1 (with peer-feedback) and Group 2 (without peer-feedback). Clinical examination (Radial-pulse examination) was demonstrated to all the students in small batches. Later, Group 2 students practiced clinical examination

in the conventional method, where as Group 1 students have practiced clinical examination with a peer with the help of a check list (procedure steps), who have given feedback about the procedure to their peer. After a practice session, both group students were assessed for their clinical skills by teachers (Max marks:10).

Results: The scores obtained were compared between the two groups by students t test. Mean score of the Group 1 (with peer-feedback): 7.6 ± 0.87 , Group 2 (without peer-feedback): 6.4 ± 1.34 with p value < 0.0001 .

Conclusion: Peer-feedback group got better score than the conventional method group. Therefore, learning of basic clinical skills in Physiology practical is better with peer feedback. This also improves overall learning and performance hence low scorers are less in group with feedback.

Key-words: Peer feedback, Clinical skills

Job stress among faculty in medical college

OR49

Rajashree, Ravindra PN

Department of Physiology, GIMS, Gadag

Background: Job stress is the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker. Job stress is inevitable and inherent in medical career. Teaching is considered a highly stressful occupation, especially medical teaching, which demands very high standards. Nevertheless, such studies are scarce with teacher samples, especially working in medical colleges. Hence, the present study aimed to assess job anxiety levels among medical teachers.

Objective: To determine the levels of job anxiety among medical college teachers

Methods: In this cross-sectional study, a pre-tested, structured Job anxiety scale and inferiority complex questionnaire was given to the teaching staff of medical college, through a neutral person and respondents were given assurance of confidentiality. Job anxiety scores were calculated and analyzed by non-parametric Mann Whitney 'U' test

Results: Job anxiety levels were significantly higher among teachers working in medical college. It was found that job anxiety levels were more ($P < 0.001$) in clinicians compared to basic science teachers and also higher in female teachers compared to male teachers ($P = 0.016$)

Conclusions: Job stress is inevitable, but it is mismanaged stress that is damaging in its consequences. The job anxiety is more in faculty those associated with many roles, such as research work, administration, clinical services etc. The findings of the study point towards the need for job-related interventions aimed at preventing burn-out among medical teachers, probably through more meaningful faculty development programs.

Key-words: job stress, anxiety, burn out, medical college teachers

Effect of online mobile games on hand grip strength & IQ among MBBS students

OR50

Naveen Kumar¹, Anjaly Mary Varghese²

¹Dept of Physiology, ²Dept of Pharmacology, Santhiram Medical College. Nandyal, A.P

Background: Online mobile video games are the most popular entertainment in the modern society targeting young population. Doing tasks to attain higher levels in the game makes players excited and losing make them anxious and they act indifferent to the surroundings.

Objective: To study the effect of online mobile games on muscle strength and intelligence quotient among medical students.

Methods: This study was carried out on 200 medical students (aged between 18 and 22 years) after obtaining informed consent. Subjects were divided into two groups. Group-I: non-players (100 subjects), Group-II: players (100 subjects). The muscle grip was assessed by hand grip dynamometer and I.Q assessed by questionnaire having different scores and the data was analyzed.

Results: There is no significant difference in age between Group-I and Group-II (19.0 ± 0.5 years vs 19.5 ± 0.4 years, $p = \text{NS}$). Group-I showed less hand muscle grip than Group-II ($p < 0.05$). IQ was found to be higher in Group II than in Group I ($p < 0.05$).

Conclusions: Though playing online mobile video games for a long time affects the health adversely and is linked to obesity, anxiety, depression, social withdrawal, the present study findings revealed that playing online mobile video games increases muscle strength and IQ levels. Cohort studies based on 'Number of hours/day' spent on online mobile gaming is required for knowing the further effect on I.Q levels on long term.

Key-words: online mobile games; hand grip strength; intelligence quotient

Usefulness of an additional teaching module in achieving higher cognitive levels in cardiovascular autonomic physiology in first year MBBS students

OR51

Amudharaj Dharmalingam^{1,2}, Hemalatha Manjeshwara³, Palaniswamy Hariharan³

¹(Formerly, where work was conducted) Aarupadai Veedu Medical College, Kirumampakkam, Puducherry, ²(Present affiliation of the presenting author) All India Institute of Medical Sciences, Mangalagiri, Andhra Pradesh, ³Aarupadai Veedu Medical College, Kirumampakkam, Puducherry

Background: Cardiovascular autonomic physiology (CAP) is an important core area in medical course. It is required to understand physiological regulations, cardiovascular pharmacology and management of non-communicable diseases. However, the number of teaching hours and marks allotted for CAP is less. Therefore, it is important to study the usefulness of introducing an additional teaching module to improve the understanding and application in CAP. Studies to explore the usefulness of including an additional teaching module in CAP are not found in literature.

Objectives: To compare the pre and post evaluation marks in the study group and the control group and to compare the difference in the marks obtained between the study and the control group.

Methods: All 100 first MBBS students were included in the study. They were randomly allotted into study and control group, each with 50 students. The study group underwent conventional teaching and additional teaching module whereas the control group underwent conventional teaching twice. The pre and post evaluations were done for both the groups. Paired t test and unpaired t test were done to assess the statistical significance.

Results: Statistical significance in differences in marks between pre and post evaluations was observed in study group. There was a statistically significant difference in the improvement of marks between the study and control group.

Conclusion: Additional teaching module is required to attain higher levels in cognitive domains pertaining to cardiovascular autonomic physiology.

Key-words: additional, module, cardiovascular, autonomic, teaching

Preferences in learning styles among undergraduate students of various disciplines of education from selected Indian universities

OR52

Sherly Deborah. G, Theingi Maung Maung, Usha Harischandran, Harini Narayanam

AIMST University, Bedong, Kedah, Malaysia.

Background: Students have different learning styles which can affect the way they learn. In the present scenario, it is vital even for the students to know their own learning style so that they can cope up easily with the learning processes in a comfort zone. Educators have a greater encumbrance to understand the heterogeneity of their students and potentially improve in a variety of ways to accommodate all learners' preferences.

Objective: To analyze preferred learning styles among final year undergraduate students of various disciplines of education from selected Indian universities.

Methods: A cross sectional study was conducted in selected Indian universities. Final year students of various disciplines of education who were willing to participate in the study were selected. The demographic details were collected after obtaining their consent for participation. VARK questionnaire was administered to the students in the form of hard copies to analyse their preferred learning styles.

Results: Based on the overall findings, students showed highest preference in kinaesthetic learning. Engineering students least preferred visual learning in comparison to students of other disciplines. Medical students were less interested in auditory and read/write learning than others. Kinaesthetic learning is preferred more by medical and dental students than engineering students. All findings are statistically significant at p -value < 0.05 .

Conclusion: The outcome of this study will help in revamping the teaching approaches to suit the students' preferences so that they feel comfortable in enhancing their learning performance.

Key-words: learning styles, VARK questionnaire

Laying the foundation of medical professionalism among pre-clinical students: Impact of 'Reflection' with Early Clinical Exposure

OR53

Agarwal Perna, Rawekar Alka

Department of Physiology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Physiology, Sawangi (Meghe), Wardha 442001 Maharashtra. dr.preranaagarwal@gmail.com

Background: There is a growing lack of 'medical professionalism' in the doctors of today. Which means professionalism has to be 'taught' to the medical students in a more explicit manner right from the beginning when they enter the medical field.

Objective: To inculcate the elements of medical professionalism among 1st MBBS students through early clinical exposure and reflection (reflection note writing) on it.

Methods: The 200 students of first MBBS of Jawaharlal Nehru Medical College, Wardha, were taken for an ICU visit, following which they wrote a 'reflection' note on it describing what they saw, what were their feelings and thoughts about it and what did they intend to do about it in future. The students were also given Objective Structured Clinical Examinations (OSCE), one before the visit and one after it for assessing their behaviour with the subject.

Results: The reflection notes were analysed thematically and revealed the budding of elements of professionalism in them: empathy towards patients, their relatives, and doctors, altruism, communication, responsibility, integrity, honesty, dedication, skill and knowledge, cooperation with other members of medical fraternity. There was a significant improvement in the OSCE scores (paired t-test, $p < 0.05$).

Conclusion: Incorporation of reflection note writing with early clinical exposure in the pre-clinical period is helpful in laying the foundation of medical professionalism among the pre-clinical students.

Key-words: Medical Professionalism, unprofessionalism, early clinical exposure, reflection, Objective Structured Clinical Examination

Intraocular Penetration and QSPR Modeling of 8 Congeneric Antifungal And Antiprotozoal Agents In Rabbits After Systemic Administration

OR54

Das U¹, Titiyal JS², Singh B³, Sreenivas V⁴, Jayaram B⁵, Halder N¹, Velpandian T¹

¹Ocular Pharmacology and Pharmacy, ²Department of Ophthalmology, ³Department of Biophysics, ⁴Department of Biostatistics, AIIMS, New Delhi, India, ⁵Department of Chemistry, IIT, New Delhi, India
Email:ujjwal87kumar@gmail.com

Background: Prediction of intraocular penetration of novel compounds is an important goal for ocular drug discovery. In the present study, we attempted to quantitate intraocular penetration of 8 congeneric compounds belong to antifungals (AFs) and antiprotozoals (APs) to derive quantitative structure-property relationship (QSPR).

Objectives: The objectives of the present study were 1) to evaluate ocular disposition of AFs and APs after systemic administration in rabbits; 2) to derive and correlate vitreous penetration with physicochemical and molecular dynamic properties.

Methods: Twelve New Zealand albino rabbits of either sex weighing 1.8-2.2kg were administered cassette of 8AFs and APs intravenously at a dose of 10 μ mol/kg and sacrificed using CO₂ at predetermined time points (30, 60 and 120min; n=4). AFs and APs were quantified in plasma, ocular fluids and tissue samples using LC-MS/MS. Percentage vitreous penetration and penetration index (logVP) for each analyte were calculated and correlated with calculated molecular properties. Multiple linear regression (MLR) was employed to generate in-silico prediction model to calculate logVP.

Results: Cassette dosing derived mean percentage vitreous penetration of tinidazole (71.6 \pm 12.9%) was found to be highest followed by fluconazole (67.6 \pm 4.7%) > metronidazole (45.7 \pm 6.1%) > voriconazole (44.8 \pm 4.9%) > clotrimazole (22.1 \pm 9.5%) > miconazole (13.3 \pm 5.2%) > ketoconazole (8.7 \pm 1.9%) > itraconazole (5.3 \pm 1.1%). MLR model was generated using parameters viz., band-gap and ionization constant showed best prediction (R²=0.989, Q²=0.920, RMSE=0.063, n=8) with respect to plasma concentration.

Conclusion: This study successfully modeled vitreous penetration of experimental compounds in-vivo in rabbits which further needs to be validated using external set of non-congeneric compounds.

Key-words: Cassette dosing, antifungals, antiprotozoals, mass spectrometry, QSPR

Acknowledgment: We kindly acknowledge DBT (Grant No. BT/PR9718/BID/7/466/2013) for providing financial assistance.

Study On The Anti-Emetic Property Of Methanolic Extract From Stem Of Swertia Chirata Using Chick Emesis Model.

OR55

Medhi Pranjal Kumar, Gohain Kalpana.

Department of Pharmacology, Assam Medical College, Dibrugarh, Assam-786002.
Email: drpranjalmedhi18@gmail.com

Background: The currently available anti-emetic drugs have limitations in many ways. Swertia chirata, a medicinal herb known since centuries, was evaluated for its anti-emetic property as claimed in traditional medicine, but still unexplored by anyone.

Objectives: To study the anti-emetic property of the methanolic extract from the stems of Swertia chirata.

Materials and Methods: Extract was prepared by Soxhlet apparatus. Acute toxicity test was done following OECD-425 guidelines. 25 young male chicks, 4 days old, weighing 25 to 35 g were used for the investigation. The chicks were grouped into 5 with each group bearing 5 chicks (n=5). Group I (Control) and Group II (Standard) received normal saline 10 mL/kg b.w. & chlorpromazine 150 mg/kg b.w., respectively. Group III (Experimental-1), Group IV (Experimental-2) and Group V (Experimental-3) received the extract at doses of 50, 100 and 150 mg/kg b.w respectively. All doses were given intraperitoneally. Emesis was induced by copper sulfate anhydride 50 mg/kg body weight. Anti-emetic activity was assessed from the percentage of inhibition of number of retches in the chicks.

Results: All the three doses of the extract showed anti-emetic activity; 50 mg/kg b.w had antiemetic activity (42.22% inhibition) comparable to chlorpromazine, 100 mg/kg b.w and 150 mg/kg. b.w (77.78% & 79.26% inhibition respectively) had highly significant (P < 0.001) and greater activity than chlorpromazine.

Conclusion: Swertia chirata has excellent anti-emetic property which can be further investigated for development of potential anti-emetic medicines.

Key-words: Emesis, copper sulfate, retches

Precorneal Tear Film Pharmacokinetics Of Extemporaneously Compounded Piperacillin And Tazobactam In Rabbits

OR56

Halder N, Velpandian T

Ocular Pharmacology and Pharmacy Division, Dr. RPC, AIIMS, New Delhi (India)
Email- nabanitah.aiims@gmail.com

Background: Corneal infections due to resistant strains are the emerging concerns of clinicians. Limited treatment modality warrants the appropriate use of antibiotics in eye infections. Therefore, the aim of the present study was to evaluate the suitability and tear pharmacokinetics of topical piperacillin/tazobactam (PT) in rabbit model.

Objectives: The objectives of this study were 1) to develop and standardize PT eye drops; 2) to evaluate tear pharmacokinetics of PT eye drops in rabbits.

Methods: New Zealand albino rabbits of either sex weighing 1.9-2.2kg were used for this study. Under sterile condition, PT eye drop (10% w/v) was extemporaneously prepared by qualified pharmacist. A

single dose containing an aliquot of 50 μ L of PT eye drop was topically instilled in conjunctival sac of right eye of each rabbit (n = 4). Tear samples were collected using calibrated Schirmer's strips at post-dose time intervals (5, 15, 30, 45, 60, 90 and 120min) and were quantified using highly sensitive method by ESI-LC-MS/MS.

Results: The results of single dose tear film kinetics showed half-life of 37.9min and 36.1min for piperacillin and tazobactam, respectively. It is indicating first order elimination from the precorneal area demonstrated low residence time of PT on tear film over the period of 120min. It attained MIC₉₀ (> 50 μ g/mL) for *Pseudomonas aeruginosa* for 30min after single instillation in rabbits.

Conclusion: This study evaluated the suitability of PT in eye drop formulations found to have limited residence in tear film. Repeated instillation is required to achieve the minimum inhibitory concentration for resistant strains.

Key-words: Piperacillin, tazobactam, LC-MS/MS, tear film

Functional importance of efflux drug transporter modulation in blood ocular barriers during inflammation

OR57

Moksha L¹, Halder N¹, Kumar A², Singh B³, Chawla R², Velpandian T¹

¹ Ocular Pharmacology and Pharmacy Div.,² Department of Ophthalmology, Dr.Rajendra Prasad Centre for Ophthalmic Sciences, All India Institute of Medical sciences, New Delhi-110029, INDIA, ³Department of Biophysics, All India Institute of Medical sciences, New Delhi-110029, INDIA
Email:mokshakoul47@gmail.com

Background: The blood ocular barriers (BOB) play an important role in the maintenance of homeostasis of the eye. Thus the understanding about the altered BOB functions during ocular inflammatory conditions is expected to reveal strategies for the rational development of drugs for their enhanced penetration with adequate concentration across the barriers.

Objectives: a) To evaluate the expression of efflux drug transporter (P-gp) in BOB in the experimental model of ocular inflammation. b) To evaluate functional role of P-gp during inflammation affecting ocular kinetics of drugs.

Methods: Wistar rats either sex (n = 6) were administered with endotoxin (200 μ g) into footpad to establish an experimental model of ocular inflammation. qRT-PCR analysis of P-gp transporter was performed in the ocular barriers (cornea, iris-ciliary body, retina-choroid) at 24hrs post LPS

challenge. Fold change in the gene expression was calculated by 2-Ct method. For functional evaluation study, at 22ndhr both control and experimental rats were intravenously injected with inert P-gp substrate Rho123 (3.038 mg/kg). Aqueous and vitreous humor were collected at 24hrs post LPS challenge for the quantitation of substrate using LC-MS/MS.

Results: P-gp expression in the experimental group was significantly upregulated in cornea, iris-ciliary body and retina-choroid. Significantly higher levels of substrate were found in aqueous humor of inflammatory model. Whereas in vitreous humor less concentration of substrate was attained.

Conclusion: The study reveals that inflammation resulted in the overexpression of efflux transporter especially across BOB. This elevated expression leads to change in ocular bioavailability of P-gp substrates like prednisolone, thereby resulting in inefficient therapeutic outcome in inflammatory conditions.

Key-words: Blood ocular Barrier; Ocular Inflammation; Endotoxin; P-gp; qRT-PCR

A study to evaluate the rational prescribing and medication appropriateness in pregnant women with co-existing illness undergoing treatment in a tertiary care hospital

OR58

Htet Wai Moe, Sushil Sharma, AK Sharma
Department of Pharmacology, Armed Forces Medical College, Pune-40, Maharashtra
Email: hwrain@gmail.com

Background: Pregnancy is a special physiological condition in a woman's body. While prescribing drugs, benefit to the mother and the risk to the foetus should be carefully considered.

Objectives: The study was conducted to evaluate rational prescribing and appropriateness of medications among pregnant women with co-existing illness in a tertiary care hospital, Western Maharashtra. Methods: It was a hospital based cross-sectional study. Pregnant women at any gestational age who are prescribed any medication apart from routine supplementations and immunization were included. The data was collected from 768 patients over 12 months. The drug utilization pattern was determined by using WHO core drug prescribing indicators and the appropriateness of medications was assessed by using the medication appropriateness index (MAI).

Results: The commonest drugs given were albendazole, l-thyroxine, aspirin, doxylamine and ranitidine in outpatient setting, and aspirin, inj. insulin, inj. progesterone, inj. enoxaparin and

l-thyroxine in inpatient setting. Average number of drugs per encounter was 3.03, percentage of generic drugs was 75%, percentage of encounters with an antibiotic was 15.49%, percentage of encounters with an injection was 45.96% and percentage of drugs from essential drug list was 93%. Drugs with highest average MAI scores were itraconazole, amikacin, albendazole, oxcarbazepine and warfarin. Diseases with highest average MAI scores were anemia, grave's disease, umbilical hernia, chronic hypertension, and UTI.

Conclusion: Evaluation of drug utilization pattern and medication appropriateness will minimize the incidence of risk to mother and foetus during pregnancy.

Key-words: Pregnancy, Rational prescribing, Medication appropriateness index

Medication and other risk factors contributing to fall related fractures in elderly: a case-control study

OR59

Vijayalakshmi D¹, Divyashree RN², Aradhana T Rathod³, Sushma M⁴

^{1,4}Department of Pharmacology, Bangalore medical college and research institute (BMC&RI), Bengaluru, ²ESI-PGIMS, Rajajinagar, Bengaluru, ³Department of orthopaedics, BMC&RI, Bengaluru
Email: drdivyavinay@yahoo.co.in

Background: Falls, considered as one of the "Geriatric giants" is a major health problem worldwide resulting from a complex interplay of various risk factors. Most frequently encountered injuries following fall are fractures (59.6%), superficial injuries (20.9%) and head injuries (8.7%). Paucity of Indian studies impelled us to take up the study.

Objectives: To assess medication and other risk factors contributing to fall related fractures in elderly.

Methods: This was a case control study and patients of either sex aged ≥ 60 yrs were included in the study. Socio-demographic details were recorded and comorbidities was assessed using Charlson comorbidity index (CCI), medications were categorised using WHO Anatomical Therapeutic Chemical (ATC) classification, cognitive assessment was done using Montreal Cognitive Assessment tool (MoCA) and polypharmacy was defined as use of five or more medications in the study. The risk factors were analysed in multivariate logistic regression model and p value < 0.05 was considered statistically significant.

Results: 200 subjects were enrolled in the study. Fracture neck of femur accounted for the majority 44% of fall related fractures. There was a 2.14 (4.38-1.04) fold of fall related fractures in elderly women. Comorbidity and polypharmacy were associated with 4.36 (2.92-6.51) fold and 3.67 (1.21-11) fold of fall related fractures respectively. The medications used belonged to category -Alimentary tract and metabolism, Cardiovascular system, Musculoskeletal system, blood and blood forming agents.

Conclusion: Female gender, comorbidity and polypharmacy was found to be clinically significant risk factors for fall related fractures in elderly.

Key-words: Polypharmacy, Comorbidity, fractures in elderly

An Insight and Potential of 5-Amino Salicylic Acid as a Tissue Regenerative Medicine

OR60

Shivaramkrishnan Balasubramanian¹, Thaggikuppe Krishnamurthy Praveen¹, Madhulika Dixit², Moola Joghee Nanjan Chandrasekar³

¹Department of Pharmacology, JSS College of Pharmacy, Ootacamund, India, ²Department of Biotechnology, Indian Institute of Technology Madras, Chennai, India, ³Department of Pharmaceutical Chemistry, JSS College of Pharmacy, Ootacamund, India

Email- shivaram.krishna@jssuni.edu.in

Background: Wound healing is a restoration process of tissue repair in response to an injury. Treating wounds is a clinical challenge for physicians. Few limitations being donor site morbidity, infection and pain. Our therapeutic direction is to initiate the re-epithelization and enhanced curative activity in a shorter duration of time without side effects. 5- Amino salicylic acid (5-ASA) is amino salicylate drug used to treat ulcerative colitis. It exerts the mucosal healing at inflamed surface of colon. This surface action of 5-ASA has not been explored for external purpose to cure wounds.

Objectives: To study the wound healing potential of 5-ASA by in vitro and by in vivo methods.

Methods: The molecular insights of 5-ASA with tissue growth factors were studied using Schrödinger Suite Version 6.4. By in vitro scratch wound assay using HaCaT cell lines and by excision wound model in Wistar rat, the healing potential of 5-ASA was studied in gel and ointment formulations.

Results: The scratch assay showed promising cell migration in 5-ASA at 125.629 μ g/ml. Excellent wound healing was seen at maximum degree of wound contraction at 99.5% in 5-ASA 2.5% Gel in 12th day and at 99.5% in 5-ASA 2.5% Ointment in 15th day in both treated groups compared to control.

Conclusion: 5-ASA showed promising tissue regenerative ability. Our future direction is to explore its molecular insight in initiating this tissue restitution and its enhanced curative activity of an injury in a shorter duration of time.

Key-words: 5-Aminosalicylic acid; growth factors; wound healing; re-epithelization

Evaluation of anti cancer effect of marine algae cladophoraglomerata in mda-mb-231 cancer cell lines- an in-vitro and in-silico study

OR61

S.Sharanya, Anusha, Darling Chellathai David.

Sri Ramachandra Medical College and Research Centre, Porur, Chennai.

E-mail: shanu.dhivya@gmail.com

Background: Marine algae are a huge Pandora box of rich nutrients and huge medicinal compounds. These medicinal compounds are widely investigated for their anti-cancer, anti-oxidant, anti-diabetic properties.

Objectives: This study evaluates the anti-cancer effect of the marine algae Cladophoraglomerata (collected from Hare Island –Tuticorin region) MDA-MB-231 breast cancer cell lines.

Methodology: The marine algae, Cladophoraglomerata was collected, processed and authenticated. Methanol, Ethyl acetate, Chloroform and Hexane extracts were prepared using hot solvent extraction process. These extracts were subjected to GCMS analysis and MTT assay (Mosmann et al). Doxorubicin was used as the positive control. The extract which showed the least IC₅₀ values in MTT assay were further subjected to In silico docking analysis against different receptor proteins.

Results: The IC₅₀ value of methanol, ethyl acetate, chloroform, hexane algae extracts and doxorubicin against MDA-MB-231 cell lines were calculated to be 24.26 \pm 1.06, 55.33 \pm 0.66, 97.88 \pm 0.67, 55.93 \pm 3.89 and 5.13 \pm 1.1 g/ml respectively. The compounds Phytol, Octadec-9-enoic acid and n-hexadecanoic acid present in the GCMS analysis of methanol extracts exhibited the least binding energy of -6.8, -4 and -4 k/cal/mol respectively when subjected to in silico docking analysis against Human Peroxisome Proliferator-activated receptor (a) ligand binding domain and human Topoisomerase enzyme respectively.

Conclusion: From the above study we can conclude that the methanol extracts of the algae Cladophoraglomerata has very good anti-cancer activity. The compounds present in the methanol-algae extract exhibits promising binding energy. These compounds can be purified and analyzed further for a potential lead as an anti-cancer molecule.

Key-words: Anti-cancer, marine algae, pharmacology, in-silico

Acute toxicity study and anti diabetic activity of marine alga – halimeda gracilis (hg) in freshwater zebrafish model

OR62

Sabari Anandh J.V¹, K. Manimekalai², A. Rajendra kumar³

¹Department of Pharmacology, MGMCRI, Puducherry, ²Kuyavarpalayam, Puducherry.
E-mail id: cronny.8681@gmail.com

Background: Halimeda gracilis (HG), a marine alga is unique with different metabolic and biological activities, but research is so far limited.

Objective: To assess the Acute Toxicity and Anti diabetic activity of HG.

Methods: In acute toxicity, the zebra fish were exposed to six different concentrations (100,50,25,12.5,6.25,0 mg/L) of HG methanolic extract for 96 hrs and were observed at 0, 24, 48,72 and 96 hours of exposure. For diabetic study, zebrafishes were injected with Sterptozotocin (STZ) and were divided into six groups, diabetic control group, diabetic zebrafish with 10, 7.5, 5.0 µg/g doses of HG treatment (test groups), diabetic zebra fish with standard metformin treatment and normal control group treated for 2 weeks. Fasting and postprandial blood glucose levels were monitored at 0, 60, 90 and 120 minute intervals after treatment and at 7th and 14th day of the treatment. At the end of the 2 weeks, fish were euthanized and sampled for histology analysis.

Results: Zebrafish did not show any signs of toxicity, behavioral changes, mortality and the Median Lethal Concentrations (LC50) were found to be ≥ 100 mg/L. HG extract treatment showed significant decrease in both fasting and postprandial blood glucose level compared with the diabetic control group. 10 µg/g of methanolic extract of HG exhibited significant decrease in pancreatic beta cells necrosis and reduced vacuolization in islets of Langerhans compared with the diabetic control group.

Conclusion: This study proved that the Halimeda gracilis was safe and possess anti-diabetic activity by improving blood glucose regulation and protecting pancreatic cell in STZ induced diabetic zebrafish.

Key-words: Halimeda gracilis, Anti-diabetic activity, Zebrafish model.

Effect of Ayurvedic and Modern medicine on clinical, biochemical and inflammatory markers in Polycystic Ovary Syndrome

OR63

Khade KN¹, Pandit VA¹, Wagh GN², Deshmukh CS², Bhalerao SS³, Gupte PA³

¹Department of Pharmacology, ²Department of Obstetrics and Gynaecology, 3IRSHA, Pune.
Email – drkalyanikhade@gmail.com

Background: Polycystic ovary syndrome (PCOS) is one of the common causes of menstrual irregularities,

which can lead to infertility in women. While etiology still remains unclear, evidences support presence of insulin resistance and chronic low grade inflammation induced by adipokines; eventually causing cardiovascular problems in these women. In the treatment of PCOS, Nishamlaki is used in Ayurved and Metformin in modern medicine. So, present study was planned to evaluate the efficacy of these drugs individually and in combination on various markers of PCOS.

Objectives: To study effects of Nishamlaki, Metformin & combination on clinical, biochemical and inflammatory markers of PCOS.

Methods: A prospective, randomized, parallel, active controlled study was done on 24 PCOS patients. After obtaining baseline parameters, they were randomly allocated to different groups and received Metformin, Nishamlaki or both for 3 months. Menstrual regularity and ultrasound examination; insulin resistance and level of TNF- α , IL-6, Adiponectin, Leptin was done before and after the study.

Results: Post treatment, regularization of menstrual cycles and reduction in insulin resistance was noted in all the groups. Significant decrease in ovarian volume was seen in Nishamlaki and combination groups. As far as markers are concerned, rise in Adiponectin and reduction in IL-6 was seen significantly in the combination group. TNF- α and leptin showed inconsistent results. Nishamlaki had minimal and Metformin had no effect on inflammatory markers.

Conclusion: Nishamlaki effectively reduced some of the clinical, biochemical and radiological changes of PCOS, hence can be considered as an adjuvant for it.

Key-words: Nishamlaki, inflammatory markers, PCOS

Comparison of cost-effectiveness between Tab Doxycycline and Tab Azithromycin with topical Clindamycin in treatment of patients with moderate to severe Acne Vulgaris – A Randomised, Prospective, Open label, Single centre, Parallel group study.

OR64

Apoorva, K Girish

Department of Pharmacology, KIMS Bangalore, RGUHS, Karnataka, India
apoorvaprabhu89@gmail.com

Background: Pharmacoeconomic analysis is increasingly becoming an integral component of the drug therapy. Acne vulgaris affects a large number of adolescents and young adults; presents with facial and truncal involvement. Systemic antibiotics are used for the treatment of papulopustular lesions.

Objective: This study was undertaken to evaluate the cost-effectiveness of Tab Azithromycin and Tab Doxycycline with topical Clindamycin for acne treatment.

Methods: The study was conducted on patients with moderate to severe Acne Vulgaris attending Dermatology OPD of KIMS Hospital. Following IEC approval 60 patients were enrolled into the study and were further randomized into two groups of 30 each who received pulse therapy Tab Azithromycin and Tab Doxycycline once daily respectively and Clindamycin ointment once at night for 8 weeks.

Results: The overall cost of therapy for Azithromycin was higher (Rs 528) compared to Doxycycline (Rs 445), it proved to be cost effective in treating acne as it not only showed early clinical improvement by decreasing lesions as well as showed improvement in Dermatology life quality Index score.

Conclusion: Azithromycin was better tolerable as well as cost-effective when compared to Doxycycline.

Key-words: Acne Vulgaris, Azithromycin, Doxycycline

Comparing the effect of statins on hepatic dysfunction induced by carbon tetrachloride in wistar rats.

OR65

Anupama Dhavaleshwal, Bharti Chogtu Magazine

Department of Pharmacology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal 576104, Karnataka, India.
email id:anupama17789@gmail.com

Background: The clinical studies have shown controversial results regarding effect of statins in liver dysfunction. However, anti fibrotic properties of statins in in vitro and in vivo experimental models has been demonstrated.

Objective: The purpose of this study was to compare the effect of statins on liver function tests.

Methods: Forty-two rats were divided into 7 groups (I to VII) (n=6). Liver toxicity was induced by injecting Carbon tetrachloride. Control groups received Cornoil and Carboxy methyl cellulose respectively. Group III to VII received CCl₄ for 6 weeks. Groups IV, V and VI received Simvastatin(10mg/kg), Atorvastatin(15mg/kg) and Rosuvastatin (2mg/kg) and group VII received Silymarin (50mg/kg) for next 8 weeks. Serum AST, ALT and ALP levels were estimated in all the groups at baseline, 6 weeks and 14 weeks.

Results: At 14 weeks, all the test groups (IV, V and VI) showed a significant decrease in ALT, AST and ALP

levels as compared to control ($p < 0.05$) and Group III ($p < 0.05$). On intergroup comparison, rats who received Rosuvastatin and Atorvastatin were superior to Simvastatin treated group though the difference was not statistically significant except for AST levels.

Conclusion: In the present study, statins decreased AST, ALT and ALP levels in CCl₄ induced hepatotoxic models.

Key-words: Carbon tetrachloride (CCl₄), Aspartate amino transaminases (AST), Alanine amino transaminases (ALT), Alkaline phosphatase (ALP)

Antiviral activity of Methyl Orsellinate and Montagnetol isolated from lichen Roccella montagnei

OR66

Nishanth B Bhat¹, Alex Joseph², Sanjeeva Nayaka³, Raghu Chandrashekhar H⁴, Narasimhan S⁵, G Gautham Shenoy²

¹Department of Microbiology, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, Karnataka, ²Department of Pharmaceutical Chemistry, Manipal College of Pharmaceutical Sciences, Manipal Academy of Higher Education, Manipal, Karnataka, ³Lichenology Laboratory, CSIR National Botanical Research Institute, Lucknow, Uttar Pradesh, ⁴Department of Pharmaceutical Biotechnology, Manipal College of Pharmaceutical Sciences, Manipal Academy of Higher Education, Manipal, Karnataka.

⁵Department of Biotechnology, Manipal Institute of Technology, Manipal Academy of Higher Education, Manipal, Karnataka.

Email:nishanth.bhat@manipal.edu

Background: Lichens are the most successful symbiotic organisms which have been traditionally used for treating different kinds of ailments. As there are only few reports on antiviral activity of lichens, we thought of evaluating the anti-Herpes simplex virus (HSV-1) activity of compounds isolated from crude methanolic extract of Roccella montagnei.

Objective: The objective of the present study is to fractionate and isolate compounds from Roccella montagnei and evaluate their anti-HSV-1 activity.

Methods: Methanolic extract of dried and powdered lichen was subjected to column chromatography and two pure compounds were isolated by gradient elution of the column with n-hexane, ethyl acetate and methanol. Cytotoxicity studies of isolated compounds were investigated on Vero cell lines by MTT assay to determine the non-toxic concentrations for antiviral studies. Antiviral activity was assessed using CPE inhibition assay.

Results: Isolated compounds Methyl orsellinate (RM6) and Montagnetol (RM80) were characterized by spectroscopy methods. The CTC50 value of RM6 and RM80 against Vero cell line was 75 and 410 $\mu\text{g/ml}$, respectively. RM6 at concentrations of 50 & 25 $\mu\text{g/ml}$ exhibited 77.78 % & 69.44 % protection, respectively against HSV-1 viral infection on Vero cell lines. RM80 exhibited 94.44 % & 88.88 % protection at 300 & 150 $\mu\text{g/ml}$, respectively. Standard drug acyclovir exhibited complete protection against infection at 25 $\mu\text{g/ml}$.

Conclusion: Two isolated compounds from *Roccella montagnei* showed good anti-HSV-1 activity. Further research is needed to understand its mechanism of antiviral activity, which may be useful in the development of new and effective antiviral agents.

Key-words: Anti-HSV-1 activity, Lichen, *Roccella montagnei*, CPE Inhibition assay

In vivo antidiabetic activity of flower of *Tupistra nutans*

OR67

Bibhushan Dhungyal¹, Chandrakala Sharma², D K Jha¹

¹Department of Physiology, ²Department of Pharmacology, Sikkim Manipal Institute of Medical Sciences (SMIMS), 5th Mile Tadong, 737102
Email: bibhu800@gmail.com

Background: Plant derived products are considered to have fewer side effects and are far less toxic as compared to the synthetic drugs. Hence, the phytochemicals are considered to have promising therapeutic potential for management of number of diseases including diabetes.

Objectives: The present study evaluated the antidiabetic potential of hydro-ethanolic extract of flower of *Tupistra nutans* (TN).

Methods: The experiment was performed by oral administration of hydro-ethanolic extract of flower of TN (400 mg/kg and 600 mg/kg body weight doses) in streptozotocin (65 mg/kg body weight) induced diabetic male albino Wistar rats. Glibenclamide was used as a standard drug in positive control group. Crude extract of TN was subjected to qualitative and quantitative phytochemical tests. Acute oral toxicity study was performed at different concentrations followed by estimation of blood glucose level and body weight in different experimental groups.

Results: The phytochemical analysis revealed the presence of flavonoid, saponin, phenol, anthocyanin and terpenoid. The extract tested at different doses did not exhibit any toxic effect or lethality in experimental animals. There was significant ($p < 0.05$) decrease in

blood glucose level in experimental groups treated with the plant extract at different concentrations as compared to diabetic control. The extract also showed dose-dependent increase in antidiabetic activity. Administration of TN extracts significantly increased the body weights in diabetic rats.

Conclusion: The findings of the present study suggest that the hydro-ethanolic extract of flower of *Tupistra nutans* has potential antidiabetic activity.

Key-words: antidiabetic, *Tupistra nutans*, hydro-ethanolic extract

Detection of genetic mutations in lung cancer patients with the help of liquid biopsy in Madurai, India - a cross sectional study

OR68

R. Shivani, Rekha, Rajkumar

Velammal Medical College Hospital & Research Institute

Background: Current biopsy procedures are invasive and especially in NSCLC, often produce too few cells or tissue sections for extensive analysis, multiple biopsies are not feasible for many patients, such as the elderly and those with comorbidities. Liquid biopsy is a minimally invasive test for assessing cancer genetic status based on the analysis of circulating free DNA. Because blood samples can be easily obtained, the concept of a blood-based biopsy has long held promise as a less invasive complement to traditional biopsy techniques.

Objectives: The present study aimed to detect the incidence of Epidermal growth factor receptor (EGFR), Kirsten rat sarcoma viral oncogene (KRAS) in the newly detected lung cancer patients with the help of Liquid Biopsy.

Methods: 20 Patients with Non Squamous Non Small Cell Lung Cancer (NSCLC) who were recently diagnosed and were planned for initial therapy underwent blood sampling (10 to 15 ml) and plasma droplet digital Polymerase Chain Reaction (ddPCR) for EGFR & KRAS mutations was done.

Results: 40% of the patients in the study population were positive for EGFR mutation. EGFR Mutation was positive in 7 out of 10 females with adenocarcinoma histology (70 %). KRAS Mutation was not detected in the female cohorts. 3 out of 10 patients (30%) among the female cohorts were negative for EGFR and KRAS mutations. One patient was positive for EGFR & KRAS mutations each among the male patient population.

Conclusions: In this study, we found that approximately one third of NSCLC patients harbour an

EGFR mutation. Patients who are female, non-smokers, and have adenocarcinoma are more likely to harbour an EGFR mutation, which is consistent with previous studies. Detection of EGFR mutation from blood sampling can be done rapidly, reliably and conveniently in lung cancer patients whereas obtaining the tissue through invasive procedure is associated with delay in diagnosis and morbidity.

Key-words: Lung cancer, Liquid biopsy

Evaluation of exercise induced changes in QT interval and its components QRS complex and JT interval

OR69

Ramkumar S, Manasi Bhattacharjee, Renuka Sharma, Raj Kapoor

Department of Physiology, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi
Email: nandyramdr@gmail.com

Background: Exercise significantly alters various ECG parameters. QT interval is one such parameter which comprises both cardiac depolarization (QRS complex) and repolarization (JT interval). A heart rate corrected QT called QTc is commonly measured. QT interval changes are linked with arrhythmogenicity. Exercise induced QTc changes have yielded controversial results, moreover the JT component is said to be a better marker for arrhythmia than the entire QTc. Hence, this study was conceptualized to evaluate exercise induced changes in QT interval and its components.

Objectives: To compare pre and post exercise QTc interval, and its components following isotonic and isometric exercise.

Methods: The study was conducted in 20 healthy male subjects. Baseline heart rate and blood pressure were measured. QTc interval, QRS complex and JT interval was measured before and after isotonic and isometric exercise.

Results: Basal blood pressure and heart rate were within normal limits. Isotonic exercise resulted in an increase in systolic blood pressure, whereas both systolic and diastolic blood pressure increased following isometric exercise. There was a statistically significant prolongation in QTc interval following both types of exercise. Of the components, QRS complex showed statistically significant change in isotonic ($p=0.01$) exercise only. JT interval showed statistically significant change following both isotonic ($p=0.01$) and isometric exercise ($p=0.01$)

Conclusion: This study shows that QTc increases significantly following exercise making the post exercise period more vulnerable for arrhythmias. Among the QT components, JT interval changes contribute significantly to the observed QTc change.

Key-words: QTc interval, QRS complex, JT interval

A novel automated approach in morphological analysis of eryptosis

OR70

Sanu Susan Jacob¹, Keerthana Prasad², Pragna Rao³, Asha Kamath⁴, Roopa B Hegde⁵, Prathap M Baby⁶

¹Department of Physiology, Kasturba Medical College, Manipal Academy of Higher Education, Karnataka, India, sanu.susan@manipal.edu, ²School of Information Sciences, Manipal Academy of Higher Education, Karnataka, India, ³Department of Biochemistry, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Karnataka, India, ⁴Department of Statistics, Prasanna School of Public Health, Manipal Academy of Higher Education, Manipal, India, ⁵Nitte Mahalinga Adyanthaya Memorial Institute of Technology, NITTE, Karkala, Karnataka, India, ⁶Department of Physiology, Melaka Manipal Medical College (Manipal Campus), Manipal Academy of Higher Education, Karnataka, India.

Background: Red blood cells (RBCs) upon injury, defect or disease, exhibit an apoptotic-like self-destruction process termed 'eryptosis', which reduces their normal life span. Eryptotic RBCs display certain hallmark morphological features such as cell shrinkage and cell blebblings. This study was intended to design an automated computerized approach for quick detection of eryptotic RBCs and also quantify their morphometrics in real-time.

Objectives: To design an automated tool for detection and quantification of eryptosis and also to analyse the accuracy of this tool in differentiating normal and eryptotic RBCs.

Methods: RBCs extracted from healthy volunteers ($n=17$), after their informed consent, were suspended in normal Ringer and hyperosmotic NaCl solutions and their photomicrographic images were captured. Morphological features, namely, cell size, cell irregularities and the presence of the central halo were picked up from the images of RBCs. Median and inter-quartile ranges for each RBC feature was derived and compared between the groups, using statistical software 'SPSS' 15.0. Receiver-operating characteristic curves for each feature were generated to determine the accuracy of this method and the cut-off values defined.

Results: The tool was capable of differentiating eryptotic RBCs from normal ones based on each morphological feature ($p < 0.0001$), each displaying a sensitivity $> 80\%$ and specificity $> 70\%$.

Conclusion: This simple automated model detects eryptotic RBCs instantaneously, in real-time, without exhaustive sample-fixation steps and with minimal manual labour. This novel technology may find wide applications in hematological research to study structural behaviour of RBCs in eryptosis caused by diverse stressors and diseases.

Key-words: Erythrocyte; Eryptosis; Image analysis

A cross-sectional study of hematological parameters of CKD patients' pre and post haemodialysis

OR71

Clevin Rashmi Rebello, Preethi G Hegde, Prasad BK
Department of Physiology, Karwar Institute of Medical Sciences, Karwar, Karnataka

Background: Chronic kidney disease is one of the emerging life threatening diseases in India.

Objectives: To compare the haematological parameters in chronic kidney disease patients, pre and post haemodialysis and to correlate their values with duration of haemodialysis.

Methods: Cross-sectional study was done on 29 patients registered for haemodialysis at Karwar Institute of Medical Sciences Hospital, Karwar, Karnataka. 5ml of whole blood was drawn from these patients by venepuncture. Two such venous samples of each patient were drawn, one 15 min prior to haemodialysis and another within 10 min post haemodialysis. The venous sample was immediately analysed for complete blood cell count by hematology autoanalyser. The collected data was statistically analysed using Microsoft excel 2010.

Results: Statistically significant increase in RBC count, Haematocrit, Hb, Granulocytes and Granulocyte%, while significant decrease in Lymphocyte% was noted post haemodialysis. Pre hemodialysis mean values of RBC count, Hb, Haematocrit, MCV are less than their normal range, while mean value of MCHC was higher than the normal range. There is insignificant change in mean value of MCV. On correlating the values of pre-dialysis haematological profile with duration of haemodialysis, there was significant negative correlation between duration of hemodialysis and Haemoglobin content ($r = -0.27$), MCH($r = -0.33$), MCHC($r = -0.42$).

Conclusion: Early screening of CKD patients for haematological parameters is necessary to avoid pre and post haemodialysis complications.

Key-words: chronic kidney disease, haemodialysis, haematological parameters

Comparative study of Neutrophil lymphocyte ratio in Diabetic patients with foot ulcer and without foot ulcer

OR72

S.M. Goornavar¹, Sangeeta Tuppada²

¹Department of medicine, SNMC, Bagalkot,

²Department of Physiology. KIMS, Koppal

Background: Diabetes is fast growing, the status of potential epidemic in India, with more than 62 million diabetic individuals currently diagnosed with the disease. Over 85% of lower limb amputations are preceded by foot ulcer and diabetes remains the major cause of non-traumatic amputation across the world with rates being as much as 15 times higher than in non-diabetic population.

Objective: To compare neutrophil-lymphocyte ratio in diabetic patients with and without foot ulcer.

Method: Diabetic patients aged above 18 years with (cases) and without (controls) foot ulcer admitted in H.S.K Hospital during the study period i.e., from 1st January 2016 to 30th June 2016. Data was analysed statistically by Mean, Standard Deviation, proportions, Chi square test and other relevant statistical tests using SPSS Software.

Result: There is statistically significant correlation between DFU and NLR with a p value 0.000 which shows high level of significance.

Conclusion: NLR can be directly calculated from the neutrophil and lymphocyte counts and can be easily be obtained from a complete blood cell count on admission and during follow up. Thus increasing values of NLR during follow up can be used to predict sub clinical inflammation and impending complications like DFU.

Key-words: Neutrophil to Lymphocyte Ratio, Diabetic foot ulcer

Effect of CD34+ Cell Dose on Neutrophil and Patient outcomes in Hematopoietic Stem Cell Transplantation – A Single Center Experience

OR73

Abraham L¹, Mathew A², Philip CC², Singh S², John MJ²

¹Department of Physiology, ²Department of Hemato-oncology, Christian Medical College and Hospital, Ludhiana

Background: Hematopoietic stem cell transplantation (SCT) is curative for a number of benign and malignant hematological disorders. CD34 expression on hematopoietic progenitor cells is used to assess stem cell content in peripheral blood stem cell and bone marrow grafts.

Objective: To evaluate the relationship between numbers of CD34+ cells infused per kg and the timing of neutrophil, platelet engraftment and day +30 outcome.

Methods: The effect of cell dose was studied in consecutive HSCT patients transplanted between November 2008 and December 2017. Neutrophil engraftment was defined as the first of 2 consecutive days with an absolute neutrophil count $>0.5 \times 10^9/L$ and platelet engraftment as unsupported platelet count $>20 \times 10^9/L$ for 7 days.

Results: Of a total of 131 patients, 26 (19%) underwent an autologous SCT, while 107 (81.9%) underwent an allogeneic SCT. The median CD34 dose infused in the autoSCT group was 5.29×10^6 CD34+ cells/kg (IQR = 2.95-10.98) and 6.42×10^6 CD34+ cells/kg (IQR = 4.20-9.20) in the alloSCT group ($p=0.773$). The median time to neutrophil engraftment in the autoSCT group was 11 days (Range 9.5 - 12) and in the alloSCT group was 15 days (Range 13-17), $p= <0.001$. The median time to platelet engraftment in both groups was similar (12 days). When patients were divided into three groups based on CD34 dose (<5 , 5 to 8 and >8), no difference was observed in the time to ANC or platelet engraftment. Similarly, no differences in time to engraftment were noted in each quartile of CD34 dosage in auto and alloSCT. The overall 30 day survival in the autoSCT was 96.2%, and the alloSCT was 89.5% ($p=0.294$). There was no correlation between cell dose and 30 day mortality.

Conclusion: A cell dose of approximately 5×10^6 /kg provides reasonably rapid engraftment, with no advantage seen for higher cell doses.

Key-words: Hematopoietic stem cell, cell dose, engraftment, patient outcomes, survival

Anaemia in Diabetics and Non Diabetics with Normal Renal Function

OR74

Srinath Rajeevan, Dinesha

Department of Medicine, Kasturba Medical College, Manipal Academy of Higher Education, Mangalore, India.

srinathcrajeevan@gmail.com

Background: In India there are 69.2 million diabetics. Generalized fatigue ability is a common symptom of diabetes which can be worsened by presence of undiagnosed anaemia. Studies have shown that the correction of anaemia slows down the progression of complications of diabetes.

Objective: Our study was undertaken to determine whether diabetics who have normal renal function have a higher prevalence of anaemia compared to non-diabetics.

Methods: It was an analytical cross sectional study, comparing diabetics and non-diabetic. Samples were chosen by simple random sampling: 50 diabetics and 50 non diabetics. The estimated glomerular filtration rate (eGFR) was calculated using the Cockcroft-Gault Equation. Those with eGFR > 60 ml/min were included. Using the WHO criteria, the prevalence of anaemia was checked for.

Results: 56 % of the diabetics were anaemic as compared to only 30 % of the non-diabetics. The p value was 0.0001. The odds ratio calculated showed, diabetics were 2.97 times more likely to have anaemia as compared to non-diabetics. Anaemic patients had an average of 9.68 years of diabetes. The non-anaemic patients had an average of 6.32 years of diabetes. The p value was 0.038. The mean glycated haemoglobin amongst the anaemic patients was 7.2 and 6.9 amongst non-anaemic patients. The p value was 0.450.

Conclusion: In our study it was seen that even in the absence of renal failure, the prevalence of anaemia was higher amongst diabetics as compared to non-diabetics.

Key-words: Anaemia, Diabetes, Normal renal function

Effect of Bromelain administration on caudal fin regeneration in streptozotocin induced Diabetes mellitus in adult zebrafish

OR75

Rajeshwari P, Sathya Narayanan G

Department of Physiology, Dr. ALM Post Graduate Institute of Basic Medical Sciences, University of Madras, Taramani, Chennai 600113, Tamil Nadu.
Email id: rajeshwari091091@gmail.com

Background: Impaired wound healing is most common in diabetes mellitus and it is critical to find a solution for impaired wound healing. Bromelain belongs to a group of enzyme obtained from pineapple which has many therapeutic benefits. Since zebrafish is an ideal model for studying metabolic diseases, it is used in this study.

Objectives: To evaluate the effect of Bromelain on caudal fin regeneration in streptozotocin induced Diabetes mellitus in zebrafish.

Methods: Zebrafish were divided into control; control + bromelain; diabetes; diabetes + bromelain groups. Diabetes was induced by using multiple doses of streptozotocin (350 mg/kg bw) on day 1,3,5,12,19 and single maintenance dose every week till the end of the experiment. Caudal fin was amputated on day 21. After day 21, oral bromelain dosage (40mg/kg bw) was given for 15 days and body weight, blood glucose level, total area and percentage of fin regeneration was observed on day 36.

Results: A significant increase in the blood glucose level was observed in diabetes induced zebrafishes compared with control. A significant decrease in the percentage of tail regeneration and area of regeneration was observed in diabetic fishes compared to the control. Bromelain treatment has significantly increased the percentage and area of regeneration and significantly decreased the blood glucose level in treatment group compared with control.

Conclusion: Our results demonstrate the potential role of bromelain in enhancing the tail regeneration. Hence, bromelain can promote the angiogenesis property which is crucial for wound healing and tissue regeneration, hence it can be used to improve the tissue degeneration which is most common in diabetes mellitus.

Key-words: Diabetes mellitus, regeneration, Bromelain, Streptozotocin

Correlation of body mass index and blood pressure among young adults

OR76

Tejashwini.V.B

Department of Physiology, Basaveshwara Medical College & Research hospital, Chitradurga.
Email: teju23091987@gmail.com

Background: There is an increase in the prevalence rates of overweight and obesity across the globe. Blood pressure (BP) has been found to increase among populations with high body mass index (BMI). Overweight and high BP both have independent fatal health consequences as they carry serious risk factors for several non-communicable diseases such as heart disease, stroke, type II diabetes and even death. It is against this background that this research was carried out.

Objectives: This study was conducted to determine the correlation of BMI and BP in young adults

Methods: 80 (36 males, 44 females) young adults of mean age 18 ± 0.96 years (mean \pm SD) were included in the study. Height and weight were measured for calculating BMI. Blood pressure was measured using sphygmomanometer. Statistical analysis was done by SPSS.

Results: The study revealed a significant correlation between BMI and BP (SBP and DBP) among the participants ($p < 0.01$). Significant correlation between BMI and BP (SBP and DBP) was recorded among male participants, while there was no significant correlation between BMI and BP (SBP and DBP) among female participants.

Conclusion: The study found a significant relationship between BMI and BP among the participants. There is a need for Students to be enlightened on the adverse health effects associated with high BMI and high blood pressure.

Key-words: Blood pressure, Body mass index, Young adults

Vitamin D status and its association with dyslipidemia among medical undergraduates in Academy of medical sciences, Pariyaram, Kerala

OR77

Annapurna.K, Swarnalatha P.K

Department of Physiology, Academy of Medical Sciences, Pariyaram, Kannur, Kerala.

Background: Vitamin D deficiency is emerging as a major public health issue in India. This vitamin is a pro

hormone, that gets activated by sunlight, and is involved in various physiological and pathological processes. Few recent studies have stated that low 25-hydroxyvitamin D is associated with cardiovascular risk factors such as dyslipidemia, hypertension and diabetes mellitus.

Objectives:

1. To study the vitamin D status among the study population.
2. To study the association between vitamin D deficiency and dyslipidemia.

Materials and Methods:

Study Design: Cross-sectional study

Study Setting: ACME, Pariyaram, Kannur, Kerala.

Study Period: 1 month. May 2018.

Study Population: 30 medical undergraduates of ACME, Pariyaram.

Study Methodology: All subjects underwent 25-hydroxy vitamin D assay by chemiluminescent micro particle immunoassay and fasting lipid profile. The values were statistically analyzed.

Results: Overall, 96.6% of subjects had deficient (<20 ng/mL; 93.3%) or insufficient (20-<30 ng/mL; 3.3%) levels and only 1 student had normal level (30-100 ng/mL; 3.3%) of 25-hydroxyvitamin D. In our study, we found that there was no significant association between vitamin D status and dyslipidemia.

Conclusion: The prevalence of vitamin D deficiency was very high among medical undergraduates in a medical college in North Kerala. But we found that deficiency of 25-hydroxyvitamin D was not significantly associated with dyslipidemia in this study population.

Key-words: 25-hydroxyvitamin D; Dyslipidemia; Medical Undergraduates

Effects of three months of yoga on body composition in females with abdominal obesity

OR78

Sushma Pal, Sachin Kumar Sharma, Niranjana Kala, Shirley Telles, Acharya Balkrishna

Patanjali Research Foundation, Haridwar, India. sushmaarsh@gmail.com

Background: Prevalence of abdominal obesity is high in Indian subcontinent. Abdominal obesity is associated with various diseases such as types 2 DM, cardiovascular disease and metabolic syndrome. Yoga can be helpful in positively altering the body composition.

Objectives: To assess whether yoga can change the body fat percentage, lean mass percentage and body

water percentage in females with abdominal obesity.

Methods: Fifteen adult females (group mean age \pm SD, 39.6 \pm 6.9 years) were selected randomly from a larger pool of data. Body composition was assessed using an electrical impedance analyzer (BF-907, Maltron, U.K.) at baseline and after three months of yoga. Supervised yoga practice was given 75 minutes/day for 3 days/week for a period of three months. The study had the approval of the ethics committee of the Patanjali Research Foundation (approval no. YRD/016/022).

Results: The body fat percentage decreased significantly from 46.9 percent to 42.2 percent ($p < 0.001$) and the lean mass percentage increased significantly from 53.7 percent to 56.5 percent ($p < 0.01$) after three months of yoga practice.

Conclusion: Yoga practice can be helpful for positively altering the body composition in females with abdominal obesity.

Key-words: Yoga, females, body composition, abdominal obesity

Effect of three months of yoga practice on hand grip strength and leg & back strength in females with abdominal obesity

OR79

Niranjana Kala, Sachin Kumar Sharma, Sushma Pal, Shirley Telles & Acharya Balkrishna

Patanjali Research Foundation, Haridwar, India
niranjankala17@gmail.com

Background: Indians show relatively greater accumulation of visceral fat which has been linked with specific diseases and decreased muscle strength. Yoga has been reported to improve muscle strength previously.

Objectives: The aim of the study was to assess the effects of three months of yoga practice on hand grip strength and leg & back strength in females with abdominal obesity.

Methods: There were 15 adult females with abdominal obesity which were randomly selected from a larger pool of data (group mean age \pm SD, 40.6 \pm 7.7 years). Hand grip strength was measured using hand dynamometer (Lafayette Instruments, model 7498-05, U.S.A.) and leg & back grip strength was measured using leg & back dynamometer (Takei model 5402, Japan). The yoga practice included postures, breathing techniques and guided relaxation which was for 75 minutes/day, 3 days/week for a period of three months. The study was approved by institutional ethical committee (approval no. YRD/06/022).

Results: Right hand grip strength increased significantly from 21.8 kg to 25.3 kg ($p < 0.01$), and left hand grip strength increased from 21.2 kg to 24.5 kg ($p < 0.05$) after three months of yoga practice. There was a trend of increased leg & back strength which was however not significant.

Conclusion: Yoga practice can improve the muscle strength in females with abdominal obesity.

Key-words: Yoga practice, hand grip strength, leg & back strength, abdominal obesity

A study on relationship of ABO blood group and Hypothyroidism

OR80

Hasana Fatima, R Anitha

Upgraded Department of Physiology, Osmania Medical College

Background: Hypothyroidism is an endocrine disorder resulting from deficiency of thyroid hormone or from impaired activity at tissue level. Prevalence of hypothyroidism is more in India when compared with western countries due to long standing iodine deficiency in the country. Despite the use of iodised salt in India, hypothyroidism is still prevalent. Hypothyroidism when treated early, prevents impairment of work performance and prevents economic decline in productivity of people.

Objective: To determine the relationship of different ABO blood group and hypothyroidism.

Methods: Fifty hypothyroid patients were selected from Endocrinology outpatient department of Osmania General Hospital, Hyderabad. Inclusion criteria: Non pregnant females, patients with no other endocrine disorder. Exclusion criteria: Hyperthyroid patients, post thyroidectomy, post radioactive iodine therapy. Blood group was determined by slide agglutination method.

Results: Out of the 50 hypothyroid patients, about 54% had O blood group, 30% had A blood group, 14% had B blood group, 2% had AB blood group. Result similar to a study by Dr. Manar Hasanal Murshidi, which concluded that people with O blood group have higher chance of hypothyroidism compared to other blood groups.

Conclusion: People with O blood group are more affected with hypothyroidism. They must be closely monitored for signs and symptoms of hypothyroidism.

Key-words: Hypothyroidism, ABO blood group

Evaluation of cognition enhancing activities of telmisartan and nimodipine in REM sleep deprived Wistar rats

OR81

Mohan Kumar.S, Mohan Amberkar

Dept. of Pharmacology, Kasturba Medical College, Manipal Academy of Higher Education (MAHE), Manipal, India.

Email: drmohan7amberkar@gmail.com

Background: Sleep deprivation (SD) may lead to the failure of advanced neural functions, including decision-making, learning and memory. Studies show that nimodipine may enter the cell and control the intracellular Ca^{2+} ion cascade by inhibiting excessive Ca^{2+} influx into the mitochondria. Thereby, Nimodipine improves the disruption of spatial cognition and elevates hippocampal acetylcholine. Telmisartan, has been proven to improve cognitive function in scopolamine induced amnesicrats.

Objective: To evaluate the cognition enhancing activities of telmisartan and nimodipine in REM sleep deprived Wistar rats

Methods: 24 rats were deprived of REM sleep for 18hrs/day for 21 consecutive days using modified multiple platform method. Group-1(sleep control+distilled water) Group-2(sleep deprived control) Group-3 (SD+telmisartan 3.6mg/kg) Group-4(SD+nimodipine5mg/kg). All the drugs are administered for 4 weeks. Morris water maze was done to estimate the spatial learning and memory. Oxidative stress was evaluated by measuring reduced glutathione and malondialdehyde levels and acetylcholinesterase activity was also measured. Results were analysed by ANOVA followed by post hoc Tukey's test.

Results: Increase in oxidative stress following REM sleep deprivation was reversed in chronic study. Chronic intake of telmisartan and nimodipine mitigated spatial learning and memory deficit in Wistar rats induced by REM sleep deprivation.

Conclusion: Oxidative stress is associated with memory deficits induced by sleep deprivation in the present study. The results demonstrate that telmisartan and nimodipine have potent cognitive-enhancing activity which may be attributed to its antioxidant properties or acetylcholinesterase inhibiting activity. However, other putative mechanisms need to be investigated.

Key-words: sleep deprivation, cognition, telmisartan, nimodipine

Evaluation of effect of escitalopram on aluminium chloride induced impairment in learning and memory in wistar rats

OR82

Arshad Basha Shaik¹, Smita Shenoy¹, Anupama V², Mohandas Rao KG³, Arul Amuthan⁴

¹Dept. of Pharmacology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, India, ²Dept. of Biochemistry, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, India, ³Dept of Anatomy, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, India, ⁴Dept. of Pharmacology, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, India.
Email: arshadbasha05@gmail.com

Background: Aluminium chloride (AlCl₃) is a neurotoxin, produces cognitive deficits and is implicated in Alzheimer's disease(AD). Depression is a common comorbidity in AD and escitalopram is commonly used to treat it. Escitalopram has antioxidant and neuroprotective properties.
Objective: To evaluate the effect of escitalopram on AlCl₃ induced memory impairment in rats.

Materials and methods: Four groups of female rats, with 6 rats in each was used. Group-I(control) and Group-II (Toxic control) received 2% Gum acacia, 10 mL/kg and AlCl₃, 175 mg/kg respectively. Group-III(Standard) and Group-IV (Test drug) receive donepezil 1 mg/kg and escitalopram 10 mg/kg respectively along with AlCl₃, 175 mg/kg. All drugs and AlCl₃ were administered orally daily for 2 months. Learning and memory was assessed by Morris water maze(MWM), oxidative stress by reduced glutathione(GSH), malondialdehyde (MDA) levels in brain. Brain acetylcholinesterase levels and histology of hippocampus were also evaluated. Results were analysed by ANOVA followed by post hoc Tukey's test.

Results: AlCl₃ alone treated rats showed significant impairment in memory in MWM, increase in oxidative stress in brain and histopathology of hippocampus showed unhealthy cellular architecture with large number of degenerated cells. All these changes were significantly reversed by donepezil and escitalopram. Though chronic administration of AlCl₃ resulted in significantly decreased acetylcholinesterase levels in brain, yet there was impairment in memory which indicates involvement of other mechanisms in its negative effect on cognition. Cholinesterase levels were further significantly lowered in rats who received AlCl₃ along with either donepezil or escitalopram.

Conclusion: Escitalopram ameliorated AlCl₃ induced memory impairment in rats by antioxidant effect and cholinesterase inhibition.

Key-words: cognition, escitalopram, aluminium chloride

Changes in Brainstem Auditory Evoked Potential of Children with Spastic Cerebral Palsy

OR83

Mandrita Chatterjee, Sonali Majumdar (Das)

Department of Physiology, R G Kar Medical College, Kolkata

Background: Cerebral palsy (CP) is a disorder of movement and posture causing activity limitation with spastic subtype being commonest. Recent studies have shown that hearing impairment occurs in 4 -25% of children with CP. Brainstem auditory evoked potential (BAEP) is a noninvasive and objective method, used to assess hearing in infants and older children who are unable to perform conventional audiometry.

Objectives: To assess BAEP changes in children with Spastic Cerebral palsy and also to assess the hearing threshold by evaluating wave V.

Methods: An observational cross-sectional study was conducted in the Department of Physiology, R G Kar Medical College & Hospital, Kolkata. Fifteen children with Spastic CP referred from Paediatric Medicine and fifteen controls were subjected to monaural threshold BAEP test after taking consent and ethical clearance. Neurosoft Neuro-MEP 4 machine manufactured by Neurosoft Software Production S.A. Ivanovo, Russia was used. Parameters considered were- absolute peak latencies of waves I, III, V, interpeak latencies of I-III, III-V, and I-V. Unpaired Student t test was applied. p value < 0.05 was taken as significant.

Results: BAEP shows anomalies in both peripheral (delayed absolute latency of Wave I) and central auditory pathway (delayed absolute latency of Wave V and III-V, I-V interpeak latency) in children with spastic CP. BAEP threshold is higher in children with spastic CP compared to healthy children.

Conclusions: BAEP may indicate hearing impairment in children with spastic CP. The neurological deficits present in cases of cerebral palsy may be the reason for abnormalities found.

Key-words: Brainstem auditory evoked potential (BAEP), Spastic Cerebral Palsy, Wave 'V', Hearing threshold, Interpeak latencies

Sympathetic Skin Response to auditory stimulus in children with and without Autism Spectrum Disorders (ASDs)

OR84

Remya Bharath¹, Shailaja S. Moodithaya¹, Harsha Halahalli¹, Shrinivasa Bhat U², Amrit M. Mirajkar¹

¹Department of Physiology, ²Department of Psychiatry, K. S. Hegde Medical Academy, Nitte deemed to be University, Deralakatte, Mangalore.

Background: Autism Spectrum Disorder (ASD) being a complex neurological and developmental disorder is associated with Autonomic Nervous System (ANS) dysfunction. Autonomic nerve reactions can be evaluated by measuring palmar sweating, to various stimuli and Sympathetic Skin Response (SSR), is one of the sensitive indices of sympathetic cholinergic activity. However, studies reporting SSR to auditory stimulus among ASDs are limited.

Objective: To assess and compare sympathetic autonomic response by evaluating sympathetic skin response to auditory stimulus in children with and without ASDs.

Methods: A total of 30 subjects were enrolled in the study, including 15 autistic children and 15 healthy controls. SSR was assessed by evaluating palmar sweating response to auditory stimulus, using a digitised data acquisition unit in a sound proof room, maintained at 23°C. SSR indices like amplitude (mv) and habituation were analysed and comparison was performed using Student t test. $P < 0.05$ was considered as statistically significant.

Results: Habituation for SSR was significantly lower ($p < 0.001$) in autistic children (0.43 ± 0.14) compared to normal children (0.98 ± 0.15), however there was no significant difference in SSR amplitude values between the groups.

Conclusion: Children with ASDs exhibited slower habituation of SSR to auditory stimulus compared to healthy controls. This slower habituation process might be due to persistent predominant state of sympathetic nerves, which in turn contributes to emotional and behavioral traits prevailing in ASDs.

Key-words: Autism Spectrum Disorder (ASD), Sympathetic Skin Response (SSR), habituation.

Effect of midazolam premedication on postoperative sedation in spine surgeries: An observational study

ORE1

Vinayak A¹, Kavitha Rajarathna¹ Raghavendra B S²

¹Department of Pharmacology, Bangalore Medical College and Research Institute, Fort, K R Road, Bengaluru- 560002, ²Department of Anaesthesia, Bangalore Medical College and Research Institute, Fort, K R Road, Bengaluru- 560002
e-mail: vinayak6491@gmail.com

Background: Midazolam, a short acting benzodiazepine is a preanaesthetic medication for tranquility, smooth induction and perioperative amnesia. It is a potent, non phlebogenic water-soluble drug, better suited for intravenous injection. Being a sedative, midazolam (t_{1/2} = 2hour) may cause residual sedation prolonging time for awakening. This may affect early neurological assessment required for spine surgeries in the immediate postoperative period.

Objectives: To assess postoperative sedation scores in patients who underwent spine surgeries, additionally premedicated with midazolam.

Methods: Data of forty patients who underwent elective spine surgeries under general anaesthesia with duration 2 ± 1 hour was considered. All patients were premedicated half an hour before induction in the preoperative ward, intravenously with glycopyrrolate 4mcg/kg, fentanyl 1 mcg/kg, on dansetron 0.15 mg/kg and pantoprazole 40 mg. Of the above premedicated patients, 20 patients received an additional premedication with midazolam (0.05 mg/kg I.V.). In the immediate postoperative period, level of sedation was assessed in all the study subjects according to modified Ramsay Sedation Scale (RSS) and compared.

Results: Baseline characteristics between the groups were comparable. Male: Female ratio was 24:16. Mean age was 43.78 years. Mean duration of all surgeries was 2 hour 13 minute. The mean RSS was 1.8 ± 0.77 in midazolam group and 2.05 ± 0.69 in the other group. (p = 0.2826).

Conclusion: Additional preanaesthetic medication with Midazolam 0.05mg/kg for anxiolysis did not increase sedation in immediate postoperative period.

Key-words: Midazolam, Post-operative sedation, Modified Ramsay Sedation Scale

Evaluation of Antidepressant activity of *Annona muricata* Leaves in Swiss albino mice

ORE2

Purushotham.K¹, Shashikumar¹, Prathima.C²

¹Department of Pharmacology, Chamaraanagar Institute of Medical Sciences, ²Department of Pharmacology, JSS Medical College, JSS Higher Education and Research
dr.arian18@gmail.com

Objective: To evaluate the in vivo antidepressant activity of the ethanolic extract of Swiss albino mice with *Annona muricata* leaves (EAML).

Methodology: The ethanol extract of *Annona muricata* leaves was prepared by a continuous method using the Soxhlet apparatus. Phytochemical evaluation followed by acute studies of oral toxicity in mice. EAML in doses of 100 and 200 mg / kg body weight was administered to test groups 1 and 2, respectively. Imipramine hydrochloride 15 mg / kg body weight Test group 3 received 100 mg / kg (p.o) of EAML + 10 mg / kg (p.o) of imipramine. The control group received a normal saline solution of 10 ml / kg of body weight. Antidepressant activity was known concluded the use of a modified forced swim test (FST) and a tail suspension test (TST).

Results: In both models a period of immobility indicative of the antidepressant activity was observed. Standard statistical methods were used to evaluate the results. The results showed an antidepressant effect dependent on the significant dose of EAML in Swiss albino mice for both models in the test groups (Test Group 1, 2 and 3). EAML has a significant antidepressant activity. However, further research is needed to determine its active components and the molecular level of the target mechanism for further use in humans.

Key-words: *Annona muricata* leaves, Immobility, Forced Swim Test, Tail Suspension Test

An experimental study to investigate the effects of HMG-CoA reductase inhibitor, atorvastatin on antidepressant action of fluvoxamine, venlafaxine and tianeptine in albino mice

ORE3

KG Bandekar, AK Sharma

Dept of Pharmacology, Armed Forces Medical College, Pune 40
Email: kedargbandekar@gmail.com

Background: High prevalence of depression as a comorbid illness is seen in patients suffering from cardiovascular diseases. Atorvastatin is commonly used in the management of cardiovascular diseases. It has been shown to possess antidepressant effect in

animal studies. However, information on its interaction with antidepressant drugs like fluvoxamine, venlafaxine and tianeptine is limited. Hence, the present study was conducted.

Objectives: i) To study antidepressant effect of atorvastatin, fluvoxamine, venlafaxine and tianeptine
ii) To study the effect of atorvastatin on antidepressant action of fluvoxamine, venlafaxine and tianeptine

Method: After IAEC approval, the study was carried out in albino mice in two phases. In phase I, antidepressant activity of atorvastatin, fluvoxamine, venlafaxine and tianeptine was confirmed after their single dose administration using forced swim test (FST) and tail suspension test (TST) and their minimum antidepressant doses were determined. In phase II, interaction of atorvastatin with fluvoxamine, venlafaxine and tianeptine for anti-depressant activity was studied by oral administration of these drugs daily for 28 days and performing FST & TST on 1st, 14th and 28th day.

Results: Minimal antidepressant dose of atorvastatin, fluvoxamine, venlafaxine and tianeptine was observed as 10, 25, 25 and 10 mg/kg respectively. In phase II, combination of sub-antidepressant dose of atorvastatin (5mg/kg) with sub-antidepressant doses of fluvoxamine (12.5mg/kg), venlafaxine (12.5mg/kg) and tianeptine (5mg/kg) demonstrated additive antidepressant activity.

Conclusion: Atorvastatin exerts dose dependent and treatment duration dependent anti-depressant activity which is additive to fluvoxamine, venlafaxine and tianeptine.

Key-words: forced swim test, tail suspension

Correlation of level of disease severity with cardiovascular autonomic status in rheumatoid arthritis

ORE4

Mohan Babu S¹, Renuka Sharma¹, Arun Gogna², Raj Kapoor¹

¹Department of Physiology, ²Department of Medicine, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi.

Background: Rheumatoid Arthritis (RA) is an autoimmune disease characterized by chronic systemic inflammation. Apart from joint destruction, cardiovascular autonomic dysfunction is a commonly observed feature in RA. This study was planned to evaluate the cardiovascular autonomic status in RA patients and also to correlate it with the level of disease severity.

Objective: To study the Heart Rate Variability (HRV) and QTc interval in RA patients and correlate them with the level of disease severity.

Methods: The study was conducted on 35 RA patients (1987 ACR Criteria) and 35 controls. Short term heart rate variability was taken as an index of autonomic function and both HRV and QTc interval were calculated from 5 minute ECG recordings. Severity of RA was assessed by DAS28(ESR) score.

Results: LF, NN50 and RANGE were significantly decreased ($p < 0.007$, < 0.028 , < 0.001 respectively) and QTc interval was significantly elevated ($p < < 0.001$) in RA patients. The disease severity score was observed to be low in RA. Correlation analysis showed significantly positive correlation of DAS28 with RMSSD, NN50 and HF.

Conclusion: RA patients exhibited autonomic dysfunction as evidenced by decreased HRV and increased QTc interval. However, on correlation, only HRV was significantly correlated with disease severity, hence suggesting it is a more sensitive indicator than the conventional QTc interval for diagnosing early cardiac dysfunction. We propose that HRV may be included as a diagnostic tool for early diagnosis and better management of patients of Rheumatoid arthritis.

Key-words: QTc interval, heart rate variability, rheumatoid arthritis, disease severity

Prescribing pattern of analgesics in orthopaedic in-patients of a tertiary care teaching hospital in north india

ORE5

Rohini Gupta¹, Apporva Malhotra², Pavan Malhotra²

¹Dept. of Pharmacology & Therapeutics, Government Medical College, Jammu, J&K, ² Dept. of Pharmacology & Therapeutics, ASCOMS & H, Sidhra, Jammu, J&K

E.mail : rohinigupta299@ymail.com

Background: Different groups of analgesics are commonly employed in orthopedic department like non-steroidal anti-inflammatory drugs (NSAIDs) and opioids. However, with their increased usage, the irrational use of these drugs has also increased.

Objective: The objective is to study the prescribing pattern of analgesics in orthopedic in-patients of a tertiary care teaching hospital in north India.

Materials and Methods: It was an observational cross-sectional study for a period of three months in the orthopedic in-patient department of a tertiary care teaching hospital from December 2016 to February 2017. Data was retrieved from the Medical Case

Record Sheets relating to age, sex, diagnosis, type of analgesics prescribed, the route of administration, fixed dose drug combination prescribed and also correlate the prescription of analgesics in relation to National List of Essential Medicines (NLEM). Data was expressed in percentages.

Results: Out of 92 patients included in the study, 57 (61.9%) were males and 35 (38%) were females. Average numbers of analgesics per prescription were 1.73. About 73 (79.3%) patients received more than one analgesic. Most commonly prescribed analgesic was Diclofenac in 86 (93.5%) followed by Aceclofenac in 59 (64.1%). About 78 (84.7%) of patients received parenteral formulations of analgesics. Analgesics prescribed from National List of Essential Medicines (NLEM) 2011, were 58.4% and analgesics as Fixed Dose drug combinations (FDCs) were prescribed in 58 (63.04%) of patients. Fixed dose drug combination of diclofenac with paracetamol was most commonly prescribed FDC in 27 (46.5%) of patients.

Conclusion: Though many analgesics were prescribed from the National List of Essential Medicines, yet it is far from satisfactory. Educational interventions need to be done at all the levels so that irrational prescribing is minimized.

Key-words: Analgesics, Orthopedic, Prescribing, NSAIDs, Opioids

Utilization of antimicrobial drugs in ophthalmology department at a tertiary care hospital

ORE6

Raghavendra Belavatagi, Ravichandra V

Department of Pharmacology, K. S. Hegde Medical Academy.

Email-raghavendrabelavatagi@gmail.com

Background: Drug utilization studies play an important role in rational prescription of drugs. Periodical assessment of utilization pattern increases the therapeutic efficacy and minimises the development of resistance.

Objective: This study was conducted to analyse the utilization of antimicrobials in ophthalmology outpatients.

Methodology: An observational study was conducted in the Department of Ophthalmology at K S Hegde Charitable Hospital for a period of 3 months. Patients attending the OPD who needed antimicrobial therapy were included in the study. Prescriptions were assessed using a specially designed proforma. Data was analysed using appropriate statistical methods.

Results: Total number of prescriptions analysed were 206. Number of drugs prescribed were 219. Average drug per prescription was 1.06. The mean age was 50 ± 17.08 years with maximum belonging to age-group of 47-62 years. The most common diagnosis was cataract (45%) followed by conjunctivitis (34%). The most common dosage form was drops (93% [204/219]) followed by tablets (3.2% [7/219]). The duration of drug administration and frequency of treatment was recorded in all the prescriptions (100%). Single drug was prescribed in 194(94.20%) patients, 2 drugs were prescribed in 11(5.3%) patients and 3 drugs were prescribed in 1(0.5%) patient. Most commonly prescribed antimicrobial was moxifloxacin (27.40% [60/219]) and the most common fixed dose combination prescribed was gatifloxacin plus prednisolone (27.40%). A total of 4.1% (9/219) of drugs were prescribed from national list of essential medicine(NLEM).

Conclusion: The present study found minimum prescribing errors. Polypharmacy was uncommon. Number of drugs prescribed from NLEM were less.

Key-words: Drug utilization pattern, Antimicrobials, Ophthalmology

To study the awareness and adherence in patients receiving anti-hypertensive drugs. A hospital-based study

ORE7

Aalia Tausif, Taruna Sharma, Juhi Kalra

Email id : aaliatausif@hotmail.com

Background: Hypertension is an important worldwide public health challenge. It has changed from a trivial cause of death and disability to one of the global burden diseases. The biggest obstacle for inadequate therapeutic control of blood pressure is meagre knowledge, poor attitude, inadequate treatment practices and lack of adherence towards antihypertensive treatment.

Objectives: The present study was conducted to assess the awareness of hypertension on various aspects and to evaluate treatment adherence in hypertensive patients.

Methods: This cross-sectional study was conducted on 100 hypertensive patients of both genders visiting medicine OPD at HIMS, Dehradun over a period of six months. A structured and validated questionnaire was used to assess the knowledge, attitude and practice among patients. Morisky 8-Item Medication Adherence Questionnaire was used to assess the adherence towards antihypertensive medications. Chi square test was used for data analysis.

Results: Out of the 100 patients 69% had expressed a good attitude, but only 34% had good practice while barely 31% had good knowledge towards hypertension. Further Analysis of data revealed that a poor score in practice was significantly associated to the gender ($p < 0.001$). Poor knowledge was significantly associated to the level of education ($p < 0.0001$) of the patient. Only 40% patients were adherent to their medication, this result was statistically associated with level of education ($p < 0.0001$) and the number of medications ($p < 0.01$).

Conclusion: Hypertensive patients in our community have relatively good attitude but poor knowledge and practice. Patients were also found non-adherent to their antihypertensive medications.

Key-words: Awareness, Adherence, Hypertension

Effect of Virgin Coconut Oil on fertility changes induced by Methotrexate in male Wistar albino rats

ORE8

Kabirdev¹, Shalini Adiga²

¹Dept. of Pharmacology, Kasturba Medical College, Manipal Academy of Higher Education (MAHE), Manipal, India.

Email: kabidev@gmail.com

Background: Many anti-cancer drugs like cyclophosphamide, methotrexate can cause male infertility. Oxidative stress induced by these drugs cause gonadal injury. Virgin Coconut Oil (VCO) contains medium chain fatty acids like lauric acid and phenolic compounds like ferulic acid, caffeic acid and p-coumaric acid. Studies have shown that these compounds have significant antioxidant properties. This may be beneficial in preventing fertility changes induced by methotrexate in males.

Objectives: To evaluate the effect of VCO on the fertility changes induced by methotrexate in male Wistar albino rats.

Methods: Thirty male rats were selected, five groups of six rats each. Group 1 was control group, Group 2 received methotrexate (MTX) 20mg/kg intraperitoneal, single dose, Group 3, 4, 5 received MTX 20mg/kg intraperitoneal, single dose, followed by VCO in doses of 1.5ml/kg, 5ml/kg and 10ml/kg respectively per oral for 15 days, following which, animals were sacrificed. Testicular weight was measured. Epididymis were collected to measure the sperm count and motility. Results were analysed by one way analysis of variance (ANOVA) followed by post hoc Tukey's test.

Results: A significant ($p < 0.05$) reduction in testicular weight, epididymal weight, sperm count and motility was seen in MTX group as compared to control. All

doses of VCO, 1.5ml/kg, 5ml/kg and 10 ml/kg/day, showed statistically significant ($p < 0.05$) increase in testicular weight, epididymal weight, sperm count and motility, in comparison to the group which received only methotrexate.

Conclusion: VCO has protective effect on testicular damage caused by methotrexate, which may be attributed to its antioxidant property.

Key-words: Methotrexate, Virgin Coconut Oil, Antioxidant, Male infertility

Prescription Pattern and Economic Burden of Proton Pump Inhibitors at A Tertiary Care Hospital in Mangaluru

ORE9

Halmond Melroyd D'Souza, Rajendra Holla

Department of Pharmacology, KSHEMA, Mangalore, Karnataka

Email: halmonddsouza@gmail.com

Introduction: Proton pump inhibitors (PPIs) are the most commonly prescribed drugs for various gastrointestinal diseases, both for therapeutic and prophylactic measures. Though studies have shown equal efficacy between different PPIs, certain PPIs are prescribed more frequently than others. Due to the cost differences between them, it leads to unnecessary economic burden on patients. This study has been conducted to determine the prescription pattern of PPIs and to find the cost difference between them.

Methodology: A cross-sectional study was conducted in K S Hegde Charitable Hospital. All patients attending the Medicine OPD over a period of one month were included in the study. The prescriptions were obtained from the patients and a note of any PPI drug and quantity prescribed were noted. Data was analysed using appropriate statistical methods.

Results: Of the 1348 patients who attended Medicine OPD in June 2017, a total of 361 patients were prescribed at least one PPI. Of these, 203 were male, and the mean age was 48 ± 16.4 years. The prevalence of PPI use was 26.8% amongst the study population. The most commonly used PPI was Pantoprazole (42.4%). It was found that the economic cost was higher for pantoprazole when compared to other PPIs, with a difference of about Rs. 80 per prescription between the two most commonly used PPIs (Pantoprazole and Omeprazole).

Conclusion: Preference of Pantoprazole has led to higher expenditure for patients. Justified prescription pattern of drugs with lesser cost can overcome this economic burden.

Key-words: Drug costs, PPIs, Cross-sectional study

An Observational Study to Evaluate the Adverse Drug Reactions Secondary to The Use of Anti-Microbial Agents in Patients Admitted to Surgery Ward at Tertiary Care Hospital

ORE10

Sumit Kumar, Bhagya M. Sattigeri

Dept. of Pharmacology, S.B.K.S.M.I. & R.C.,
Sumandeep Vidyapeeth an institution deemed to be
university, Vadodara, Gujarat
Email: drsumit.kumar@yahoo.com

Background: Antimicrobials with the greatest contributions to therapeutics are widely used in surgical patients, for prophylaxis and treatment of infections. Common problems associated with their use include, the antimicrobials resistance and adverse drug reactions.

Objectives: The study aimed to evaluate the occurrence of adverse drug reactions due to antimicrobials in surgical cases.

Methods: The prospective observational study for six months was conducted on the participants who fulfilled the inclusion criteria. They were observed for occurrence of the adverse drug reactions and those identified were recorded and subjected to causality analysis.

Results: A total of 10 ADRs were reported with predominance in men (14.03 %) and elderly (60 %) with incidence of 11.11 %. Meropenem (30 %) caused highest ADR involving mostly the GI system (78.57 %). Type A reactions were more common than type B of which 90 % were preventable. The reactions were moderate in severity, (50 %) probable and (50 %) possible on assessment with WHO-UMC and Naranjo's scale, with 60% recovered while remaining were under treatment.

Conclusion: Use of antimicrobials is inevitable. Since it is observed for 90 % of ADRs to be preventable, care should be administered in their judicious use.

Key-words: Adverse drug reactions, antimicrobials, surgical prophylaxis

Pattern and Causality Assessment of Reported ADRs from A Southern Single Tertiary Care Centre and Hospital

ORE11

¹Madhavrao C, ²Mythili Bai K, ³Sharath Babu K, ⁴Prathab Asir A

¹Dept. of Pharmacology & ²Dept. of Physiology, AIMS, Kerala, ^{3,4}Dept. of Pharmacology, SMIMS, Tamil Nadu

madhavchavan78@gmail.com

Background: Monitoring of ADRs is important for patient safety. Continuous ADR monitoring can detect any untoward effect of drugs, which was not detected during the early part of the clinical trial development phases.

Objectives: To study the pattern and causality assessment of reported ADRs from a southern single tertiary care centre and hospital.

Methods: This study was done in a southern single tertiary care centre and hospital. This study was prospective observational in design and study protocol was approved by the Institutional Review Board [IRB]. The collected ADRs from this single tertiary care centre and hospital were subjected for analysis using ADR causality assessment scales.

Results: A total of one hundred and seventy-five ADRs were subjected to different ADR causality assessment scales. It was revealed that antimicrobial class of drugs [29.14%] was responsible for maximum causation of ADRs. ADR causality assessment by WHO-UMC scale revealed, maximum number of ADRs was possible [75.43%]. It was also seen in Naranjo algorithm scale that ADRs were possible in 58.29% of cases. Modified Hartwig and Siegel scale found 85.14% of ADRs were mild in nature and Schumock & Thornton preventability scale identified as, majority of ADRs were definitely preventable [56%], probably preventable [30.29%] and 13.71% as not preventable.

Conclusion: This study showed that drugs acting on microorganisms were responsible for maximum number of ADRs. ADR causality assessment showed that, majority of the ADRs was possible in WHO and Naranjo, definitely preventable on Schumock & Thornton and mild in nature on Modified Hartwig and Siegel scales.

Key-words: ADR, Naranjo, Pharmacovigilance, WHO causality scale

Prescription pattern of antiepileptic drugs in a tertiary care hospital

ORE12

Anu Mohan T¹, Anuradha M¹, James Jose²

¹Department of Pharmacology, GMC Kozhikode,

²Department of Neurology, GMC Kozhikode.

Email id: dranumohant@gmail.com

Background: Epilepsy affects about 0.5% to 1% of the population. Antiepileptic drugs are the mainstay of treatment of epilepsy. The prescribing pattern of antiepileptic drugs has changed over the last decade with the development of newer drugs.

Objective: To analyse the pattern of prescriptions of antiepileptic drugs in a tertiary care hospital.

Methodology: Data was collected from patients visiting the outpatient department of Neurology in Government Medical College, Kozhikode. Data regarding the type of epilepsy, the antiepileptic drug prescribed, age & sex of the patient were recorded in a proforma for analysis

Results: Among the study participants, 237 were males (53.6%) & 204 females (46.2%).

The study showed that in the 442 participants, the most common type was focal seizures (64.5%) & the most commonly prescribed drug was Carbamazepine (128 patients), followed by Levetiracetam (99 patients) and Valproate (90 patients). Majority of the patients were treated with single AED (79.2 %).

Conclusion: Out of the 442 participants, newer drugs are also increasingly used in our tertiary care centre.

Key-words: Epilepsy, focal seizures, prescription pattern

Study of frequency domain measures of heart rate variability among type 2 diabetes mellitus patients - a comparative study

ORE13

Nabeel Beeran Abdul Rahiman, Shobith Bangera

Dept of Physiology, Yenepoya Medical College, Mangalore. nabeelbeeran@gmail.com

Background: Diabetes mellitus (DM) is associated with an increased risk of both morbidity and mortality in type 2 diabetic patients from cardiovascular disease. Cardiac Autonomic Neuropathy (CAN) is associated with type 2 DM. Heart Rate Variability (HRV) is a simple and useful tool which helps in detecting autonomic dysfunction.

Objectives:

1. To assess the cardiac autonomic function status in type 2 DM patients by analyzing frequency domain measures of HRV.
2. To assess the importance of 5 minutes HRV for the detection of autonomic dysfunction in type DM.

Methods: 50 diabetic patients of both genders who belong to age group 40-60 years attending Yenepoya Medical College, Mangalore were selected as test group. 50 non-diabetic patients matched for age and sex as that of test group from the general population, were selected as control group. Cardiac autonomic activity was assessed by using spectral analysis of HRV. Computerized ECG system with the PhysioPac 4-channel software was

used for the study. Frequency domain measures such as very low frequency, low frequency, high frequency and LF/HF ratio were assessed to observe both sympathetic and parasympathetic nerve function status. Statistical analysis was done by SPSS and unpaired t-test was used.

Results: The results obtained were treated statistically by appropriate methods and compared between the groups. Frequency domain parameters like low frequency and LF/HF ratio were significantly (< 0.001) reduced in diabetic subjects compared to non-diabetic subjects.

Conclusion: Cardiovascular autonomic neuropathy is associated in patients with type 2 diabetes and 5 minutes HRV test is an important tool for detecting CAN.

Key-words: Heart Rate Variability; Diabetes mellitus; Cardiac Autonomic Neuropathy; Frequency domain measures

A survey on the awareness and attitude of doctors towards the application of pharmacogenomics in Guwahati

ORE14

Indrani Das¹, Bonti Bora²

¹2nd year MBBS, ²Department of Pharmacology Gauhati Medical College
email: indranidasbora@gmail.com

Background: Pharmacogenetics is one of the subject areas within personalized medicine. Presently knowledge of pharmacogenomics is important for therapeutic purposes as well as for the prevention of many ADRs (adverse drug reactions). Pharmacogenomics aims to elucidate the contribution of genetic variants to individual variability in drug responses, such as efficacy, dose requirements and adverse reactions.

Objective: The aim of this study was to assess the awareness and attitude of doctors towards pharmacogenomics and its implications.

Methods: The study was done through a survey among 50 doctors by a questionnaire method which was formulated to know the awareness and extent of knowledge of doctor. The answers were in yes and no and the data was calculated in percentage.

Results: Out of 50, 2 (4%) doctors were well aware about pharmacogenomics, 39 (78%) doctors were not aware but wanted to know about it, while 9 (18%) of doctors were neither aware nor interested about pharmacogenomics.

Conclusions: Most of the doctors were not aware about the pharmacogenomics theoretically so by seminars, presentations they need to be updated .Only 2 doctors were aware about its clinical application in their practice. Most of the doctors were not aware about the pharmacogenomics theoretically and they need to be updated about its clinical application in their practice by seminars, presentation and workshops.

Key-words: Pharmacogenomics, Doctors, Awareness, Precision medicine

A Study of cost effective benefits of Cilnidipine versus Amlodipine for the treatment of Hypertension at tertiary health care centre

— ORE15

Preeti Dharapur

BRIMS Bidar

Email Id : preetidharapur14@gmail.com

Background: Hypertension (HTN), or high blood pressure, now defined as systolic blood pressure of more than 140 mm Hg and diastolic blood pressure of more than 90 mm Hg, is attributed as the leading cause of cardiovascular mortality by the World Health Organization.

Objectives: To Study cost effective benefits of Cilnidipine versus Amlodipine for the treatment of Hypertension at tertiary health care centre

Methods: The Present study was undertaken by the department of Pharmacology in collaboration with the department of Medicine. Group A- 50 patients who were prescribed Tab Cilnidipine (5-10mg/day). Group B- 50 patients who were prescribed Tab Amlodipine (2.5-10mg/day). Data was analyzed using the SPSS. Quantitative data are presented as means and standard deviation (mean \pm sd) and qualitative data as frequency and 95% confidence interval (CI). The average cost of the drug per person was calculated.

Results: We obtain data regarding mean SBP and DBP reduction in two groups and the average monthly cost of the study drug per patient. Our analysis shows no cases of pedal edema and lower number of ADRs in Cilnidipine group when compared with Amlodipine group.

Conclusion: It can be concluded from our study that significantly less ADRs were in Cilnidipine group with the comparable cost of Amlodipine so Cilnidipine can be used in .cost effectively with Amlodipine.

Key-words: Amlodipine, Cilnidipine, Cost effective

Influence of early rising performance in task requiring attention and memory in Medical students

P1

Ramchandra Girmallappa Latti

Department of Physiology, Rural Medical College Loni, Ahmednagar, Maharashtra, India

Background: Rising early morning has been discipline of ancient Indian tradition. There are very few scientific studies conducted to underline its importance.

Objective: To study the influence of early rising performance in task requiring attention and memory in Medical students.

Methods: The present study was conducted in Department of Physiology at Rural Medical College, Loni. 125 healthy medical students both male and female in age range of 18-22 years were included in present study. We divided them into two groups, viz. study and control group. Brahma muhurta group was asked to wake up before 4.30am, while control group was asked to wake up after 7.00am. These groups were assessed on days 1, 10, 20 etc.

Results: Brahma muhurta group after 20 days showed a significant improvement in net score for verbal and spatial memory tasks.

Conclusion: The present study suggests rising early in the morning influences the process of attention and can improve the ability to recall.

Key-words: Medical students, Memory

Impact of body mass index and arm length on Abductor Pollicis Brevis H-reflex among females

P2

D. Rekha, Suganthi B

Department of Physiology, Pondicherry Institute of Medical Sciences, Ganapathichettikulam, Puducherry

Background: Hoffmann reflex (H-reflex) is one of the late responses seen in nerve conduction study. H-reflex is useful clinically to diagnose nerve root lesions, particularly involving S1 radiculopathy and in proximal nerve lesions. H-reflex is affected by various physiological factors like age, height and gender. However, there are only few studies done to know the effect of arm length and BMI on latency and amplitude of APB H-reflex among females

Objective: To know the impact of Body mass index (BMI) and arm length on Abductor Pollicis Brevis (APB) H-reflex among females.

Methods: The present cross-sectional study was done on 50 healthy adult female volunteers between age group of 20-30 years. During early follicular phase of the participants, APB H-reflex was recorded in the digital nerve conduction/EP/EMG machine (Recorders Medicare System, India) by stimulation of median nerve while abducting the thumb. Data analysis was done by using Karl Pearson Correlation coefficient.

Results: BMI was negatively correlated with APB H-reflex latency and positively correlated with APB H-reflex amplitude with "r" value -0.025 and 0.059 respectively. Arm length was found to be positively correlated with APB H-reflex latency and amplitude with "r" value 0.410 and 0.024 respectively.

Conclusions: With increasing arm length, APB H-reflex latency and amplitude increased. As BMI increased, APB H-reflex latency decreased and amplitude increased. Hence, arm length and BMI must be taken into consideration while interpreting APB H-reflex among females to avoid misleading diagnosis.

Key-words: Abductor Pollicis Brevis, H-reflex, arm length, Body mass index

Comparative study of auditory and visual reaction times among children of chronic smokers and non-smokers

P3

Ashwini R Doyizode, Savitri P Siddanagoudra, Shantala S Herlekar

SDMCMS & H, Dharwad

Background: Smokers are at the risk of serious health problems and the people around them, particularly children are also exposed to much potential danger through passive smoking. Tobacco smoking has been associated with impaired perceptual-motor coordination. Hence the present study was conducted with the hypothesis that passive smoking in children leads to increase in their reaction time.

Objective: To compare visual as well as auditory simple reaction and choice reaction times among the children of chronic smokers and non-smokers

Methods: This cross sectional study was conducted among healthy children (n = 30) aged 8-14 years with smoking environment at home (minimum of 5 years of smoking history) and thirty children of non-smokers, after applying the inclusion and exclusion criteria. VSRT, VCRT, ASRT and ACRT were recorded. The results were analyzed using student t test. P value < 0.05 was considered as statistically significant.

Results: Data analysis revealed the following results: VSRT- 277.7 ± 35.84 ; VCRT- 309.1 ± 52.01 and ASRT- 250.4 ± 45.6 ($P < 0.05$). ACRT was also delayed but not statistically significant.

Conclusion: A delay in the auditory and visual reaction times may indicate that children with prolonged exposure to passive smoking might have trouble in handling even simpler tasks because of impaired perception and reaction time.

Key-words: Cognition, Passive smoking, Reaction time

Effect of 3 select Indian classical music ragas on 19 channel EEG

P4

Kirthana Kunikullaya U¹, Vijayadas¹, Arun Sasidharan², Anjani Kumar Bhushan³, Radhika Kunnivil¹, Jaisri Goturu⁴, V S Prakash³, N S Murthy⁵

¹Ramaiah Medical College, Bangalore, ²Axxonet System Technologies Pvt. Ltd, Bangalore, ³Ramaiah Memorial Hospital, Bangalore, ⁴International medical school, Bangalore, ⁵Division of research and patents, GEF, Bangalore.

Background: Ragas are a set of notes that create a melody. They form the basis of Indian classical music, with each raga producing a different emotion (rasa). Music, though used predominantly as entertainment, is shown to have various effects on different parts of the brain. Indian music has rarely been studied scientifically.

Objective: To evaluate the effect of 3 select Indian classical ragas on brain via electroencephalogram.

Methods: In this triple blind study, 61 subjects were randomly divided into 3 groups (A = 22, B = 21, C = 18) where each received 3 ragas. EEG (19 channel, Galileo NT) was recorded before, during and after music (each condition 10 min). It was analysed using BESS Software (Axxonet System Technologies Pvt. Ltd.) and MATLAB software (Mathworks). After artefact rejection, PSD was done & standard frequency bands grouped. Permutation-based ANOVA and post-hoc t-tests were done to determine if the FFT values were significantly different between condition and group.

Results: The 3 groups were comparable. Between conditions effects in theta, alpha, beta and gamma bands were observed which got restricted to only alpha band at right frontal region. after collapsing the conditions (post Music-pre Music). Group A showed a significant reduction in alpha frequency band in right frontal region (greater increase in right frontal activity), whereas Group C showed significant increase in that region.

Conclusion: EEG showed significant hemispheric differences with each raga. This seems important in understanding emotional behaviour during exposure to different ragas of Indian music, and is in line with the model of hemispheric specialisation concerning perceived positive or negative emotions proposed by Heilman.

Key-words: listening music, EEG Brain, music therapy, emotion

Nootropic activity of ethanolic extract of Alangiumsalvifolium leaves on Scopolamine mouse model of Alzheimer's disease

P5

¹Parameshwari.K, ¹Shashikumar, ²Priyadharshini Bai.G, ²Prathima CS, ¹Neetha.CS

¹East Point Institute of Medical Sciences & Research Centre, Bidarahalli, Bangalore, ¹Department of Pharmacology, Chamarajanagar Institute of Medical Sciences, Chamarajanagar, ²Shridevi Medical College and Research Centre, Tumkur

Objective: The present study was undertaken to assess on learning and memory enhancing activity of Alangium Salvifolium Leaves in Swiss albino mice.

Material and Methods: Ethanolic extract of Alangium salvifolium leaves extract of two different doses (EASF-100 & 250mg/kg orally), and scopolamine (0.4 mg/kg i.p) per kg body weight were administered for seven days to individual groups of mice. The exteroceptive behavioral models such as elevated plus maze and Morris water maze were used to evaluate learning and memory, However, Scopolamine is the natural agent which is induced amnesia served as interoceptive models.

Statistical Analysis: The results are expressed as mean \pm S.E.M. Statistical analysis was done by One-way ANOVA test followed by Post-hoc Dunnett's multiple comparison tests. $p < 0.05$ was considered statistically significant. (Graph Prism Pad Version 7.1)

Results: The results of this study showed that, Alangium salviifolium at the doses of 100 and 250 mg/kg significantly ($p < 0.05$) improved spatial short-term and long-term memory, the remarkable reduction in TL of a 6th and 7th day as a part of learning and memory. In the elevated maze and reducing the escape latency in the Morris water maze.

Conclusion: In the present investigation, Alangium salvifolium leaves has shown promise as a memory-enhancing agent in all the laboratory models employed

Key-words: Amnesia, Learning, Memory, Alangium salvifolium

Does Orexin B infusion in Nucleus Accumbens alter alcohol preference in male Wistar albino rats?

P6

¹Rashmi K S, ¹Ganaraja B

¹Department of Physiology, Kasturba Medical College, Mangalore

Background: Nucleus Accumbens (NAc) is primarily involved in the mesolimbic reward circuit of the brain. Reports suggest role for orexins in feeding, alertness, sleep and wakefulness. Therefore, we predicted a role of orexin in alcohol preference. Till date there are no specific studies of infusion of orexin B into NAc to assess the addictive behaviour in rats.

Objective: To study the effect of microinfusion of orexin B into NAc on addictive behaviour.

Methods: Inbred male Wistar rats (n= 24) were divided into three groups. i. e Control, Treated 1 (Orexin B-3nm/ μ l) and Treated 2 (Orexin B- 30nm/ μ l) groups. Using stereotaxic method, guide cannula was set in place bilaterally to reach NAc. Orexin B were infused in separate groups of overnight fasted rats. Four trials of Orexin B infusion was done with a time gap of 72 hrs between the injections. Total alcohol intake and Alcohol preference test was done. Alcohol preference ratio was calculated. Data expressed as mean \pm SEM. $p < 0.05$ were considered as statistically significant.

Results: At 3nm/ μ l of Orexin B infusion, there was no net/total increase in alcohol. At 30nm/ μ l of Orexin B infusion, there was significant increase in alcohol intake in take at the end of 1 hr and 4 hrs when compared to their controls. Alcohol preference ratio was found to be significantly increased with the infusion of 30nmol/ μ l of Orexin B at the end of 1, 2,4,12 and 24 hrs.

Conclusion: Present observation indicates the role of orexin B in preference for alcohol consumption involving NAc.

Key-words: Nucleus accumbens, Orexin, alcohol

Effect of chronic excessive noise exposure on hearing in industrial workers

P7

Ashwini Priyanka¹, Karthiyanee Kutty²

¹Department of physiology, St.John's Medical College and Hospital, Bangalore, ²Department of physiology, Sri Devaraj Urs medical college, Tamaka, Kolar

Background: Many workers are exposed to noise in their work places. Noise is a major health threat in occupations where it exceeds the permissible level of

90dB. Noise induced hearing loss (NIHL) first appears for high frequencies then expands to speech frequencies which further leads to communication disorders. Hearing can be assessed by pure tone audiometer (PTA) a device to assess the auditory thresholds.

Granite factory is one among the industries where the noise exposure is extremely high for the workers, who are later vulnerable to NIHL. The studies on NIHL in India are limited and it is necessary to provide effective demonstrations of the future risk on these workers, hence this study is undertaken on granite factory workers in Kolar.

Objective: To determine the auditory thresholds of granite factory workers and compare it with the controls to assess their quality of hearing.

Methods: 85 granite factory workers for the study group and 85 administrative workers for the control group were taken. After taking consent they were assessed for hearing by PTA. Parameters that were recorded were air conduction (AC) and bone conduction (BC) thresholds of both ears at different frequencies. The resulting data was statistically analysed.

Results: The PTA showed that the study group had significantly higher AC and BC thresholds in both the ears at higher frequencies than the control group.

Conclusion: NIHL is major preventable cause of permanent hearing impairment and the most effective way to prevent is by using ear plugs, ear muffs thereby having a safer environment to work.

Key-words: Granite factory workers, Noise induced Hearing loss, Pure tone audiometer

Salt taste sensitivity threshold and its association with salt craving in healthy young adult Indians

P8

M Fortuna, M Vaz

Department of Physiology, St. John's Medical college

Background: Excess salt intake associated with hypertension, cardiovascular disease and stroke, among others, is the 7th leading cause of mortality in South East Asia. The present average salt intake worldwide is 9-12 g/day and > 7.5g/ day in India. Salt consumption depends on salt taste perception of an individual which in turn is determined by the salt taste threshold, although data in this regard are not available for Indians.

Objectives: To compare the salt taste threshold between: 1) Salt cravers and non-salt cravers and 2) Subjects with and without a family history of hypertension.

Methods: 150 healthy subjects (18 - 35 years, females = 126) were recruited. Blood pressure, height and weight were measured. Salt taste threshold (STT) was measured using serial concentrations, and salt preference and salt craving assessed using a visual analogue scale/structured questionnaire.

Results: STT was not normally distributed. Median STT was 32 mmol/L. STT was higher in those with family history of hypertension ($p=0.03$) and in high salt cravers when compared to low salt cravers ($p=0.07$). A negative correlation ($\rho = -0.21$, $p = 0.01$) was found between salt taste threshold and salt perception. Conclusion: Salt taste threshold was associated with a positive family history of hypertension & high salt craving.

Key-words: Salt taste threshold, salt craving, salt perception

F wave Index - A ray of hope in the nerve conduction study for Diabetic Peripheral Neuropathy

P9

Sathya G.R¹, Jayanthi Arulneyam², Venkatachalam J³
¹Department of Physiology, Pondicherry Institute of Medical Sciences, Puducherry, ²Department of Neurology, Pondicherry Institute of Medical Sciences, Puducherry, ³Department of Community Medicine, JIPMER, Puducherry

Background: In a skeletal muscle, when one nerve root is affected and the rest is spared, the conventionally used nerve conduction studies can still be normal. An F wave index was constructed to include various parameters of the F wave (late response) to determine its usefulness in the diagnosis of peripheral neuropathy.

Objectives: This study was undertaken to construct the F wave index in the upper limb-median nerve in normal healthy adult males and in patients with peripheral neuropathy and to compare the values obtained in both groups.

Methods: This hospital-based study was carried out on 40 males with diabetic peripheral neuropathy and 40 age matched healthy males. The F wave recording were done between 0900 and 1100 h at an ambient temperature of 22°C using a digitalized nerve conduction machine in a quiet and dimly lit room.

Results: The median value for F wave index obtained from median nerve (abductor pollicis brevis) in patients with peripheral neuropathy [right arm - 35.85, IQR - 35.26; left arm - 39.49, IQR - 39.49] was significantly lower ($P=0.001$) as compared to the

control group (right arm - 102.62, IQR - 83.76; left arm - 77.43, IQR - 58.02).

Conclusions: Our results showed that F wave index could be used for early detection of peripheral neuropathy compared to conventional F wave studies.

Key-words: F wave index, latency, males, median nerve, peripheral neuropathy, upper limb

A study on senile peripheral neurological changes as evidenced clinically and electrophysiologically

P10

Sunil Kumar, Arup Bandyopadhyay

Department of Physiology, MGM Medical College, Kishanganj

Background: In recent years, advances in medical sciences have dramatically improved human health and have increased the average human life span. As a result, there are a number of senile persons on earth than ever before. Naturally, there have been more number of geriatric diseases and to understand them we have first to understand geriatric physiology. This is why we have ventured here to study senile peripheral neurophysiology in a semi-urban set up in Bihar.

Objectives: To study and compare the findings of clinical neurophysiology and electro-neurophysiology between normal young adults and aged persons.

Methods: Done in the Physiology department of MGM Medical College, Kishanganj, Bihar, after taking permission from IEC, this study was both an institutional and community-based observational study. 60 elderly subjects (>60 yrs) were chosen as test subjects (40 males and 20 females). 60 young healthy subjects (20-40 yrs) were chosen as controls (40 M + 20 F). All diseased persons were excluded. On all of them, standard clinical neurological examinations were done, as well as nerve conduction velocity (NCV) studies on all four limbs.

Results: Clinically, sensory defects were noted in only 2 of 60 senile subjects (3.3%) and both were in their ninth decade. Further, 4 persons (6.7%) had motor signs and again in ninth decade. Regarding, electrophysiological studies, both NCV and amplitude (CMAP and SNAP) were reduced in senile age group. Results were statistically significant.

Conclusion: Old age does compromise with nerve conduction studies, but clinical signs become evident only after ninth decade.

Key-words: Gerontology; Clinical neurological examinations; NCV; SNAP; CMAP

Correlation of blood pressure changes to Intra ocular pressure changes after isometric handgrip exercise test in young adults

P11

Priya C Rao, Chethan H.A

Subbaiah Institute of Medical Sciences, Purale, Shimoga

Background: The influence of size of active muscle mass on cardiovascular responses to static contraction showed the direct relationship. The relationship between the isometric exercise and Intra ocular pressure(IOP) showed a significant lowering IOP. It was concluded that isometric exercise lowered IOP in ophthalmologically normal subjects. This may be useful in glaucomatous patients also.

Objective: To correlate the blood pressure changes to intraocular pressure before and after handgrip exercises

Methods: Healthy young male adults in the age group of 18-22 years were selected among MBBS phase I students. Sample size was 40. Blood pressure and IOP were recorded at rest and after isometric handgrip test. Mean and Standard deviation were calculated. Paired t-test was applied at 5% level to test the significance of changes in above parameters (Using Epi-Info).

Results: Right eye IOP decreased significantly from resting 16.27 ± 1.54 to 13.34 ± 1.32 ($p < 0.001$) immediately after handgrip exercise IOP has returned back to baseline level within 15 min after exercise. Left eye IOP decreased significantly from resting 16.28 ± 1.55 to 13.04 ± 1.19 ($p < 0.001$) immediately after handgrip exercise IOP has returned back to resting level within 15 min after exercise. Blood pressure significantly & negatively correlated with IOP (Pearson's correlation coefficient, $r = -0.387$)

Conclusion: Isometric exercise increases blood pressure and simultaneously lowers IOP (after handgrip test). Blood pressure is significantly & negatively correlated with IOP (Pearson's correlation coefficient, $r = -0.352$). Hence prove useful in normotensive glaucomatous patients.

Key-words: blood pressure, intraocular pressure, handgrip dynamometer

VEGF Polymorphism in Acute Cerebral Infarction of Han Dynasty Population in Xuzhou, China

P12

Gengdeqin, Lakshmi Sarapalli

Andhra Medical College, Vizag

Background: VEGF (vascular endothelial growth factor) is a secreted mitogen.

Objectives: To find out whether there is any influence of VEGF gene variations in acute cerebral ischemic stroke of Chinese Han population, Xuzhou, by TOAST classification of ischemic stroke subtypes for assessment of VEGF gene variation and its polymorphism.

Methods: Eighty four patients with ischemic stroke and 67 controls were recruited in this case-control study. The patients are categorized into subgroups according to TOAST classification: LAA (large artery atherosclerosis), cardio embolism (CE), SAO (small artery occlusion), SOE (stroke of other etiology) (LAA: 30, SAO: 45, CE: 17, SOE: 5). Polymerase chain reaction, electrophoresis and DNA sequencing techniques were used to detect single nucleotide polymorphism (SNP) in acute cerebral infarction patients of Xuzhou Han population.

Results: There was significantly higher incidence of patients with HTN, DM, CAD in patients with LAA compared to controls ($p < 0.05$). In the present study it was observed that FPG, HDL, LDL, HCY was significantly higher in patients with LAA compared to controls ($p < 0.05$)

Conclusions: There was no significant association of single nucleotide polymorphism or variants at the site (-2578) of VEGF A gene was observed in both cases and controls of Han population of Xuzhou, China. May be because of the small sample size, our research work couldn't find significant difference between the cases and controls.

Key-words: VEGF polymorphism, Acute cerebral infarction

Effects of mobile phone exposure on Brainstem Evoked Response Audiometry (BERA)

P13

Renu Lohitashwa, Soumya. B. A, D V. Deshpande

Department of Physiology, SSIMS & RC, Davangere

Background: Human physiology creates a framework for understanding how the human body adapts to stresses, physical activity and disease. Best example is usage of mobile phones for daily routine. An attempt was made to study the effect mobile phone exposure on ears functions.

Objective: To study the effects of mobile phones on BERA in long term mobile phone users.

Methods: One hundred normal healthy volunteers aged 18 – 30 years of age were considered for the

study. Two groups of 50 each participants, who used mobile phones for > 4 years for > 60 minutes in each day and who used mobile phones since a year for < 60 minutes per day respectively. Brief click acoustic stimuli alternating in polarity were presented by an earphone on the ear with 40 and 90 dB intensities. Peak BERA latencies (I, III and V) were recorded and interpeak latency I – V was calculated.

Results: Analysis shows statistically significant prolongation of latencies in wave III and wave V in Group I participants compared. There was also significant prolongation of inter peak latency I – V in Group I participants.

Conclusions: On comparison of various latencies of BERA in participants of both the groups, a significant increase in latencies of the wave III and V was observed in Group I. This damage to the ear can be at various levels of auditory pathway and can be proportional to the amount and duration of exposure.

Key-words: BERA, interpeak latencies, auditory pathway

Peak alpha frequency of children with ASD is similar to age-matched controls at rest

P14

Ahmad A¹, Muthukrishnan SP¹, Kaur S¹, Tayade P¹, Chakrabarty B², Gulati S², Sharma R¹

¹Stress and Cognitive Electroimaging Laboratory, Department of Physiology, AIIMS, New Delhi,

²Department of Paediatrics, AIIMS, New Delhi

Background: Impaired cognitive function is reported in children with Autism spectrum disorder (ASD). Cognitive function predicts response to intervention, with higher pre-treatment cognition associated with substantial gain in acquisition of skills during intervention. Objective assessment of cognitive functions could be based on EEG indices. One of the important index being, Peak alpha frequency (PAF), which has been correlated with cognitive performance.

Objective: To compare Peak alpha frequency (PAF) of children with ASD to typically developing (TD) children during resting condition.

Methods: Sixty-four children with ASD diagnosed by DSM 5 criteria and forty-seven age-matched TD children participated in this study. EEG was recorded during eyes closed condition for 3 minutes using 128 electrodes, followed by segmentation into 40 epochs of 1 second duration. Due to the presence of artifacts, 36 ASD (6.368 2.645) and 40 TD (7.268 2.345) subject's data were used for analysis. PAF was

calculated using "Spectopo" EEG lab function, with window size of 256 data points and overlapping windows of 50%. Mann Whitney U test was used to compare the PAF between groups.

Results: There was no significant difference (U = 642.0, P = 0.4136) in PAF between ASD (8.694 1.185) and TD (8.850 1.069). The values were expressed in mean SD.

Conclusion: No significant difference in PAF at baseline suggests no decline in cognitive function in children with ASD compared to TD. Further analysis of PAF based alpha spectral power and coherence needs to be done to extend the findings of the present study.

Key-word: Cognition, peak alpha frequency, autism spectrum disorder, EEG

Study of H-reflex parameters in hypothyroidism

P15

Sanghamitra Mukherjee, Achyut Ghosal, Anilbaran Singhamahapatra

Dept. of Physiology, R.G.Kar Medical College & Hospital.

Background: Neuropathies are common presenting complaints of hypothyroidism. It leads to dystrophic degenerative changes in axons of all fibre classes and there is marked reduction of large myelinated fibres which suggests that neuroaxonal degeneration may be the major pathogenic mechanism of neuropathy in hypothyroidism. H-reflex measures conduction through afferent and efferent fibres in the monosynaptic reflex arc and is the result of submaximal orthodromic stimulation of type Ia sensory fibres. H-reflex is a sensitive test for the evaluation of the physiologic integrity of the tibial/S1 sensory pathway, including the intraspinal course of the S1 root. It is markedly reduced in amplitude or absent in axon loss lesions affecting the S1 root and the tibial nerve at or proximal to the popliteal fossa.

Objective: This study was conducted to find out whether there were any abnormalities in H-reflex parameters in hypothyroidism.

Methods: The present study was conducted as an observational case control study in the Neurophysiology laboratory of Department of Physiology, R.G Kar Medical College, Kolkata within the study period of 6 months. Fifty diagnosed primary hypothyroidism patients aged between 20-50 years were taken as cases and 20 apparently healthy controls were selected from the patients' relatives. Detailed medical history was obtained; clinical examination and nerve conduction study by Neuro-MEP-Micro (Version 2009) were done on all subjects.

Results: Our study showed that there was highly significant difference in H-amplitude but no significant differences were found in H-latency and H/M ratio in between the cases and the control. Mean (\pm SD) of H-amplitude was significantly less (p value=0.0001) in cases (4.61 ± 5.16 mv) than that of the control (8.25 ± 4.1 mv).

Conclusion: These findings suggest that axonal compromise reduces reflex amplitude earlier than the latency parameter during the pathologic processes of hypothyroidism.

Key-words: hypothyroidism, H-reflex, neuropathy

Amplitude of nerve conduction a better predictor of type 2 diabetic neuropathy than the nerve conduction velocity

P16

Anwar Hasan Siddiqui¹, Akif Ahsan², M Mobarak Hossain¹

¹Department of Physiology, ²Department of Biochemistry, J. N. Medical College, A.M.U., Aligarh

Background: Diabetic peripheral neuropathy (DPN) is the most common but least recognised and understood long term complication of type 2 diabetic patients (T2DM). Nerve conduction study is an important non-invasive diagnostic modality used in the detection of diabetic peripheral neuropathy. Nerve conduction velocity and the nerve conduction amplitude are the two important components of a nerve conduction study.

Objective: The aim of this study is to see which one of the two component viz nerve conduction velocity and nerve conduction amplitude is the better predictor of the diabetic peripheral neuropathy by assessing their correlation with the clinical neuropathy scores.

Methods: The study included 90 type 2 diabetes patients with clinically suggestible symptoms of diabetic peripheral neuropathy (DPN). Clinical evaluation of DPN was done using three clinical scores: the Neuropathy Disability Score (NDS), Diabetic Neuropathy Examination (DNE) score and the Neuropathy Impairment Score (NIS). Nerve conduction study was carried out in relevant nerves along with the measurement of serum advance glycation end product (AGE).

Results: All the clinical scoring systems viz. NDS, DNE and NIS showed a very significant negative correlation with the motor as well as sensory amplitude of the nerves tested. The conduction of velocity of ulnar nerve and sural nerve showed a significant correlation whereas those of median and peroneal nerve showed insignificant correlation. Amplitude of the nerves also showed a significant negative correlation with the serum age level whereas velocity had an insignificant negative correlation.

Conclusion: Amplitude of the nerve conduction in the nerve conduction studies are a better predictor of neuropathy as compared to the nerve conduction velocity.

Key-words: neuropathy, nerve conduction velocity, clinical neuropathy scores, advanced glycation end products

Neuroprotective role of N-acetylcysteine against learning deficits and altered brain neurotransmitters in rat pups subjected to prenatal stress

P17

Liegelin Kavitha Bernhardt

Department of Physiology, Melaka Manipal Medical College, Manipal Campus, Manipal Academy of Higher Education, Manipal, India.

Background: Exposure to prenatal stress (PS) results in neurochemical and behavioral alterations that persist into adulthood. Oxidative damage to the developing brain is known to be one of the causative factors for these alterations. Antioxidant N-acetyl cysteine (NAC), has been shown to play a neuroprotective role in humans and experimental animals.

Objectives: To examine the effects of late gestational stress and NAC treatment on the postnatal expression of behavior and neurochemical profiles in male and female Wistar rats.

Methods: Pregnant dams were subjected to restraint stress thrice daily for 45 min during d 14-21. One group received PS along with NAC treatment. At postnatal day 63, the offspring of control, PS and NAC treated dams ($n=12$ in each of the 3 groups) were tested for locomotor behavior in an open field chamber, which was followed by dopamine (DA) estimation in different brain regions. Analysis were made using SPSS software version 16.

Results: PS offspring exhibited significant hyperactivity in a novel environment and a significant reduction in the level of DA in frontal cortex ($p<0.05$). NAC treatment in PS rats significantly reversed the hyperactive behavior as well as brain dopamine alteration in offspring ($p<0.05$).

Conclusion: These findings reinforce the view that prenatal stress affects multiple facets of brain development, interfering with the expression of normal behavioral and neurochemical levels. Our data also suggest that NAC treatment could protect the progeny from undesirable behavioral and neurochemical sequel associated with prenatal stress.

Key-words: Dopamine; N-acetylcysteine; hyperactive; prenatal stress

A gender based comparative study of median motor nerve conduction velocity in young healthy individuals of Guwahati city region

P18

Sengrak R Marak, Arpana Hazarika

Department of Physiology, Gauhati Medical College

Background: Nerve Conduction Studies are the most often used tool to assess the functions of a nerve. The nerve conduction velocity parameters are known to vary with demographic profile, anthropometric measurements such as gender, height, BMI, etc. of the population study.

Objective: The aim of the study was to assess the variation in median motor nerve conduction velocity in relation to the gender of the individual

Methods: The study group consisted of 60 healthy subjects of age groups 18 to 25 years, after a simple random sampling, fulfilling the inclusion criteria. They were divided into two groups wherein 34 were male participants and 26 were female participants. The recording of the median motor conduction velocity was done after a supramaximal stimulation at wrist and the elbow using the NeuroStim Software by MediCaid systems.

Results: The distal latencies were found to be significantly ($p < 0.05$) longer in males. The amplitudes were significantly higher in females and the conduction velocity was found to be significantly faster in females with $p < 0.05$.

Conclusion: The study showed that gender of an individual has a definite influence on the median motor nerve conduction velocity parameters. Thus, gender must be taken into account when performing nerve conduction studies to provide more accuracy of the recorded data.

Key-words: Nerve conduction studies, median motor nerve conduction velocity, gender, supramaximal stimulation

Phases of the menstrual cycle and its effect on visual and auditory reaction times

P19

Christina S¹, Kammar KF²

¹Department of Physiology, Koppal Institute of Medical Sciences, Koppal, Karnataka, ²Department of Physiology, Karnataka Institute of Medical Sciences, Hubli, Karnataka

Background: The menstrual cycle involves cyclical changes in the sex steroids and the effects of these hormones have been known to occur outside the reproductive system also.

Objectives: To observe the reaction times of the visual and hearing system during different phases of the menstrual cycle.

Methods: This study was done on 50 healthy females in the age group of 20-25 years. Visual and auditory reaction times were recorded in these subjects during the three phases of the menstrual cycle – menstrual, proliferative and secretory. Students paired t test was used for statistical analysis.

Results: The average reaction times (in milliseconds) during different phases of menstrual cycle were – (ART = M - 187.23 ± 19.20 , P - 182.58 ± 14.63 , S - 178.23 ± 13.14) and (VRT = M - 190.37 ± 8.83 , P - 185.79 ± 10.70 , S - 181.53 ± 15.11).

Conclusion: The shortest reaction times was noted during the secretory phase, and the menstrual phase is characterized by longer reaction times.

Key-words: reaction time; menstrual cycle; estrogen; progesterone

To evaluate gender differences in sleep health in psychiatric patients with significant clinical improvement

P20

Aniruddha, A Santakumari, Geetha Shavali

Upgraded Department of Physiology, Osmania Medical College.

Background: Sleep disturbances have become a common co-morbid condition in psychiatric illnesses. Even after treating the immediate psychiatric symptoms, some individuals have difficulties in sleep and their quality of sleep is altered, which further affects functional disability and quality of life of the patient.

Objective: To study the quality of sleep in male and female psychiatric patients with significant clinical improvement.

Methods: Clinical Global Impression–Global Improvement (CGI–I) Scale and Pittsburgh Sleep Quality index (PSQI) scale were used for the study. Among the patients attending Review out-patient department of Institute of Mental Health, Hyderabad, 109 were selected as subjects. Inclusion criteria: Schizophrenia, Bipolar disorder, Depression patients

were included in general. Patients who scored <4 on CGI-I scale were 86 and they are included. Exclusion criteria: Patients who scored >4 on CGI-I scale were excluded.

Results: P – value was significant.

Conclusion: Good quality sleepers among females are very less in comparison with males.

Key-words: Quality of Sleep, Pittsburgh Sleep Quality Index, Clinical Global Impression - Global Improvement scale, Psychiatric patients

Effect of prenatal maternal stress on offspring's neurobehavioural alterations and its amelioration by dieckol in the Wistar albino rats

P21

Ravindran Rajan, Sakthivel Govindaraj

Department of Physiology, Dr. ALM Post Graduate Institute of Basic Medical Sciences, University of Madras, Taramani campus, Chennai, India.

Background: Stress is an inevitable part of human life, People begin to experience stress at early stages of life, even before birth. Pregnancy is associated with major physiological changes and adaptation to these changes is crucial for normal fetal development. Prenatal stress has been linked to several diseases and disorders including many adverse neurobehavioral outcomes. The severity depends on intensity, duration and time period of stress exposure.

Objective: To investigate the effect of prenatal stress on offspring's neurobehavioural alteration and its amelioration by dieckol.

Methods: Animals were divided into seven groups. Group I - Control; Group II – early gestational stress, Group III – late gestational stress; Group IV – Full-term gestational; Group V - Early gestational stress + treatment with dieckol (10mg/kg); Group VI - Late gestational stress + treatment with dieckol by oral administration throughout the gestational days and Group VII- Full term gestational stress + treatment with dieckol. Offspring of control and experimental animals were employed to behaviour studies on 30th postnatal day. Open field and elevated plus maze tests to study the animal's anxiety, eight arm radial maze to study spatial learning and memory, Spontaneous alteration T-maze is to assess cognitive ability and memory retention and novel object recognition test is to analyze recognition memory.

Results and conclusion: Offspring of maternal stress exposed rats showed anxiety like behaviour, impaired object recognition memory, spatial learning and memory and also showed impaired cognition and

memory retention, which was improved in stress along with dieckol treated group.

Key-words: maternal stress, neurobehaviour, cognition, dieckol

Effect of hypothyroidism on nerve conduction studies: a cross sectional study

P22

Ahmad Faraz¹, Sangeeta Singhal¹, M.M.Hossain¹, S.S.Siddiqui²

¹Department of Physiology, J.N.Medical College Aligarh, ²Rajiv Gandhi Centre for Diabetes and Endocrinology

Background: Thyroid hormone plays an important role in development of Central Nervous System and in myelination of neurons. Hypothyroidism is one of the major cause of dysfunction of peripheral nerves.

Objective: To evaluate the dysfunction of motor & sensory nerves in hypothyroid patients.

Methods: Thirty patients of hypothyroidism were included in the study, detailed history and clinical examination was performed. 30 normal subjects were included as control. Nerve Conduction Studies were performed in neurophysiology lab of Physiology dept of JNMC Aligarh.

Results: Significant bilateral decrease is observed in the MNCV of the Median Nerve in Hypothyroid subjects as compared to the control subjects. Also there is significant bilateral increase in the Motor Latency of the Median Nerve in Hypothyroid subjects. While comparing the Sensory Nerve Conduction velocity of Median nerves between the two groups, the SNCV of right Median is found to be significantly decreased in hypothyroid subjects. On comparing the Sensory latency of Median nerve between the two groups, the latency is significantly increased bilaterally in hypothyroid subjects.

Conclusion: Hypothyroidism is a definite cause of Neuropathy. We suggest early performing of electrophysiological studies in hypothyroid patients, even in asymptomatic patients. So we can prevent the progression of Neuropathy.

Key-words: MNCV; motor nerve conduction velocity, SNCV sensory nerve conduction velocity

Effect of limb dominance on the speed of information processing

P23

Soumya BA, Deshpande DV

Department of Physiology S S Institute of Medical Sciences and Research Centre, Davangere, Karnataka, India.

Background: Cerebral dominance is a known fact and has its effect in terms of speech, handedness, facial recognition. This study was undertaken to observe if any difference in handedness translates into difference in reaction time, which will have far reaching real life implications.

Objective: To study the effect of limb dominance on auditory and visual reaction time.

Methods: The study was conducted after taking approval from Institutional Scientific & Ethical Committee and included 100 adult males (10 left handers and rest right handers) between 17–21 years. Speed of information processing was tested by Digital Reaction Time Response Apparatus (Inco Ambala) which gives both auditory and visual reaction time in seconds. Results were analyzed using SPSS software.

Results: The auditory reaction time was significantly less in left handers (0.46 seconds) compared to right handers (0.54 seconds). No significant difference was observed in the visual reaction time between right and left handers.

Conclusion: Left handed individuals have a better auditory reaction time compared to right handers. No significant difference was seen in visual reaction time between the two groups.

Key-words: limb dominance, auditory reaction time, visual reaction time

Efficiency of learning and adaptation established through lateralization of local circuits within brain: to demonstrate through simple observational and EEG studies on rats.

P24

Vivek Elangovan, Ravindran Rajan

Department of Physiology, Dr. ALM PGIBMS, University of Madras

Background: Lateralization is a mosaic of computational processes that require unification of both hemispheres for integrated function. For efficiency, CNS has developed local circuits within small regions of the brain to carry out simple neural computations. The motor skill is developed by motor-adaptation and motor-learning, where the former one is feed-forward mechanism, and later being feed-back mechanism.

Objectives: Thus, we hypothesized that the “feed-forward mechanism”, is lateralized to the dominant intra-hemispheric network, which is fine tuned by the inhibition of subtle “feedback-mechanism”.

Methods: To establish this, we designed an operant-conditioning environment for rats, learned to get food after manipulating two different triggers. Rats trained using both paws for food to manipulate the “wheel rotation” (symbolic transformation) and to manipulate the trigger to induced three long beeps (immediate recognition). Restraining one paw: Dominant paw was restrained, to observe the choice of trigger for food by non-dominant paw, later with Dominant paw by restraining non-dominant paw, to observe the choice. With continuous EEG monitoring during 3 and 4.

Results: Preference for symbolic transformation activity during dominant-paw's choice and immediate recognition for non-dominant-paw's choice was observed. Central (C3/C4), parietal (P5/P4), occipital pole (O1/O2) of dominant intra-hemispheric network was found active during symbolic transformation and only frontal with minimal activity in other poles on non-dominant network was observed.

Conclusion: It is hypothesized that the dominant intra-hemispheric networks responsible for control of motor actions will have more feed-forward loop and less feed-back loop, with the non-dominant side with less feed-forward loop and more feed-back loop.

Key-words: Lateralization, Motor programming, feed-back and feed-forward loop

Assessment of perceived stress and association with sleep quality and attributed stressors among first year medical students: a cross-sectional study from Karwar, Karnataka, India

P25

Clevin Rashmi Rebello, Prasad B K, Preethi G Hegde

Department of Physiology, Karwar Institute of Medical Sciences, Karwar, Karnataka, India

Background: Inability to cope with goals and responsibilities often leads to stress. Numerous stressors can impact the wellbeing of students in medical school. Apart from coping with day to day stressors, medical students must deal with stressors specific to medical school.

Objectives: To study the extent of perceived stress among first year medical students using the Perceived Stress Scale-14, and its association with sleep quality as assessed by the Pittsburgh sleep quality index and attributed stressors.

Methods: A cross-sectional study was conducted of 121 first year medical students at the Karwar Institute of Medical Sciences, Karwar, Karnataka, India. The extent of their stress was assessed using the Perceived Stress Scale-14 and their sleep quality was assessed

using the Pittsburgh Sleep Quality Index. Graded stress exerted by the attributed stressors was also assessed.

Results: A total of 33.8% of participants had perceived stress scores of >28. Among academic stressors, performance in examinations (34.7%), lack of time for recreation (30.6%), curriculum (24.8%) and frequency of examinations (24.8%) were the highest rated stressors. Quality of food in the mess (50.4%) and lack of entertainment in the institution (39.7%) were the highest rated psychosocial stressors. There was a positive correlation between the perceived stress scale scores and various academic stressors, and the global Pittsburgh Sleep Quality Index score.

Conclusion: First year medical students reported a high level of stress, including academic and psychosocial stressors. Effective changes in the curriculum and living conditions can reduce the level of stress among these students.

Key-words: perceived stress, sleep quality, stressors

Comparison of H reflex in abductor digitiminimi between dominant and non- dominant hands of healthy adult male volunteers in Puducherry- an observational study

P26

Sathiyamoorthy P, Subhasis Das

Department of Physiology, Pondicherry Institute of Medical Sciences Pondicherry

Background: Preferred use of a limb may cause adaptation and bring about asymmetries in fiber composition of muscles. Such asymmetries may affect the H reflex which impinges primarily on low threshold motor units associated with type 1 fibers. Some studies have shown differences in H reflex between dominant and non-dominant limbs. However, others have reported no difference.

Objective: The present study was undertaken to compare latency and amplitude of H reflex of abductor digitiminimi of the dominant and non-dominant hands.

Methods: Fifty healthy male subjects in the age group of 25-35 years were studied by stimulating ulnar nerve while the subject was maintaining 10-20% of maximum voluntary contraction of the abductor digitiminimi. The H reflex was recorded using a digitalized nerve conduction/EMG machine.

Results: Mean latencies of Dominant and Non dominant hands were 27.4 ± 2 ms and 27.3 ± 1.7 ms and mean amplitudes of the two hands were 0.62 ± 0.3 mV and 0.59 ± 0.2 mV, respectively.

Conclusion: This study showed that there was no statistically significant difference between dominant and non-dominant hand in the mean amplitude and latency of H reflex.

Key-words: abductor digitiminimi, H reflex, dominant and non-dominant hand

Effect of sodium nitrate exposure on behavior and learning and memory in zebrafish

P27

Swathi Priya AK, Sathya Narayanan G

Department of Physiology, Dr. ALM Post Graduate Institute of Basic Medical Sciences, University of Madras, Taramani, Chennai, Tamil Nadu.

Background: Nitrates are vital to all plants and animal life. However over exposure can lead to serious negative health effects by increasing the free radical generation and predisposing the cells to irreversible damage. Nitrate is used as a food adulterant in cheese products, curing of meat and also in fertilizers.

Objective: To assess the effect of sodium nitrate exposure on behavior and memory in zebrafish.

Methods: Adult zebrafish were divided into control and sodium nitrate group. zebrafish were exposed to sodium nitrate with the concentration of 606 mg/L for 10 days. The behavior and memory were assessed by novel tank, light and dark tank, social preference tank, novel object task, sexual behavior tank and fish maze.

Results: Novel tank test showed a significant alterations and the fishes represented a stress and anxiety like behavior upon exposure to sodium nitrate. In light and dark experiment, sodium nitrate group showed significant decrease in time spent in the dark than control. In social preference, sodium nitrate group showed significant decrease in the time in conspecific area than control. In Novel object recognition test, sodium nitrate group showed significant decrease in time spent near the novel object than control group. A decrease in memory and sexual behavior are also observed upon exposure to sodium nitrate.

Conclusion: Our data indicates that short term exposure to sodium nitrate has induced behavior anomalies and decreased the memory and learning performance in adult zebra fish suggesting common mechanism of neural toxicity.

Key-words: Zebra fish, sodium nitrate, anxiety

P300 or Cognition in different type of learners

P28

Rachna Parashar¹, Abhimanyu Ganguly¹, Mukesh Shukla², Sandip M Hulke¹, Rajay N Bharshankar¹

¹Department of Physiology, ²Department of Community and Family Medicine, AIIMS, Bhopal

Background: VARK (Visual – Aural – Read/Write – Kinaesthetic) model of learning that depends on sensory channels and pathway classify learning into four types of learning modalities namely, Auditory, Visual, Read & Write and Kinaesthetic. Cognition or physiological alterations in sensory pathways might play its role in different modalities of learners based on different type of perception. P300 or Event-related potentials (ERPs) are late responses. Provides useful information about the response to cognitive tasks processing that reflects attention memory and other higher functions

Objective: To study the late cortical responses (P300) in different type of learners.

Methods: Study was conducted among 101 first & second year medical students. Participants were categorised in to five groups using latest English version 7.0 of the Visual-Aural-Read/write-Kinaesthetic (VARK). The P300 of participants was recorded using odd ball Auditory paradigm in terms of latency and amplitude at Fz (frontal), Cz (Central) & Pz (Parietal) sites using NIHON KOHDEN NEUROPACK X.

Results: Latency for P300 was minimum among Read and write learners modality frontal (309 ± 22.1359), Central (300.75 ± 20.6135) & parietal (296.5 ± 10.8474) and P300 amplitude was maximum among visual learners. However, no significant difference was observed in the mean value of amplitude. Differences in scores among VARK-learning styles were tested by Friedman's test with post-hoc pair wise comparison.

Conclusion: Results of the study suggest that to improve learning one should try to use multi modal styles with special emphasis given to read and write and visual mode especially among basic science teaching in medical education.

Key-words: VARK, cognition, learners

Sural Nerve Conduction in Prediabetics

P29

Sujata Gautam¹, Santhanalakshmi .D¹, Asha Gandhi¹, Debasish Choudhury, Binita Goswami², Sunita Mondal¹

Department of Physiology¹, Biochemistry², Medicine³, Lady Hardinge Medical College, Delhi

Background: Prediabetes as the name indicates a stage before type 2 diabetes mellitus (T2DM) with either impaired fasting glucose (IFG) or impaired glucose tolerance (IGT) or both IFG and IGT. Whereas the link between diabetes and peripheral neuropathy is well-established, there remains scientific uncertainty regarding the effects of prediabetes (impaired fasting glucose or impaired glucose tolerance) on sensory nerve conduction.

Objective: To record and compare the sural nerve conduction in Prediabetics and healthy controls.

Method: 30 prediabetics and 30 apparently healthy subjects in the age group of 40 to 60 years of either sex were enrolled for the study as per American Diabetic Association guidelines. Sural nerve conduction was recorded on these subjects using Schwarzer Topas EMG – 4channel EMG/NCV/EP system following standard procedure. Latency, amplitude & velocity of sural nerve conduction were recorded from both the limbs. Statistical analysis was done using Graph Pad Prism Version 5 software.

Result: The prediabetic group exhibited a significant reduction in nerve conduction velocity in both right and left Sural nerve ($p < 0.001$). Sural nerve latency was also significantly increased bilaterally ($p < 0.001$) amongst prediabetics as compared to control group. Amplitude on left side Sural nerve was reduced significantly ($p = 0.039$) while no such difference was observed on right side.

Conclusion: There is an early onset of neurophysiological sensory nerve impairment among prediabetics even before frank diabetes sets in. Early lifestyle intervention in the form of exercise, yoga, dietary modification and counselling sessions in prediabetics, may help in preventing the progression of the disease.

Key-words: prediabetes, peripheral neuropathy, nerve conduction

Effect of single bout of exercise on the executive functions of cognition in young medical students

P30

Sneha PM, Maria Pauline

Department of Physiology, St.Johns Medical College, Bangalore-34

Background: Physical activity and physical exercise is known to influence one's cognitive skills as observed in many studies, while few studies reported the contrary. The effect of training (learning effect), which is a major contributor to the task performance has not been analyzed in such studies, especially in an Indian population.

Objective: To assess the effect of single bout of exercise using Harvard step on executive functions in medical students aged 18-25years.

Methods: The subjects were recruited and randomised into two groups. The exercise group (N = 18; 4M, 14 F) performed 5 minutes stepping exercise using Harvard Step Test while the control group (N = 18; 2M, 16F) was rested for the same period. Both groups performed two cognitive tests, Trail making test (TMT) and Stroop Colour Word Test (SCWT), before and after the intervention.

Results: There was no significant difference in preintervention values between two groups ($p > 0.05$). In TMT both group showed significant difference post intervention ($p = 0.00$; $p = 0.03$). All components of stroop test showed significant improvement in both groups, after intervention. ($p < 0.01$) The performance in SCWT-color naming was better in the exercise group when compared to the rest group ($p = 0.05$), while no such significance noted in the interference test ($p = 0.73$).

Conclusion: We have observed an effect of training in both the tests of executive function (TMT and SCWT) while a single bout of exercise resulted in better performance of Stroop test which was limited to colour naming task.

Key-words: Executive function, learning effect, stroop test, trail making test

Effect of garlic administration on brain antioxidant system in Wistar albino rats after noise stress

P31

Sathya Narayanan G, R. Sheela Devi

Department of Physiology, Dr. ALM Post Graduate Institute of Basic Medical Sciences, University of Madras, Taramani, Chennai, Tamil Nadu.

Background: Noise is one of the most widespread sources of environmental stress in living surrounding. Noise stress has been shown to induce free radical generation in brain. In developing countries like India, where poverty and malnutrition is rampant, knowledge of plant derived antioxidants could reduce the cost of health care. Herbal medicine has now become an integral part of the standard health care strategy.

Objective: To evaluate the effect of garlic administration on brain antioxidant system in discrete regions of rat brain.

Methods: Wistar strain male albino rats were divided into control; garlic (125 mg/kg bw); 30 days noise stress; garlic + 30 days noise stress exposed groups. Serum corticosterone, lipid peroxidation and brain

antioxidant system like superoxide dismutase, catalase, glutathione peroxidase, reduced glutathione and vitamin C were estimated in discrete regions of brain like cerebral cortex, cerebellum, midbrain, pons, medulla, hippocampus and hypothalamus.

Results: A significant increase in serum corticosterone, lipid peroxidation and Glutathione peroxidase was observed in noise stress exposed animals and garlic treatment has significant decreased these levels in all the brain regions studied. A significant decrease in superoxide dismutase, catalase, reduced glutathione and vitamin C were observed in noise stress exposed animals and garlic treatment has significantly decreased these levels in all the brain regions studied.

Conclusion: The present study shows the adaptogenic property of garlic. Since garlic is already under human consumption, it can be considered as a better choice to combat the deleterious effects of noise stress exposure.

Key-words: noise stress, garlic, antioxidant system

Effect of Ammonium sulfate exposure on fear, anxiety and social behavior in zebrafish

P32

Karthik P, Sathya Narayanan G

Department of Physiology, Dr. ALM Post Graduate Institute of Basic Medical Sciences, University of Madras, Taramani, Chennai 600113, Tamil Nadu. Email id: pkarthik1796@gmail.com

Background: Ammonium sulfate is used as popularized agricultural fertilizer, food additive and in bread making. Excess of its utilization leads to environmental pollution and shows the effect on physiological functions of living organisms.

Objective: To study the effect of ammonium sulfate exposure on fear, anxiety and social behavior in zebra fish.

Methods: Adult zebra fish divided into control and ammonium sulfate treated group with 20 fishes in each group. Ammonium sulfate was exposed in the amount of 175 mg/lit in tank water. Novel tank, Novel object and Light & dark experiments were performed to observe the fear and anxiety behavior and social preference was performed to observe the social behavior in zebrafish. Data were analyzed by students 't' test.

Results: Ammonium sulfate exposed fishes showed stress and anxiety like behavior in novel tank behaviour. In light and dark experiment, ammonium sulfate treated group showed a significant increase in

the time spent in the light compartment when compared to control. In social preference test ammonium sulfate treated group showed a significant decrease in time spent in the social group compared to control. In the novel object recognition test ammonium sulfate treated group showed a significant decrease in time spent near the novel object compared to control group.

Conclusion: Identification and evaluation of the adverse effects of ammonium sulfate is crucial for clinical or toxicological approaches. The study shows that on exposure to ammonium sulfate, zebrafish showed increased stress and anxiety behavior denoting the toxic effects of ammonium sulfate on brain.

Key-words: Ammonium sulfate, zebrafish, behavior

Effect of Gamma binaural beats on Cognitive functions

P33

Y.Raghu Srinivas, M.Padma Geethanjali, L.G.B.Patru

Department of Physiology, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India
dr.raghu668@gmail.com

Background: Binaural beats (BB) are auditory illusions perceived when 2 sinusoidal waves of slightly different frequencies are presented to both ears separately. BB modulates physiological & cognitive processes through cortical entrainment. BB within EEG frequency range entrains EEG activity & affects various cognitive domains of brain.

Objective: To study whether a single session of 20-minute duration exposure to 40Hz BB has any positive effect on cognitive performance in healthy subjects.

Methods: Study was conducted on 22 subjects (11 males and 11 females) with age between 18 to 28 years in 2 sessions. Selective attention & cognitive flexibility were tested using Normal Reaction Time & Interference Reaction Time of Eriksen Arrow Flanker's conflict task. In each session, NRT & IRT were noted before and after applying either 40Hz Binaural beats or pink noise. Baseline & Post intervention scores within each subject for both BB & Pink noise sessions were compared and analysed using paired sample T-test.

Results: Our study showed a statistically significant decrease in NRT and IRT after entraining with 40Hz BB compared to pink noise.

Conclusion: This study suggests single session of 40Hz BB stimulation for 20 minutes, can improve cognitive performance levels in healthy subjects.

Key-words: Binaural Beats; Normal & Interference Reaction Time; Eriksen Flanker's Task, Cognitive flexibility

Effect of meditation on the neural systems: a prospective study to assess trait change with meditation

P34

Abhimanyu Ganguly, Rajay N Bharshankar

Department of Physiology, AIIMS Bhopal;
(dr.abhimanyu.ganguly@gmail.com)

Background: Meditation has long advocated as a means to combat stress. We wanted to observe the effect of meditation on P300 Event Related Potential, a marker of cognition and Readiness Potential (RP)/ (Bereitschaftspotential), as a tool to evaluate motor planning.

Objectives: To assess trait effects of meditation on (i) P300 and (ii) RP

Methods: P300 was recorded over Frontal (Fz), Vertex (Cz) and Parietal (Pz) areas and evaluated in terms of latencies and amplitudes. RP was recorded over Cz, right (C4) and left (C3) primary motor cortices with a surface EMG of extensor indicis muscle as trigger and evaluated in terms of latencies, amplitudes, intervals and area.

Results: The amplitude of the P300 was found to be significantly increased over the central area or the vertex (Cz) (N=7; Mean Age=38.57 ± 14.28 years) (mean difference: 3.36 ± 1.84; p value 0.003) as a trait change. No significant changes were observed in the latency of P300 wave at Fz, Cz or Pz or in the amplitude of the P300 wave at Fz or Pz. The RP also did not demonstrate any significant trait changes at C3, Cz and C4.

Conclusion: An increase in the amplitude of the P300 wave was observed after 3 months of meditation reflecting a possible improvement in resource allocation towards attention.

Key-words: P300, Bereitschaftspotential, Meditation

Role of Clitoria ternatea aqueous root extract and combination of Choline with DHA supplementation to rat pups in attenuating maternal separation stress induced alterations in corticosterone levels at different time point of aging

P35

Prathibha M D'Almeida¹, Kiranmai S Rai¹, Shobha U Kamath²

¹Department of Physiology, Melaka Manipal Medical

College, MAHE, Manipal, Karnataka, India,
²Department of Biochemistry, Kasturba Medical
College, MAHE, Manipal, Karnataka, India.
prathibha.almeida@manipal.edu

Background: Normal HPA axis function during early life is essential for brain development. Perinatal maternal separation stress [PMSS] during stress hypo-responsive period [SHRP] can affect normal development of HPA axis. Many supplements have been studied for their efficacy in attenuating stress induced alterations. There are no studies elucidating the role Clitoria ternatea aqueous root extract [CTR] and combination of choline with DHA supplementation in attenuating PMSS alterations in plasma corticosterone levels.

Objective: To study role of CTR in combination with choline, DHA supplementation in attenuating PMSS stress induced alterations in plasma corticosterone levels

Materials and Methods: Inbred Wistar rat pups were divided into 4 groups - Control, PMSS, PMSS + CTR PMSS + Choline + DHA [n = 6 pups/group]. PMSS was given from PND 2-30 for 6 hrs/day to all groups except control group. CTR, choline with DHA was supplemented to the appropriate groups from PND 2-30. Plasma corticosterone levels were analyzed on day 30, 60, 90, 210 and 360 using ELISA kit method.

Results: Plasma corticosterone levels were increased in PMSS rats at day 30 ($p < 0.05$), 60 ($p < 0.001$), 90 ($p < 0.001$) and at 360 ($p < 0.05$) when compared to the same in age matched normal controls. Alternately measured plasma corticosterone levels were significantly decreased in PMSS Choline DHA supplemented rats and PMSS CTR supplemented rats at day 30 ($p < 0.05$), 60 ($p < 0.001$), 90 ($p < 0.05$) and 360 days ($p < 0.05$) respectively when compared to the same in age matched PMSS rats.

Conclusion: Results of the present study supports the use of CTR and combination of choline with DHA to alleviate early life stress-induced alterations in corticosterone levels

Key-words: Perinatal maternal separation stress, Clitoria ternatea, Choline, DHA

Effect of obesity on cognition in adolescents

P36

Pranathi R¹, Suguna S²

¹Department of Physiology, St John's Medical College, Bangalore-34, ²Department of Physiology, Bangalore Medical College and Research Centre, Bangalore-02.

Background: Obesity is a chronic, relapsing, neurochemical disease that is prevalent in both

developing and developed countries. Greatest obesity related mortality is among young people leading to greater years of quality life lost. While the physical dangers of obesity are well-known, the emotional and cognitive effects are not given importance. Obesity during adolescence makes them vulnerable to damaging psychological effects such as discrimination, stigmatization, emotional trauma, depression and withdrawal from social interactions. These have potential to interfere with cognitive stimulation at a critical development stage.

Objective: To evaluate the effect of obesity on cognitive functions (attention, learning and memory, executive functions and visuospatial organization) in adolescents.

Methods: Sixty obese (BMI for age and sex \geq 95th percentile) and 60 non obese adolescents (age 10-19 yrs.) were recruited after matching for the confounders (e.g. age, gender, intelligence, socioeconomic status, etc.). Cognitive functions were assessed using a battery of tests for attention (Color trails test), learning and memory (Rey's auditory verbal learning test), visuospatial organization (Visual N Back Task, Complex figure test) and Executive functions (Design fluency test, N back test).

Results: Obese adolescents scored significantly less compared to non-obese adolescents in tests of attention (51.9 ± 7.1 vs 40.8 ± 8.5 , $P < 0.001$), learning and memory (7.3 ± 1.4 vs 10.3 ± 1.8 , $P < 0.001$), executive functions (1.2 ± 0.8 vs 2.7 ± 1.3 , $P < 0.001$) and visuospatial organization (6.9 ± 2.6 vs 10.5 ± 2.3 , $P < 0.001$).

Conclusion: Obesity has a negative impact on adolescent's cognitive domains.

Key-words: Obesity, attention, memory, executive functions, visuospatial organization

Effect of Green Tea Extract (Camelia sinensis) on Spatial Learning and Memory in REM sleep deprived Albino Wistar Rats

P37

Veena Nayak¹, Vinay Mamulpet¹, Laxminarayana Bairy Kurady², Basavaraj Poojar³

¹Department of Pharmacology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, Karnataka, India; ²Department of Pharmacology, Ras al-Khaimah Medical and Health Sciences University, United Arab Emirates, ³Department of Pharmacology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Karnataka, India
email id:veena.nayak@manipal.edu

Background: Sleep deprivation can enhance the metabolic rate and oxidative stress, causing memory deficits. Green tea (*Camellia sinensis*), has shown to have radical scavenging, gene modulating, and cell signalling activities rendering it to have neuroprotective action.

Objective: To evaluate the possible beneficial effect of aqueous extract of green tea (GTE) on spatial learning and memory in rapid eye movement (REM) sleep deprived rats.

Methodology: Wistar albino rats were deprived of REM sleep for 96 h using the modified inverted flowerpot technique. Morris water maze, antioxidants levels and body weight were used to assess cognitive enhancing and metabolic activity.

Results: Increase in oxidative stress following REM sleep deprivation was reversed in both acute and chronic study. Chronic intake of GTE mitigated spatial learning and memory deficit in Wistar rats induced by REM sleep deprivation by significantly reducing the latency time and increasing the time spent in the target quadrant.

Conclusion: The extract of green tea *Camellia sinensis* ameliorated the oxidative stress associated with memory deficits induced by sleep deprivation in the present study.

Key-words: REM sleep, spatial learning and memory, Green tea Extract, Morris water maze

Modafinil on Learning & Memory- Is there a Connection? Evaluation of the Effect of Modafinil on Learning and Memory in Wistar Rats

P38

Priyanka Kamath¹, Mnnat Gill², Pragati Srivastava³, Bhuvaneshwari S.⁴, Sheetal Ullal¹

¹Department of Pharmacology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, ²Final Year MBBS, Roll no. 140201250, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, ³Regional Medical Advisor, Oncology - North Zone, Astra Zeneca India Pvt. Limited, ⁴Medical Advisor, Diabetes division- Central Zone, Boehringer Ingelheim, Email: piyukamath@gmail.com

Background: Modafinil, a drug approved for use in narcolepsy, has shown conflicting effects on cognition.

Objectives: To observe the effects of acute and chronic administration of modafinil on learning and memory in wistar rats.

Methods: Seven groups with 6 rats in each was used. Group I - control, Group II - negative control (vehicle), Group III – standard (donepezil), Group IV and V received modafinil 10 mg/kg and 20 mg/kg, respectively for 15 days (chronic study), Group VI and VII 10 mg/kg and 20 mg/kg single dose (acute study). Scopolamine was administered to induce amnesia on 1st day (Groups VI and VII) and 15th day (Groups II – V), 1 h after drugs were given. Using the Hebb-William maze, learning score was recorded on day1 and 2 (acute study) and days 15 and 16 (chronic study).

Results: On days 15 and 16, the learning scores significantly decreased in Group I, while it significantly increased in group II, compared to baseline, indicating induction of amnesia by scopolamine. In group III, the learning scores on days 15 and 16 (8.66 ± 2.63 , 9.66 ± 2.75 seconds) was decreased significantly compared to baseline (18.83 ± 2.65), indicating a reversal of scopolamine-induced amnesia. Acute and chronic administration of modafinil showed a statistically significant increase in learning scores compared to baseline, indicating no reversal of scopolamine-induced amnesia.

Conclusion: Modafinil in doses of 10 mg/kg and 20 mg/kg, given either as a single dose or over a period of time, does not reverse amnesia induced by scopolamine in rats.

Key-words: acute, chronic, donepezil scopolamine

Effect of artesunate in an animal model of alzheimer's disease induced by oral aluminium chloride

P39

Praveen Kumar S E¹, K L Bairy², Veena Nayak¹

¹Department of Pharmacology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, ²Department of Pharmacology, RAK College of Medical Sciences, P.O.Box 11172, Ras Al Khaimah, UAE.

Email id: praveendrug@gmail.com

Background: Alzheimer's disease (AD), a geriatric neurodegenerative disorder, is a common cause of dementia among older adults. Artemisinin and its derivatives (artesunate) have proved to have effect in neuroinflammation at different concentrations. The present study was aimed to investigate the effect of artesunate in aluminium chloride induced animal model of AD

Objectives: To evaluate the effect of artesunate on behavioural and histopathological changes of learning and memory in experimentally induced AD in albino Wistar rats.

Materials and Method: Albino wistar rats were divided into seven groups (n = 6) where Group-I received saline, Group-II received aluminium Chloride (AlCl₃) 30mg/kg for 60 days, Group-III to VII received AlCl₃ for 30days followed by 30days of artesunate (28mg/kg b.w), rivastigmine (1mg/kg b.w), memantine (20 mg/kg b.w) and their combinations along with aluminium chloride, respectively. After 60th day of treatment, all animals were assessed for behavioural parameter (Passive Avoidance Test) & histopathological examination of the hippocampus was done.

Results: Animals treated with artesunate alone and in combination with rivastigmine and memantine showed protective effect in behavioural observations when compared to control and lesion group. These results were consistent with histopathological findings in the brain tissue.

Conclusion: Artesunate has shown to have a promising effect in the aluminium chloride induced dementia model of AD alone and along with standard available drugs for AD.

Key-words: Passive avoidance test. learning, memory

Neuroprotective effect of Dehydrozingerone in temozolomide-induced cognitive impairment in glioma rats

P40

Nitesh Kumar¹, Nandini Pathak¹, Suhani Sumalatha², Karthik Gourishetti¹, Sri Pragnya Cheruku¹, C. Mallikarjuna Rao¹

¹Department of Pharmacology, Manipal College of Pharmaceutical Sciences, Manipal Academy of Higher education, Manipal, Karnataka- 576104; ²Department of Anatomy, Kasturba Medical College, Manipal Academy of Higher education, Manipal, Karnataka-576104

Email id: nitesh.kumar@manipal.edu

Background: Temozolomide (TMZ) is a commonly used chemotherapy agent to treat glioblastoma. However, it is reported to induce cognitive impairment in the survivors.

Objective: Present study was designed to evaluate the protective effect of dehydrozingerone against TMZ-induced cognitive impairment in male Wistar rats with C6 glioblastoma.

Methods: Glioblastoma was developed in male Wistar rats by intracerebral injection of 50000 C6 glioma cells in the cerebral cortex. TMZ (18mg/kg i.v once in 5 days over 32 days) was administered to treat glioma and to induce the cognitive impairment. Dehydrozingerone was given 100 mg/kg p.o. daily. Spatial memory component of cognition was assessed by the Morris water maze test (MWM). A part of the hippocampus

and frontal cortex was subjected to antioxidant evaluation and remaining for the assessment of neuronal integrity by histopathology.

Results: Induction of glioma was confirmed by histological evaluation of cortex. MWM test showed a significant decrease in total zone entry, path efficiency, and escape latency in C6 injected control animals as compared to normal control. TMZ treatment further worsened them as compared to C6 control. These changes were correlated with histopathological features and antioxidant parameters, except the elevation of glutathione levels in the brain by TMZ treatment. Glutathione elevation by TMZ treatment is considered to be a reason for its resistance in glioma. However, the treatment with dehydrozingerone significantly reversed the changes in GSH level.

Conclusion: The result confirmed the role of TMZ in worsening the memory component and dehydrozingerone in reversing it.

Key-words: Dehydrozingerone, Temozolomide, C6 glioblastoma, Spatial memory, Antioxidant levels

Effect of pomegranate extract on cognition in rats

P41

Divya Bhargavan¹, Rosmitha Paulose²

¹Department of Pharmacology, ²MBBS IVth year student, K S Hegde Medical academy, Nitte (Deemed to be University)

Email id: divyabhargavan@rediffmail.com

Background: Punica granatum (Pomegranate) a member of Punicaceae family is reported to have memory enhancing activity in animals. In this study, Punica granatum fruit extract was evaluated for its effect on cognition.

Objective: To evaluate the effect of Punica granatum fruit extract on cognition in normal and scopolamine-induced amnesic rats.

Methods: Punica granatum fruit extract was administered orally in two doses, 100 and 200 mg/kg. Elevated plus maze was used to evaluate the learning and memory parameters.

Results: Punica granatum fruit extract showed significant improvement in learning and memory when compared to control in elevated plus maze.

Conclusion: Hence Punica granatum appears to be a promising drug for improving memory and it would be worthwhile to explore the potential of this plant in the management of impaired learning, dementia and Alzheimer's disease.

Key-words: Punica granatum, learning, memory, cognitive function

Role of nardostachys jatamansi on anxiety of alcohol withdrawn wistar albino rats

P42

Deepa.B¹, Shyamjith Manikkoth²

¹K S Hegde Medical Academy, Nitte (Deemed to be University), ²Kanachur Institute of Medical Sciences and Research centre, Mangalore
Email id: bdeepa05@gmail.com

Background: Anxiety associated with alcohol withdrawal is the most important negative motivation which revert people to alcohol abuse. Several agents are used for management of anxiety in ethanol withdrawal, but their uses are associated with side effects. Therefore, this pre-clinical study was done using a medicinal plant Nardostachys jatamansi to screen its efficacy in treating anxiety associated with ethanol abstinence.

Objectives: To study the therapeutic role of Nardostachys jatamansi on alcohol withdrawal induced anxiety in wistar albino rats.

Methods: For studying the therapeutic role of Nardostachys jatamansi on alcohol withdrawal induced anxiety in Wistar albino rats, the following steps were done

- ▶ 1 ml of 20% alcohol was administered orally twice a day for 30 days orally.
- ▶ On 31st day, alcohol was withdrawn and substituted with drinking water.
- ▶ On 32nd day, after confirming the development of withdrawal symptoms, Nardostachys jatamansi ethanolic extract (NJEE) was administered (100mg/kg body weight) to animals for next thirty days.
- ▶ On 61st day, pharmacological experiments were done on animals for screening the role of drug on anxiety using elevated plus maze (EPM) apparatus.

Results: As observed by EPM test, there was a statistically significant increase of anxiety in alcohol withdrawal rats, which was treated with NJEE.

Conclusion: Alcohol withdrawal induced anxiety can be treated by indigenous medicinal plant Nardostachys jatamansi.

Key-words: Nardostachys jatamansi, alcohol, wistar albino rats, anxiety, elevated plus maze

Effect of Piper betel leaf extract on learning and memory in Aluminium chloride induced Alzheimer's disease in Wistar rats.

P43

Shivaprakash G¹, Shreeraksha Upadhyaya¹, Pallavi LC²

¹Department of Pharmacology Kasturba Medical College, Manipal Academy of Higher Education,

Manipal-576104, ²Department of Physiology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal-576104
Email id : shiva.g@manipal.edu

Background: Alzheimer's disease is a common neurological disorder affecting a significant proportion of the elderly population. There are only a few drugs which can be used safely to treat it. Piper betel leaf, a postmeal mouth freshener is popular for its many medicinal values. We sought to investigate for the first time its potential use in Alzheimer's disease.

Objectives: The study aimed to investigate the effect of Piper betel leaf extract in an animal model of Alzheimer's disease.

Methods: Five groups of male Wistar rats with six rats in each group were used. The control group received the distilled water, AlCl₃ group was treated with aluminium chloride (AlCl₃), the standard group was treated with rivastigmine, and the two test groups received piper betel leaf extract (PBE) at doses of 400mg/kg and 500mg/kg body weight. Memory and learning were evaluated by Morris water maze test and Passive avoidance test.

Results: The results of Morris water maze test showed reduced mean escape latency period in all the groups on trial day three ($P \leq 0.05$) and on trial day four ($P \leq 0.01$) compared to AlCl₃ group. The AlCl₃ group exhibited an increase in escape latency on all four days to find the platform. The retention of spatial memory by probe trial showed that PBE and rivastigmine treated group spent more time in the target (platform) quadrant when compared to AlCl₃ group ($P \leq 0.01$). The passive avoidance test showed significant increase in step through latency in standard and test groups compared to AlCl₃ treated group.

Conclusion: The study shows the beneficial effects of Piper betel leaves in Alzheimer's disease by significantly improving the learning and memory functions in rats.

Key-words: Piper betel leaves, Alzheimer's disease, Learning, Memory

A comparative study of effects of antidepressants on learning and memory-An experimental study

P44

Vybhava Krishna G R, Veena Nayak, Aravind Pandey¹
Department of Pharmacology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal

¹Department of Anatomy, Kasturba Medical College, Manipal Academy of Higher Education, Manipal.
Email id : vybhavakrishna@gmail.com

Background: Antidepressants are prescribed commonly throughout the world for a prolonged period of time for these illnesses. In view of inconclusive and contradictory evidence on the impact of these drugs on memory, there is an unmet need to compare to their effect on memory.

Objectives: To assess the impact of antidepressants escitalopram, desvenlafaxine and mirtazapine on scopolamine induced behavioural, biochemical, and histological changes in wistar albino rats.

Methods: A total of 66 rats were assigned into 11 groups of 6 rats each. Three antidepressants, escitalopram, desvenlafaxine and mirtazapine were used in the current study. Two doses of antidepressants were given orally for one month and tested in scopolamine induced amnesia model in water maze. At the end of the study rats were sacrificed, brain acetyl cholinesterase level was measured. Histopathological examination was done to confirm results.

Results: Compared to control, scopolamine treated rats showed significant decrease in percentage of distance travelled and percentage of time spent in the target quadrant ($P < 0.05$) in probe trial of water maze test. Higher dose of all three antidepressants reversed scopolamine induced memory impairment whereas lower dose failed to reverse. Scopolamine treated rats brain showed significant increase in acetyl cholinesterase level compared to control ($P < 0.05$). Brain cholinesterase activity of rats treated with higher dose of antidepressants were able to reverse the scopolamine induced increase in enzyme levels but lower dose could not reverse. This finding was confirmed by histological changes.

Conclusion: Higher dose of escitalopram, Desvenlafaxine and mirtazapine reversed scopolamine induced behavioral, biochemical and histopathological changes.

Key-words: antidepressants, memory, scopolamine

A study of prescription pattern in cases of depression in tertiary care hospital

P47

Virendra Kushwaha, Mohit Trivedi, Ch. Nagesh, Shruti Dubey

Department of Pharmacology, King George Medical University, Lucknow (U.P)
Email: mohittrivedi108@gmail.com

Background: Irrational use of medication is one of the main cause of resistance. It can be prevented by giving right drug to right patients. Hence the present study was conducted to evaluate the prescribing pattern in depressed cases.

Methods: A prospective study, was carried out by evaluating prescription of 161 subjects who had definite diagnosis of depression in liaison with Department of Psychiatry and Department of Pharmacology at Government Medical College Kannauj from May 2018 to July 2018.

Results: In this study there was no much difference pertaining to the gender ratio with 76.52% being females and 23.48% being males. All patients received multiple drug therapy. Most commonly prescribed antidepressants were SSRI (90.1%) followed by TCA (51.5%). Some patients also received other groups of antibiotics like Duloxetine (16.1%), Venlaflexine (3.7%) and Mirtazapine (0.6%). All the prescriptions had Generic drugs which were written in small letters of English. 93.1% received Cyproheptadine as appetite stimulant and 82.4% of the patients received Benzodiazepines in form of clonazepam as anxiolytics and lorazepam and nitrazepam as hypnotics.

Conclusions: There can be certain recommendations made pertaining to rational prescription of drugs giving patients monotherapy, adhering to treatment guidelines of depression, prescribing antidepressants which is in formulary of the tertiary hospital which aims at minimizing unnecessary cost to the patient.

Key-words: Depression, prescription pattern, tertiary care hospital

Reworking periodic blood pressure response to successive divided attention tests when performed with instrumental background music – a randomised controlled trial

P49

Shantala.S.Herlekar

Dept. Of Physiology, SDMCMSH, Dharwad, Karnataka.

Background: Music is used by students while studying. Does music really help them relax faster and concentrate better?

Objective: To analyze the effect of classical-instrumental background music on concentration test and BP-response in first year medical students.

Methods: 120 first year medical students, with equal number of girls and boys, were randomized into two groups' i.e music and control. 3-different forms of SDMT (Symbol Digit Modality Test; concentration-test) were used as pre-test, during music/control session and post-test. It was assessed for total, correct and error score. Simultaneously, multiple BP-recordings were taken as pre-test, during 1, 5, 15, 25 minutes of music/control (+SDMT) and post-test. Classical instrumental flute music was used. Student t-

test was taken for statistical analysis and p-value < 0.05 was considered significant. A drop in BP indicated relaxed state and a rise with task performance indicated increased arousal.

Results: In concentration-test, music group showed significantly better results for correct (p=0.02) and total (p=0.029) scores during post-test while errors reduced (p=0.002). BP response was similar in music and control group with following variations in music group; a significant drop in BP at 5minutes (p < 0.001), a steep rise at 15minutes (corresponding to SDMT) (p < 0.001) and post-test SBP in controls were at lower levels.

Conclusion: These recordings indicate increased relaxed state, within a short period of 5min in our study, with music and increased arousal which enhanced performing in concentration-task. Music was beneficial irrespective of preference. Short duration of music can be used between lectures to help students concentrate better for the subsequent classes, especially afternoon sessions.

Key-words: 1st year MBBS; blood pressure; instrumental music; concentration-test

Heart rate variability and autonomic status in normal and premenstrual syndrome cases in follicular and luteal phase

P50

Gaurav Swami¹, Neelam Vaney²

¹Department of Physiology, LHMC New Delhi, ²Department of Physiology, UCMS, New Delhi.

Background: Twenty PMS cases with their mean age 20 ± 1.5 with regular menstrual cycles participated in this study. The autonomic nervous system activity was noninvasively measured by HRV power spectral analysis.

Objective: To evaluate autonomic nervous system activity during different phases of the menstrual cycle.

Methods: HRV was taken in two different stages in luteal phase & follicular phase. The recording was taken on BIOPAC MP-100. The data obtained was analyzed using SPSS software (Version 17.0).

Results: Study has shown significant change in VHF, HF, LF in PMS case in luteal phase as compared to control. Significant increase in HF & VHF is seen in luteal phase as compared to follicular phase in PMS cases. SDNN & RR interval was also compared it was found to be significantly increased in PMS cases as compared to controls.

Conclusion: we can say that there is sympathetic over activity in premenstrual phase of menstrual cycle in females of age group 20-25.

Key-Words: Premenstrual Syndrome, Heart rate variability, Autonomic nervous system

Assessment of effect of sleep deprivation on auditory reaction time in children of hypertensive parents –a cross sectional study

P51

Sunita, Padmashri Kudachi,

Department of Physiology, J.N.M.C, Nehru Nagar, Belagavi, Karnataka.

Background: Hypertension is an emerging global health problem. 30-40% children with family history of hypertension exhibit autonomic dysfunction (sympathetic hyperactivity). Sleep deprivation/Short habitual sleep is associated with autonomic imbalance. Sleep deprivation affects neuro-cognitive performance & alertness (mood, reaction time, decision making) which are core demand of certain professions like doctors, nursing staff, drivers, armed forces etc. Reaction time assesses cognition like quickness, decision making, alertness etc. Family h/o hypertension, academic stress & chronic sleep deprivation makes these children vulnerable & need to be evaluated at the earliest.

Objectives: To study the auditory reaction time in children of hypertensive parents with sleep deprivation.

Material and methods: This is a cross sectional study done on 60 healthy medical students who fulfilled study inclusion criteria following an Informed written consent. Ethical clearance was obtained from the institutional ethical committee. The study was conducted in department of Physiology, JNMC and Belagavi. Auditory reaction time was measured using research audiovisual reaction time analyzer. Sleep deprivation was evaluated using validated PSQI questionnaire and maintenance of sleep diary by participants. Statistical analysis was calculated using mean ± SD and unpaired t-test.

Results: On sleep deprivation ART in study group more prolonged than control group.

Conclusion: Auditory reaction time is delayed in children of hypertensive parents post sleep deprivation. This may have negative effect in long run in these health care professionals.

Key-words: Hypertension, sleep deprivation, sympathetic overactivity, audio reaction time

Relationship of Sympathetic nervous system functions and Body mass index of healthy young adults

P52

Aparna M, Ganashree C P

Department of Physiology, Basaveshwara Medical College & Hospital, Chitradurga, Karnataka, India.

Background: Body Mass Index (BMI) is the marker for body fat content. It has been used to identify and classify individuals who are most likely to be overweight or obese. Increase in BMI ($>25\text{kg/m}^2$) is not only risk factor for Cardiac disorders but also altered autonomic functions.

Objectives: To study Sympathetic nervous system (SNS) functions between group I & group II, To assess relationship between BMI and Sympathetic functions.

Methods: After obtaining institutional ethical clearance, 100 healthy subjects aged between 18-40 years were selected and categorized in two groups. First group with BMI $<25\text{kg/m}^2$ and second group with BMI $>25\text{kg/m}^2$ consisting of fifty subjects in each group. Blood pressure (BP) response to standing (BPRS) & BP response to sustained handgrip exercise (HGE) were recorded using mercury sphygmomanometer.

Results: In comparison with Group I, Group II subjects showed statistically significant increase in the Weight, BMI and Body Surface Area (BSA), Whereas resting heart rate in Group II subjects was statistically not significant. Sympathetic functions were significantly reduced in Group II subjects as compared to group I. We observed there was a negative correlation between BMI & SNS functions in group II.

Conclusion: Increase in BMI is associated with altered sympathetic nervous system functions which can cause far-reaching adverse effects in near future, including metabolic syndrome and cardiovascular malfunction. So having a constant check on BMI helps in preventing SNS abnormalities.

Key-words: BMI, SNS, Handgrip exercise

Impact of sleep quality on body composition, heart rate variability, electrocardiography, and quality of life

P53

Rajani Bala Jasrotia¹, Arvind Kanchan², Nitin Ashok John¹, Manish Kumar Verma¹, Vibha Gangwar¹

¹Dr Ram Manohar Lohia Inst. of Medical Sciences, Lucknow, UP, ²Hind Inst. of Medical Sciences, Barabanki, UP

Background: Poor sleep quality disturbs the circadian rhythm, causing negative changes in metabolic and neuro-endocrine functions. Sleep architecture also affects the body composition and quality of life via a combination of impairments to the various physiological mechanisms. The poor sleep quality affecting the autonomic functions had not been studied in much elaboration.

Objective: To study the impact of sleep quality on body composition, heart rate variability, electrocardiography and quality of life.

Methods: Fifty-five apparently healthy adult individuals (age ranged 20-65 years) were invited to participate from the community for this study. They were asked to reply the Pittsburgh sleep quality index (PSQI) questionnaire and their Global sleep quality score were assessed. They were further divided into three groups on the basis of their sleep quality. Group 1: Good sleep (0-5); Group 2: Moderate quality (6-10) and Group 3: Poor quality (>10). Their anthropometric measurements and regional distribution of adipose tissue and skeletal muscles (bioelectric impedance method) were noted. The heart rate variability (HRV), Electrocardiography (ECG), and Quality of life (SF-36) were recorded. Two-way Analysis of variance (ANOVA) followed by post-hoc test were applied to find out the significant difference among the groups. Pearson correlations coefficients (r) were used to analyze the strength of associations.

Results: The statistical significant difference were observed between group 1 and 2 for LF, HF, Total Power and BF%; between Group 1 and 3 for LF, LF/HF ratio and QT interval, Visceral Fat% and BF%; and between Group 2 and 3 for LF/HF, Total Power, VF%. Sleep duration and Global sleep quality were negatively correlated with HF and emotional wellbeing.

Conclusion: Poor sleep quality causes increased sympathetic activity.

Key-words: PSQI, HRV, SF-36

Sudomotor function in hypothyroid women -- an observational study

P54

Shanti Sudha J¹, Paramita Bhattacharyya¹, Subhasis Das¹, A.K Das²

¹Department of Physiology, ²Department of General medicine and Endocrinology, Pondicherry Institute of Medical Sciences (PIMS) Pondicherry.

Background: Hypothyroidism is considered to be the second most common disorder seen in the clinics next to diabetes mellitus. Previous studies to assess sudomotor function using tests like Sympathetic skin

response (SSR) and Galvanic skin resistance (GSR) in hypothyroid patients have yielded either inconclusive or conflicting results. Hence the present study is being undertaken.

Objectives: To compare the latency and amplitude of SSR and to measure the resistance to galvanic stimulation between hypothyroid women and controls.

Methods: Women in the age group of 25-40 years with hypothyroidism and age matched euthyroid women (40 in each group) were recruited as subjects and controls respectively. SSR and GSR were recorded using AD INSTRUMENTS with power lab data acquisition unit with lab chart 8 software in the noise and light reduced research laboratory. SSR was measured by deep inspiration and the GSR was measured in the supine and standing positions. Results were analysed using the Mann Whitney U test with a statistical significance at the level of $p = < 0.05$.

Results: The percentage increase in GSR on standing from supine position was significantly higher in hypothyroid group when compared to controls ($p = 0.002$).

Conclusion: There was a change in Sudomotor function in hypothyroid women and hence sudomotor function tests can be considered as additional tools in assessing the autonomic function in hypothyroidism.

Key-words: Sudomotor function, SSR, GSR

Prevalence of anxiety levels in first MBBS students of Basaveshwara medical college, Chitradurga

P55

Kanyakumari DH¹, Timmareddy Kataraki²

¹Dept. of Physiology, ²Dept. of Anesthesiology, Basaveshwara Medical College and Hospital, Chitradurga.

Background: Medical students are exposed to many stressful experiences during their training and often they must cope with this situation alone. Studies showed that stress, anxiety, and depression are more common in the medical community than the general population as they go through lot of academic changes, curriculum at different timings.

Objective: To know the prevalence of anxiety levels in medical students.

Methods: This study was conducted at Basaveshwara Medical College & Research Institute, Chitradurga, after getting the approval of the Institutional Ethics Committee. Universal sampling of all first year MBBS students (100), aged between 18-22 years of both

sexes was considered after written informed consent. HAM-A scale was used to assess the anxiety which consists of 14 items, each defined by a series of symptoms, and measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety). Descriptive analysis was done.

Results: On analyzing the given data out of 100, 61 were females and 39 males. 78 students had mild anxiety levels, 10 students had moderate levels and 12 students had severe levels of anxiety. Among females, 48 (78.68%) had mild anxiety whereas 7(11.5%) had severe anxiety. Out of 39 males, 30 (76.9%) had mild and 5(12.87%) had severe anxiety levels.

Conclusion: Our study indicates that students having mild anxiety were more, as the interaction of students with staff is friendly at all levels. Further all the students were called for change in the lifestyle like walking, yoga, pranayama practice continuously in the hostel.

Key-words: anxiety, HAM-A scale, medical students

Dietary patterns and the sympathetic nervous system function

P56

Shivakumar.J

KIMS Hubballi

Background: The autonomic nervous system is central to managing various visceral functions, and it has two components (sympathetic and parasympathetic) usually acting in opposing directions. Autonomic imbalance is integral to various cardiovascular diseases and metabolic syndromes, and diet also has a role in these situations.

Objective: To observe the response of diastolic blood pressure (DBP) to handgrip test (HGT) under different dietary conditions.

Methods: 23 subjects professing to a non-vegetarian (NV) diet and 15 subjects who were vegetarians (V) formed the study population. The sympathetic nervous system in these subjects were assessed using the Hand grip test (HGT). The diastolic blood pressure (DBP) was recorded after a brief rest, as well as during the performance of HGT. Comparison of the results for their statistical significance was done using the students unpaired t test. A p value of < 0.05 was considered as significant.

Results: The two groups were well matched as far as anthropometric data are concerned. The diastolic blood pressure (in mm of Hg) under basal conditions was similar in both the groups (NV: 70.30 + 5.44, V: 69.27 + 5.48). The magnitude of rise in DBP (in mm of

Hg) in response to HGT was also comparable (NV: 9.35 + 5.62, V: 8.93 + 9.59) and was not statistically significant.

Conclusion: The sympathetic nervous system function as assessed by the hand grip test was comparable in both the groups, thereby ruling out the role of diet in this aspect.

Key-words: hand grip test, diastolic blood pressure, diet, vegetarian

Does maternal vitamin B12 status affect fetal autonomic modulations?

P57

Sowmya Sharma¹, Krishnamachari Srinivasan², Renuka Ramiah³, Sheela C Nagaraj⁴, Sucharita Sambashiviah¹

¹Department of Physiology, St John's Medical College, Bangalore, ²Department of Psychiatry, St John's Medical College and Hospital, Bangalore, ³Department of Obstetrics and Gynaecology, ESI Medical College, Bangalore, ⁴Department of Obstetrics and Gynaecology, St John's Medical College, Bangalore

Background: Maternal vitamin B12 deficiency can result in obstetrical complications during pregnancy and adverse birth outcomes in offspring. One of the possible mechanisms is changes in autonomic nervous system activity. However, no evidence in humans exist. Fetal heart rate variability measurement is a novel non-invasive in utero technique to measure autonomic modulations.

Objective: To compare the fetal cardiac sympathetic and parasympathetic activity (derived from heart rate variability) in mothers with low and high vitamin B12 status.

Materials and methods: 65 healthy pregnant mothers were recruited in their 1st trimester and longitudinally followed. Maternal abdominal ECG were collected in each trimester and birth outcomes were recorded. Fetal ECG was extracted from maternal ECG and heart rate variability analysis (HRV) was performed on both maternal and fetal ECG. Maternal-fetal dyad were categorised into three groups based on tertile values of first trimester vitamin B12

Results: Analysis of maternal and fetal HRV indicated low frequency to be higher in the highest tertile compared to lowest tertile vitamin B12 ($P < 0.05$). Fetal low frequency component was significantly and positively correlated with vitamin B12 levels ($r = 0.4$, $p < 0.05$). Also fetal low frequency component was significantly and positively associated with birth weight ($r = 0.34$, $p = 0.05$).

Conclusion: Current study provides first direct evidence through non-invasive technique that low vitamin B12 status during pregnancy may play a role in autonomic modulations not only in mothers but also in the fetus. This can not only help in early detection of functional changes but also can help in developing therapeutic strategies.

Key-words: Fetal heart rate variability, Vitamin B12, pregnancy

Blood pressure response to sustained handgrip test – a single test for diagnosing autonomic neuropathy in patients of chronic kidney disease on haemodialysis

P58

T Kiran Kumar, AL Bajentri

Department of Physiology, KIMS, Hubballi

Background: Cardiovascular autonomic dysfunction is a major complication of Chronic Kidney Disease (CKD) likely contributing to the high incidence of cardiovascular mortality in this patient population. The purpose of this study was to determine the frequency of autonomic neuropathy in patients with Chronic Kidney Disease on haemodialysis (HD) by using cardiovascular reflex tests and compare the sensitivity of each test.

Objective: To assess the cardiovascular autonomic functions in patients of CKD on HD.

Methods: Following five tests were performed on 40 patients of CKD on HD: Parasympathetic function tests: Heart-rate response to Valsalva maneuver, Heart-rate variation during deep breathing, Immediate heart-rate response to standing; Sympathetic function tests: Blood-pressure response to standing, Blood-pressure response to sustained handgrip.

Results: Thirty-two of forty subjects (80%) had one or more abnormal tests. Among five tests the two most abnormal tests were heart-rate variation during deep breathing ($n = 28$, 70%) and the blood pressure response to sustained hand grip ($n = 24$, 60%).

Conclusion: According to previous studies parasympathetic dysfunction occurs much earlier than sympathetic dysfunction. In this study 20 out of 24 subjects who had abnormal blood pressure response to sustained hand grip also had one or more abnormal parasympathetic test. So the blood pressure response to sustained hand grip test can alone be used to diagnose the autonomic neuropathy in patients of CKD on HD.

Key-words: chronic kidney disease, autonomic neuropathy

Cardiovascular autonomic function in normotensive individuals with family history of hypertension

P59

Parvati R.S, Pradeep C Thomas, Mohan Paul.

Department of Physiology, Government Medical College, Kottayam, Kerala

Background: Hypertension is a major public health problem all over the world. If not detected and treated, it can lead to cardiovascular abnormalities with increased risk of morbidity and mortality. It has been shown that changes in autonomic nervous system activity is responsible for essential hypertension. So, if an early diagnosis can be made based on the alteration in cardiovascular autonomic function, we can reduce cardiovascular mortality to a great extent.

Objective: This study was done to compare the cardiovascular autonomic function status in normotensive individuals with and without family history of hypertension.

Methods: This study was carried out on 50 normotensive adults with normotensive parents and 50 normotensive adults with hypertensive parents, in the age group of 17 to 20 years. For Parasympathetic function Valsalva maneuver and Heart rate responses to standing and deep breathing were used and Blood pressure response to standing and isometric hand grip exercise were used to assess sympathetic function. The values obtained were expressed as Mean \pm SD and was compared by using student 't' test.

Results: The systolic resting BP (cases 118.12 ± 8.73 , controls 114.28 ± 7.45 , $p = 0.020$), resting Heart rate (cases 75.72 ± 8.08 , controls 72.68 ± 5.21 $p = 0.028$) Valsalva ratio (cases 1.31 ± 0.22 , controls 1.40 ± 0.13 $p = 0.016$) showed statistically significant difference between two groups. The diastolic blood pressure response to isometric exercise and systolic blood pressure response to standing also showed statistically significant difference between cases and controls ($p = 0.001$)

Conclusion: There was alteration in autonomic function in the form of reduced parasympathetic response coupled with enhanced sympathetic response resulting in sympathetic hyperactivity.

Key-words: essential hypertension, autonomic functions, isometric handgrip

Geometric indices of heart rate variability in shift workers as an index of impending cardiovascular disease

P60

Monica Jasti¹, Kirthana Kunikullaya U¹, Venkatesh D¹, Jaisri Goturu²

¹Ramaiah Medical College, Bangalore, ²International medical school, Bangalore

Background: Shift workers are prone to suffer from different health problems that includes cardiovascular related disorders. Autonomic nervous system has a major role to play in cardiovascular functions.

Objectives: To study different geometric indices of heart rate variability (HRV) (a marker of autonomic function) among shift workers.

Methods: After general demographic data collection, HRV was recorded (RMS vagal HRV, Vagus Inc.) before and after one week of continuous night shifts and compared with day shift workers. ECG in lead II was recorded at the beginning of & at the end of 7 days of continuous night duty. Day shift workers were subjects who had never done night shifts. The HRV indices were log transformed due to their skewed distribution. Sleep was measured using Epworth's sleepiness scale (ESS). P value of ≤ 0.05 was considered significant.

Results: The two groups are comparable according to their age, gender and sociodemographic characteristics. Night shift workers had a significant deprivation of sleep according to ESS. There was a shift in night shift workers towards higher sympathetic indices of HRV that was significant.

Conclusion: A higher sympathetic activity, stress and sleep deprivation all add up together to cause a higher incidence of cardiovascular disorders among shift workers.

Key-words: shift workers, heart rate variability, sleep deprivation, autonomic function

Effect of acute ingestion of ice water on blood pressure in relation to body mass index in healthy subjects

P61

Savitri Siddanagoudra, Shantala, Ashwini

Department of Physiology, SDM College of Medical Sciences & Hospital Dharwad, Karnataka

Background: The physiological response to water drinking in healthy subjects is an integrated response with increase in sympathetic vasoconstrictor activity with induced bradycardia. Obesity is a modern pandemic, implicated in the pathogenesis of cardiovascular disease. In autonomic failure patients, water drinking has been shown to result in increased blood pressure and bradycardia. Acute effects of ice water ingestion on blood pressure (BP) in relation to BMI is not addressed in literature.

Objectives: To record BP before and after ingestion of cold water in 3 groups of healthy subjects.

Methods: Sixty healthy subjects between the age group of 18-24 yrs were selected and assigned into 3 groups based on BMI.

BMI \leq 25 kg/m²: Normal

BMI 25- 29 kg/m²: Overweight

BMI \geq 30 kg/m²: Obese

Procedure: Basal and after ingestion of 250 ml of cold water (7 OC \pm 0.50 C), BP was recorded in all the 3 groups.

Results: Basal and after ice water ingestion, BP increased in all 3 groups and the increase was found to be statistically significant.

Conclusion: On acute ingestion of ice water, overweight and obese people may have more sympathoexcitation compared to normal subjects.

Key-words: Ice water, Body mass index, blood pressure, sympatoexcitation

Effects of meditation with autosuggestion in comparison with meditation alone on cardiovascular variables

P62

Shilpa M¹, Tejaswini K S²

¹Department of Physiology, Sri Siddhartha Medical college, Tumakuru. ²Department of Physiology, Mysore Medical College and Research Institute, Mysore.

Background: Primordial prevention of hypertension is a public health concern. Health benefits of meditation in reducing blood pressure and heart rate is well documented by various studies. The effects of autosuggestion, a form of self-hypnosis is not much studied.

Objectives: To study the physiological effects of meditation with autosuggestion in comparison with meditation alone on cardiovascular variables.

Methods: 60 students in the age group of 17 to 20 years were included and divided into 2 groups randomly. Group-A practiced meditation and Group-B practiced meditation with autosuggestion for 3 months. Physiological parameters like Heart Rate(HR), Blood Pressure(BP), and changes in BP with posture were recorded using a standardised digital BP monitor and R-R interval was recorded using a Heart Rate Variability analyser before and after 3 months of practice. Paired sample 't' test and Repeated measure Anova was applied.

Results: We found a statistically significant (p-value $<$ 0.001) decrease in HR & BP. With change in posture immediate fall in BP was significantly less. There was statistically significant (p-value $<$ 0.001) increase in R-R interval in both the groups. Changes in Group-B was more profound than Group A.

Conclusions: The observations in our study suggests that meditation with autosuggestion helps to improve the cardiovascular efficiency by reducing the basal HR, and BP due to decrease in sympathetic tone. Also the increase in R-R interval suggests an increase in parasympathetic tone. Hence meditation with autosuggestion seems to have an added benefit when compared to meditation alone.

Key-words: Autosuggestion, Blood Pressure, Heart rate, Meditation

Music on dipping pattern of blood pressure among hypertensives and prehypertensives – a randomized controlled trial

P63

Kirthana Kunikullaya U¹, Jaisri Goturu², Radhika Kunnavil¹, N S Murthy³

¹Ramaiah Medical College, Bangalore, ²International medical school, Bangalore, ³Division of research and patents, Gokula Education Foundation, Bangalore.

Background: Normal Dipping in ambulatory blood pressure (ABP) means a drop of 10 – 20% in systolic blood pressure (SBP) of daytime average or overall BP values & a fall less than 10% is called non – dipping pattern. Music has shown to reduce stress and is considered now a modality of non-pharmacological management of various non-communicable disorders. Gandharva Veda enlists Bhimpalas (Abheri) as being beneficial for hypertensives. Effect of music on this dipping pattern has hardly been studied, to the best of our knowledge.

Objective: To evaluate the effect of Bhimpalas(Abheri) raga on dipping pattern among hypertensives and prehypertensives.

Methods: After ethical clearance from institutional committee, a randomized control trial with bhimalas raga as intervention was given to intervention group (G1-n = 50) along with lifestyle modifications recommended by JNCVII. The control group (G2-n = 50) received only lifestyle modification. ABP was recorded before and after 3 months of intervention (follow up rate = 86%) & results computed & analyzed using SPSS software. P \leq 0.05 was considered statistically significant.

Results: Mean (SD) of diastolic BP (DBP) pre and post intervention were overall = 85.1(6.8) and 83(8.7) {P = 0.004}, awake = 87.7(7.6) and 85.9(9.2) {P = 0.021} and morning surge was G1-18.97 to 8.94 and G2-53.90 to 24.19. Significant change in DBP was seen among those who were prehypertensives prior to intervention [13.10 to 14.76 dip in DBP].

Conclusions: This study shows that music not just relaxes the vessels on short term, but also leaves a continuing effect, as evident by the change in dipping pattern overnight and in the morning.

Key-words: Music, dipping hypertension, ambulatory blood pressure, morning surge

A study on the effects of common salt on blood pressure in normal and hypertensive subjects in Bihar

P64

Mritunjay Kumar, Arup Bandyopadhyay

Department of Physiology, MGM Medical College, Kishanganj, Bihar

Background: Hypertension is globally a major public health challenge. The relation of salt intake to hypertension is controversial. However most authorities agree that there is a positive correlation between the level of salt intake and the prevalence of hypertension in a community. We have hereby ventured to study the effects of common salt on blood pressure with particular reference to our population, that is, low to middle income people in a semi-urban community in Bihar.

Objectives: To find out whether level of salt intake truly reflects the blood pressure variability.

Methods: 30 normotensive males (age 18 to 60 years) and 50 recently diagnosed hypertensive patients, still not on medicine were chosen with other diseases excluded. In all subjects, urinary sodium excretion was measured. All subjects were classified into four groups from history low, optimum, high and very high salt takers. Blood pressures in the four groups were compared.

Results: The 24-hour urinary sodium (mmol/L) of the normal and hypertensive subjects were 151.4 ± 29.7 and 233 ± 39.8 respectively. The average mean arterial blood pressure (MABP) among different salt takers were (mmHg) 92.4 ± 10.8 (low), 92.6 ± 10.5 (optimum), 119.3 ± 8.4 (high) and 135.8 ± 7.4 (very high). When compared between low and optimum with high and very high, the results were statistically significant.

Conclusion: Within our limited research frame work, sodium intake does increase blood pressure, but small differences of salt intakes are not statistically significant.

Key-words: Hypertension; salt intake; urinary sodium excretion

Vegetarian diet and mental stress reactivity of the cardiovascular system

P65

Vijayalakshmi. C, Shivakumar.J

KIMS Hubballi

Background: Diet is an important risk factor for several cardiovascular (CV) diseases, and dietary interventions are central to both preventive as well as treatment strategies. Vegetarian diets have also been shown to reduce perceived stress levels. The present study was an attempt to see whether a vegetarian diet affects the reactivity characteristics of the cardiovascular system to a lab based acute mental stress.

Objective: To observe any differences in the reactivity patterns of the cardiovascular system to acute mental stress and dietary habits.

Methods: The eligible subjects meeting the prescribed inclusion and exclusion criteria were classified into two groups, based on their diet pattern [Vegetarian (n-16) and Non vegetarian (n-19)]. Heart rate (HR) was obtained using an ECG machine and BP was recorded using an electronic equipment. The cardiovascular parameters were recorded during resting conditions and also during a mental stress task. The results were analysed using Students unpaired t test.

Results: The two groups were well matched on anthropometric terms and consisted of only females. There were no statistically significant differences between the two groups in the CV parameters - HR, Systolic BP and Diastolic BP, both under basal condition as well as during acute mental stress.

Conclusion: The type of diet does not seem to have an effect on the way the cardiovascular system reacts to mental stress.

Key-words: diet, acute mental stress, cardiovascular, blood pressure, heart rate

Effect of acute aerobic exercise on carotid-radial pulse wave velocity among healthy young adults

P66

Sheetal Chandrashekar.N, Sowmya Sharma

Department of Physiology, St John's National Academy Of Health Sciences, Bengaluru

Background: Prevalence and mortality due to

cardiovascular diseases especially among young previously healthy Indians is on the rise. Arterial stiffness is said to be an early marker of atherosclerosis and increased cardiovascular risk. Changes in pulse wave velocity (PWV) is a simple noninvasive clinical index of arterial stiffness and is used to detect even subclinical changes. PWV can be modified by factors like aging, body mass index and physical activity. However, there is lack of evidence of the same among young Indians.

Objective: To evaluate the effect of acute aerobic exercise on carotid-radial PWV (PWVcr) among normal and overweight/obese healthy young adults

Methods: Twenty-one (Males = 14, Females = 7) young adults aged 18-40 years were recruited. All subjects performed a bout of submaximal exercise at 70% heart rate maximum calculated using the formula $220 - \text{age}(\text{years})$, lasting for 15 mins. PWVcr (m/sec) and lead II ECG were recorded simultaneously before and after exercise. Subjects were categorised into normal and overweight/obese using the BMI cutoff for Asians ($23\text{kg}/\text{m}^2$)

Results: PWVcr following exercise tended to be significantly lower compared to baseline values on performing paired t test ($p=0.05$). Delta change (PWVcr) between the post and pre exercise PWVcr was measured to study the magnitude of response to exercise. PWVcr was higher in normal BMI group compared to overweight/obese group though not statistically significant

Conclusion: Aerobic exercise improves arterial stiffness as shown by decreased pulse wave velocity. BMI play a role in modulating this response even among healthy young adults.

Key-words: aerobic exercise, pulse wave velocity, BMI

Correlation between postoperative ventilatory support and preoperative parameters in CABG patients

P67

Kanyadari Swapna¹, Srinivas Sai Kantamneni²

¹Department of Physiology, KIMS, Hubballi, ²Chief CTV Surgeon, Aayush Hospital, Vijayawada.

Background: Pulmonary complications are common Post-operative finding in cases of Coronary Artery Bypass Graft (CABG) patients. Many of them require Mechanical Ventilation. The degree of respiratory derangement may depend not only in the actual operative procedure, but also in the pre-operative patient parameters and risk factors.

Objective: To assess the correlation between postoperative ventilatory support and pre-operative parameters in CABG patients.

Methods: Parameters like age, BMI, History (smoking, hypertension, DM, Previous MI, stable angina), Hb, PCV, Platelet count, WBC count, Ejection fraction and TSH were noted down in 15 cases who underwent CABG operation. These cases required post-operative mechanical ventilation. The duration of ventilator support in hours was the correlated with above pre-op parameters using regression analysis.

Results: Good correlation was observed for parameters like BMI, Hb, WBC count and TSH. Also patient who had previous smoking history along with DM and obesity had long ventilator support requirements. Whereas no correlation was observed for parameters like WBC count, PCV, EF and TSH.

Conclusion: Some studies have noted increased age and the prolonged surgery to be strongly associated with prolonged ventilation. Another study showed that Preoperative risk factors for developing Pulmonary complications were an age of >70 years, productive cough, diabetes mellitus and a history of cigarette smoking. Protective factors against the development of PPCs were a predicted inspiratory vital capacity and a predicted maximal expiratory pressure.

Key-words: ventilatory duration, smoking, DM, obesity

A study of prevalence of gastric upset & cardiovascular parameters in late night workers as compared to daytime workers in Muzaffarpur, Bihar

P68

Mishra Kamala Kanta, Kumari Malti, Mehta Ramanand, Gupta Kr. Ashish

Department of Physiology, Sri Krishna Medical College Muzaffarpur

Background: It has been seen that working late night causes different types of stress viz. psychological, physiological & pathological that might lead to GI upset & cardiovascular abnormalities like HTN, Tachycardia & ECG changes which is to be seen/tested in present study.

Objective: To observe the effect of late night working on different cardiovascular parameters & GI upset.

Methods: Eighty subjects were selected randomly (40 subjects working as late night workers & 40 subjects working as daytime workers in control group). Both the groups were subjected to clinical history, examination & cardiovascular test (ECG, Pulse rate examinations, blood pressure examination etc.). These were recorded using 3 channels electrocardiograph, sphygmomanometer & pulse rate was recorded manually by palpating radial artery.

Results: Differences in prevalence of ECG abnormalities, Tachycardia & HTN between late night workers group & control group were insignificant. Differences in prevalence of GI upset between late night workers group & control group were found to be significant.

Conclusion: There was stronger association seen for gastric upset than selected cardiovascular parameters in late night workers as compared to control.

Key-words: ECG, Hypertension, Gastrointestinal

Relationship between cognitive function, arterial stiffness and blood pressure in middle-aged individuals

P69

Amritha Kuthuru, Lata Mullur, Satish G Patil

Department of Physiology, Shri B.M.Patil Medical College, Hospital & Research Centre, BLDE (Deemed to be University), Vijayapura, Karnataka

Background: Hypertension is associated with worse cognitive performance. The mechanism linking hypertension with cognitive performance is not clear. The effect of mild increase in blood pressure on cognitive function in middle-aged individuals is not known.

Objectives: To determine whether any significant relationship exist between blood pressure, vascular health and cognition in middle-aged individuals and to assess the effect of prehypertension on different domains of cognitive function in the middle-aged subjects.

Methods: A total of 90 subjects with age ranging between 40-60 years with normal blood pressure (n=45) and prehypertension (n=45) were included for the study. Cognitive function was evaluated by using Mini-Mental State Exam (MMSE), Clock drawing test (CDT), Trail making test-A (TMT-A) and Trail making test-B (TMT-B) and Weschler Memory Scale (WMS). Vascular health was assessed by measuring Pulse Wave velocity between brachial-ankle (baPWV), carotid-femoral (cfPWV) and arterial stiffness index (ASI) and aortic augmentation index (Aix@75).

Results: There was a significant difference in MMSE between normotensive and prehypertensive subjects (p=0.001) while no change was observed in other domains of cognitive function. Mean arterial pressure was significantly correlated with TMT-A (p=0.048). Other domains of cognitive function were not significantly correlated with BP. Further there was no correlation between arterial stiffness and cognitive function in middle-aged individuals.

Conclusion: Executive domain of cognitive function was impaired in prehypertensives when compared with normotensive individuals. There was no significant relationship between arterial stiffness and cognitive function in middle-aged individuals.

Key words: cognitive function, blood pressure, arterial stiffness

Fluid challenge in circulatory shock: are the Physiology students sensitized?

P71

RS Sood¹, A Sood², SS Jadhav¹

¹Department of Physiology, Dr. DY Patil Medical College, Hospital & Research Centre, Pune, ²Medical Practitioner, Pune.

Background: The principle behind the fluid challenge technique is that the response to administering a small amount of fluid (250-1000mL of crystalloids) in a short period (30 minutes) can be used to assess whether a hemodynamically unstable patient has a preload reserve that can be used to increase the stroke volume with more fluids. This technique is considered the gold standard for the purpose. If used, it is likely to improve patient management and outcome. Sensitizing the Physiology students will not only serve this end but also make the study of hemodynamics utilitarian and thereby, interesting and worthwhile.

Objective: This study examined whether Physiology texts introduce the concept of 'Fluid Challenge', whether the teachers, students or medical practitioners are aware of the concept.

Methods: Physiology teachers, students and medical practitioners (N=33) were interviewed and probed about the technique. Standard Physiology textbooks (N=5) were checked if the concept is mentioned.

Results: Neither the Standard Physiology texts introduce the importance and application of the concept nor the Physiology teachers / students / medical practitioners were able to recall it.

Conclusion: The concept 'Fluid Challenge' must find legitimate due place in the Physiology curriculum.

Key words: fluid challenge, cardiac preload reserve, fluid responsiveness

Left ventricular mass of normotensive individuals with family history of hypertension – an echocardiographic study

P72

Mounica, A. Santa kumari, Geetha Shavali

Osmania medical college, Hyderabad, Telangana

Background: Left ventricular hypertrophy and left ventricular dysfunction are the pathological hallmarks of systemic hypertension, but there is no consensus about the time of development of abnormalities in left ventricular function during the evolution of systemic hypertension. It is believed that increased left ventricular mass might antedate the development of hypertension in the individuals destined to develop systemic hypertension in later life. Since essential hypertension is thought to have an important genetic component in its causation, offspring of hypertensive parents represent an excellent opportunity to study the early subclinical phases of the syndrome of systemic hypertension.

Objective: To assess Left ventricular mass in offspring of hypertensive parents.

Methods: 15 healthy individuals with family history of hypertension and 15 healthy individuals without family history of hypertension were included in the study. Arterial blood pressure, M-mode 2D echocardiography [septal wall thickness at diastole(SWTd), posterior wall thickness at diastole(PWTd), left ventricular internal diameter at diastole(LVIDd)] and left ventricular mass was calculated by using the formula approved by American society of echocardiography.

$LV\ mass = 0.8 \times 1.04 \times ((LVIDd + PWTd + SWTd)^3 - LVIDd^3) + 0.6g$

Results: Left ventricular mass index of individuals with family history of hypertension (64.33 ± 20.22) was significantly higher than in individuals without family history of hypertension (56.12 ± 16.13).

Conclusion: The study suggests that early evaluation of left ventricular mass in healthy individuals with family history of hypertension helps in prevention or delaying of clinical symptomatology of hypertension with proper management.

Key-words: Hypertension, Echocardiography

A comparative study of heart rate biofeedback on psychomotor performance among college students & professional tailors

P73

Prabha V

Department of Physiology, Chamarajanagar Institute of Medical Sciences, Chamarajanagara – 571313

Email:prabhavsetty@gmail.com

Background: Learning motor skills is a part of day to day activities. The rate of learning and final task performance is affected by the amount of training, training conditions and quality of practice. The coordination between the central nervous system and muscular system plays a critical role in acquisition of learned skills and thus, helps in responding correctly at the required spot. Psychomotor test predicts rate of skill acquisition. One of the tools for objective evaluation of stress is heart rate. Heart rate is accepted as an indicator of autonomic nervous activity. The current study was designed to compare the effect of heart rate biofeedback in psychomotor performance among college students & tailors.

Objectives: To assess heart rate biofeedback on psychomotor performance.

Methods: Thirty young healthy students & thirty tailors in the age group of 18 -25 years were included for the study. Informed consent was taken from the participants who volunteered for the study. Psychomotor performance was measured by the instrument finger dexterity test. When the Heart rate is 300, the task was stopped & the score and time noted. The results were analyzed by student 't' test.

Results: The Psychomotor score was significantly higher in tailors (59.53 ± 2.08) than the student group (52.7 ± 2.21) ($p < 0.05$).

Conclusion: HR biofeedback can be used as a clinical intervention for the treatment of psychological disorders and stress reduction, which ultimately increases the work efficiency.

Key-words: Biofeedback, Finger dexterity test, Psychomotor performance, Heart rate

Effect of Sarvangasana on Blood Pressure

P74

Joshna Rani Malla¹, M.P.Geethanjali¹, P.Kiranmayi²

¹Andhra Medical College, Vizag, ²Gayatri medical College, Vizag

joshnamalla@gmail.com

Background: Therapeutic values of yoga practices are well documented in the ancient Indian literature. The different yogic techniques may have different effects on each and every cell of the human body and this in turn will depend on the various tissues, organs, and organ systems. In this study an attempt has been made to see the effect of Sarvangasana on BP in yoga practicing healthy adults for more than 3 months.

Objective: To observe the effect of BP during performing Sarvangasana compared to supine position

Methods: There are 14 males and 19 females with an age range of 20-60 years. Systolic blood pressure (SBP), Diastolic blood pressure (DBP) were recorded using sphygmomanometer in 33 subjects, before asana, in asana at intervals of 1 minute and 2 minutes, and immediately after asana. This is a head-down body-up postural exercise in a "negative gravity" condition. The variables are compared and analyzed using ANOVA.

Results: Our study showed statistically significant increase in both SBP and DBP during asana compared to supine position.

Conclusion: The study showed the evidence that there is increase in BP while performing sarvangasana in healthy volunteers

Key-words: Sarvangasana, Blood Pressure

Heart rate corrected QT (QTc) in healthy geriatric population of low socioeconomy- A cross sectional study

P75

Padmashri Kudachi, Buddha Khatri

Department of Physiology, JN Medical College Belgaum
Email- padmashrik@rediffmail.com

Background: Cardiovascular disease risk increases with aging. Corrected QT is known to be a predictor of cardiac mortality. The elderly population with low socioeconomy is at more risk of disease as the routine health screening is neglected in them. Hence the QTc finding in this group and association of QTc with gender was studied in the present study.

Objectives: To know the QTc in healthy geriatric population of low socio-economical status and to study the association of gender.

Methods: Based on 38% prevalence of ECG abnormality in the previous study, total sample size of 200 was determined and elderly subjects attending health check-up clinic, aged 60 and above, belonging to low socioeconomic status were recruited in the study. The data was collected after approval of institutional ethics committee. Corrected QT was studied after obtaining 12 lead ECG graph with BPL 108 ECG machine. The QTc in different age groups, gender was analysed and p-value was calculated using Chi-square test. P value < 0.05 was considered as statistically significant.

Results: QTc was normal in 141 subjects, borderline in 26 and prolonged in 33. There was no association found with age & gender.

Conclusion: Corrected (QTc) does not change significantly with age and gender.

Key-words: ECG in geriatric population, QTc in elderly, corrected QT and gender

Study of Frequency Domain Measures of Heart Rate Variability among patients with gynecological disorders- A comparative study

P76

Farhat Jabeen, Aswini Dutt R.

Department of Physiology, Yenepoya Medical College

Background: Gynecological disorders like fibroids, dysfunctional uterine bleeding are associated with many co morbidities like anemia. Directly or indirectly it can be a cause of autonomic dysfunction in patients with gynecological disorders. 5 minutes HRV study can be used as a tool for assessment of the autonomic function in such patients.

Objective: To assess the autonomic function status in patients with gynecological disorders by analyzing frequency domain measures of HRV.

Methods: 44 patients with gynecological disorders were selected in cases group and 44 age matched women in control group. Cardiac autonomic activity was assessed using spectral analysis of heart rate variability. Computerized ECG system with Physiopac 4 –channel software was used for study. Frequency domain measures such as very low frequency, low frequency, high frequency LF/HF ratio were assessed to observe both sympathetic and parasympathetic nerve function status. Statistical analysis was done by using SPSS and unpaired t-test was used.

Results: The results obtained were treated statistically by appropriate methods and compared between the groups. Frequency domain parameters like low frequency and LF/HF ratio were significantly (<0.01) reduced in patients with gynaecological disorders as compared to normal subjects.

Conclusion: Autonomic neuropathy is present in patients with gynaecological disorders as compared to normal subjects, and 5 minutes HRV test is an important tool for detecting autonomic dysfunction.

Key-words: Gynaecological disorders, Autonomic dysfunction and 5 minutes HRV

Correlation of inter-arm blood pressure difference with anthropometric parameters and mean arterial blood pressure

P77

Seema Tanaji Methre, Priyanka Joshi, Ramya Jayakumar, Nirmala Gopal Borade

Dept of Physiology, Dr. D. Y. Patil Medical College, Hospital & Research Centre, Sant Tukaram Nagar,

Pimpri, Pune, Dr. D. Y. Patil Vidyapeeth, Pimpri, Pune.

Background: Blood pressure (BP) measurement is routinely done and often the values obtained from left and right arms of patient differ. Difference between left and right arm BP has been shown to relate with a delayed diagnosis of hypertension. Failure of considering higher value for diagnosis results in delayed institution of treatment.

Objectives: To study the correlation of inter-arm difference (IAD) of BP with anthropometric parameters & mean arterial blood pressure

Methods: A cross-sectional study was carried out in 300 healthy subjects in the age group of 18-60 years after approval of ethical committee. Height, weight, body mass index (BMI), waist circumference (WC) & BP was measured after written informed consent.

Results: Data was analysed using Pearson's coefficient of correlation analysis & Chi-square test. 51.91% of people showed large IAD (≥ 10 mmHg) with 38.03% of systolic inter-arm difference (SIAD) and 13.88 % of diastolic inter-arm difference (DIAD) [$\chi^2 = 39.892$ with 3 degrees of freedom; $P = 0.000$]. SIAD showed significant and positive correlation with weight [$r = 0.205^{**}$; $p = 0.000$], BMI [$r = 0.184^{**}$; $p = 0.001$], WC [$r = 0.127^*$; $p = 0.03$] and left arm mean arterial pressure (LAM) [$r = 0.278^{**}$; $p = 0.000$]. On the other hand, DIAD showed significant and positive correlation only with LAM [$r = 0.181^{**}$; $p = 0.002$] & right arm mean arterial pressure (RAM) [$r = 0.244^{**}$; $p = 0.000$].

Conclusion: Positive correlation of increased IAD in BP with adverse values of anthropometric parameters & mean arterial pressure was confirmed.

Key-words: IAD, BP, delayed diagnosis, correlation

Effect of iron deficiency and iron therapy on electrophysiology of heart

P78

Gupta Kr Ashish, Kumari Malti, Mehta R N, Mishra K K
Department of Physiology, Sri Krishna medical college, Muzaffarpur

Background: Iron deficiency according to Blayney et al leads to reduction of several myocardial enzymes which could lead to myocardium hypoxia on exercise leading to several electrophysiological changes viz ST segment depression.

Objective: observation of electrophysiological abnormalities of heart in IDA and effect on the same after iron therapy.

Material and method: Fifty five patient with iron deficiency anaemia (transferring saturation $< 16\%$) were taken with no cardio respiratory illness, normal chest x ray and ECG. Controls were selected with apparently healthy parameters (no anaemia, normal chest x-ray and normal ECG. Different parameter like ECG, Pulse rate, Blood pressure were recorded in both patients and control group during rest, hyperventilation, exercise and recovery period. ST depression over 1 mm was considered significant. Patients with abnormal response on two occasions of exercise were given iron Dextran I.V. 3 days post therapy exercise test were repeated and parameters were again recorded.

Result: Incidence of abnormal electrophysiological response after exercise in IDA patient was significantly high ($p < 0.001$) than in control group. Correction of electrophysiological abnormalities in IDA patient by total dose iron therapy was highly significant ($p < 0.003$).

Conclusion: Appearance of electrophysiological abnormalities and its correction in IDA patients by total dose iron therapy, before any rise in Hb, may be due to result of the effect of iron at tissue level (changes in myocardial enzymes level).

Key-words: haemoglobin, Iron deficiency anaemia, Intravenously

A study to evaluate the efficacy and safety of lowest dose of rosuvastatin versus atorvastatin 20mg in drug naïve dyslipidemic patients

P79

Venkataraman A P, Kamath L, Raveendra K. R¹
Department of Pharmacology Bangalore medical college and research institute, Bengaluru 560002, RGUHS, ¹Department of Medicine, Bangalore medical college and research institute, Bengaluru 560002, RGUHS.
Email id: dr.apvr@gmail.com

Background: Elevated LDL-C levels, a major modifiable risk factor and an important point for intervention in prevention of Atherosclerotic Cardiovascular Diseases. Atorvastatin and Rosuvastatin are the first choice of statins for dyslipidemia. FDA advises low starting dose of Rosuvastatin at 5 mg/day in Asians.

Objectives: To compare the efficacy and safety of Rosuvastatin 5mg versus Atorvastatin 20 mg in patients with dyslipidemia.

Methods: 60 treatment naïve adult patients with dyslipidemia were randomised into two arms of 30 each in 1:1 ratio to receive either Rosuvastatin 5mg OD or Atorvastatin 20 mg OD. Lipid profiles at

baseline and at 6-week follow-up visit were recorded. Efficacy was assessed by mean change in lipid parameters at the end of 6 week and safety by recording adverse events.

Results: An interim analysis of an ongoing study with 40 patients, 20 patients in each arm. The baseline mean lipid parameters in both the arms were comparable. The mean difference at 6 weeks from baseline for Total cholesterol, LDL, HDL and Triglyceride for Rosuvastatin: -54.8, -38.7, +3.35 and -10.35 and for Atorvastatin: -57.5, -44.35, +5.05 and -15.6 respectively. In both the arms the mean differences were significant. However, no significant difference (p 0.05) was seen in any lipid parameter between the two arms at 6 weeks. Few reported myalgia in Atorvastatin arm.

Conclusion: Rosuvastatin in a dose of 5 mg OD was found to be efficacious and safe in adult patients with dyslipidemia at par with Atorvastatin 20 mg OD.

Key-words: Dyslipidemia, ASCVD, Rosuvastatin, Atorvastatin

A Comparative Study to Evaluate the Efficacy and Safety of Telmisartan versus Olmesartan in Elderly Diabetics with Hypertension

P80

Kiran Warriar, C.R.Jayanthi, K.R.Raveendra

Department of Pharmacology, Bangalore Medical College and Research Institute(BMCRI), Bengaluru, Karnataka, India, 1Department of Medicine, Bangalore Medical College and Research Institute(BMCRI), Bengaluru, Karnataka, India, Email: kiran1990@gmail.com

Background: Hypertension is an independent predictor of fatal cardiovascular disease in elderly. Indian Census 2011 reports 104 million elderly population with prevalence of hypertension and diabetes being 40 and 53 respectively. Angiotensin receptor blockers like Olmesartan and Telmisartan have once-daily dosing, minimal drug interactions and consistent 24-hour BP control including early morning surge with additional cardio and nephron-protection. Objectives: To evaluate the efficacy and safety of Telmisartan versus Olmesartan among elderly diabetics with hypertension.

Methods: 56 elderly diabetics (age ≥ 60 yrs) with untreated hypertension were randomized into two groups to receive Telmisartan 40 mg and Olmesartan 20 mg. SBP and DBP were recorded at baseline, 2, 4 and 8 weeks. Efficacy was assessed by measuring change in SBP and DBP and safety using adverse reactions.

Results: Telmisartan reduced Mean Systolic BP (SBP) from 157.5 ± 1.70 to 133.4 ± 0.91 and Diastolic BP (DBP) from 99.0714 ± 2.721 to 85.2 ± 1.04 . Olmesartan reduced mean SBP from 158.6 ± 2.17 to 136 ± 0.58 and DBP from 97.2593 ± 2.0763 to 85.33 ± 1.37 . Telmisartan showed a significantly better reduction in SBP at weeks 4 and 8 compared to olmesartan but there was no significant difference in DBP.

Conclusion: Telmisartan produced a greater and statistically significant reduction in SBP than Olmesartan in elderly diabetic patients with hypertension at 4th week and 8th week.

Key-words: Olmesartan, Telmisartan, Elderly, Diabetes, Hypertension

A comparative study of sleep quality in athletes & non-athletes

P81

Sneha Jaiswal, Shashikala K T

Department of Physiology, Bangalore Medical College & Research Institute, Bengaluru, Karnataka

Background: As we know that sleep is important factor for all of us, but little is known regarding athlete sleep quality. It has been reported that sleep may be compromised in athletes by many factors, like increase in core temperature following exercise, increase in muscle tension, fatigue and pain following training and competition.

Objective: The objective of present study was to assess normative sleep quality among highly trained athletes. Methods: Fifty athletes (short distance runners) & 50 non athletes were taken who were of 18 to 25 years. They were given Pittsburgh Sleep Quality Index (PSQI) questionnaire to assess their sleep quality. Results were statistically analysed using student 't' test.

Results: Different components of PSQI questionnaire were assessed in both case & control group. Component 1- subjective sleep quality, component 2- sleep latency, component 3- sleep duration component 4- sleep efficiency were better in controls than athletes with a $p < 0.05$. Component 5- sleep disturbance & component 7- daytime dysfunction scores were higher in athletes than controls ($p < 0.05$). Component 6- use of sleep medication was not statistically significant. So the overall global score was higher in athletes indicating better sleep quality in controls.

Conclusion: we conclude that controls have better sleep quality than athletes.

Key-words: athletes, sleep quality, PSQI

Association of health literacy with physical fitness among adults

P82

Ramya Jayakumar, Seema Tanaji Mehtre, Nirmala Gopal Borade

Department of Physiology, Dr D Y Patil, Medical College and Research Centre, Sant Tukaram Nagar, Dr D Y Patil Vidyapeeth, Pimpri, Pune

Background: The benefits of physical activities and exercises has been known from ages but the present day lifestyle has resulted in decrease in physical fitness level and increase in the non –communicable diseases. Health literacy is the ability of the individual to gain health information and utilise it to take the right health decision. This study offers the opportunity to explore the relationship between health literacy and physical fitness level.

Objective: To correlate the health literacy with muscle strength, endurance and flexibility of the individuals.

Methods: An exploratory research study was conducted on 50 subjects after obtaining ethical clearance from the institution and taking informed consent from the participants. Subjects were selected based on the inclusion and exclusion criteria. Health literacy, muscle strength, endurance and flexibility was assessed using Health Literacy Survey European Questionnaire 16, Hand grip test, curl up test and sit and reach test respectively.

Results: Data was analysed using the test of Pearson's correlation coefficient. 15.68%, 37.8% and 47.05% of people showed inadequate, limited and adequate health literacy respectively. Health literacy showed significant positive correlation with flexibility component of physical fitness ($r=0.4847$; p value = 0)

Conclusion: We can conclude with this study that flexibility of the individuals improves with increasing health literacy.

Key-words: health literacy, physical fitness, flexibility, muscle strength, muscle endurance

Correlation of Hemoglobin concentration with Maximal Aerobic Capacity in healthy young adults

P83

Amita Kumari Panigrahi

Department of Physiology, MKCG Medical College, Berhampur University. Email: amiami645@gmail.com

Background: Maximal aerobic capacity (VO_2 max) is the maximum capacity of individual's body to transport and use oxygen during incremental exercise which reflects physical fitness of that individual. Queen's College Step Test is a standard method to measure one's maximal aerobic capacity using submaximal exercise in the form of bench stepping suitable for adults. The biological significance of oxygen transport by hemoglobin is well illustrated by anemia where decreased Hemoglobin also decreases exercise performance.

Objective: The objective of the study is to find out any correlation between Hemoglobin concentration and VO_2 max by using Queen's College Step Test.

Methods: A total of 86 1st yr MBBS students (57 males, 29 females, aged 17-24yrs) were taken as subjects. Each subject performed the exercise for 3 minutes by Queen's College Step Test. VO_2 max was obtained by calculation. Hemoglobin concentration was measured by acid hematin method in Sahli's Hemoglobinometer.

Results: There was a significant positive correlation between Hemoglobin concentration with VO_2 max in both male ($r=0.347$, $P=0.0081$) and female ($r=0.473$, $P=0.0095$) subjects.

Conclusion: Increase in Hemoglobin concentration is an indicator of increased VO_2 max, hence persons with increased hemoglobin concentration may have increased exercise capability in both male and female subjects.

Key-words: VO_2 max, Hemoglobin concentration, Queen's College Step Test

Effect of acute exercise on Cognitive control

P84

Manish Kumar, Sunita, Ashok Sharan, Tarun Kumar, Sanaul Mustafa Ansari, Kumar Siddharth, Deepmala Sinha

Department of Physiology, I.G.I.M.S., Patna
E-mail: ksiddharth10@gmail.com

Background: Previous studies have shown that exercise and cognition are positively correlated. Cognitive control encompasses core cognitive process like inhibition, working memory and cognitive flexibility. Key elements like selection, scheduling and coordinated programming process are needed for cognitive control is brought about by target oriented, self-regulatory operations of brain. This study was specifically designed to examine the effect of acute exercise on attention and memory).

Objectives: To assess effect of acute exercise on attention and memory (Cognitive Control).

Methods: Participants, 60 healthy young male subjects (age group:18-25 years), were instructed on the methodology of Stroop colour Word Test, Ray Auditory Verbal Test and Complex figural test. Following instruction on methodology they were given five practice sessions. They were then divided in two group (A, B) i.e. Group A had resting session on the second day and exercise session on the third day whereas Group B had the session in exactly reverse order to that of group A.

Results: After a session of acute exercise, the reaction time for Stroop colour condition, Stroop word condition and Strop colour word condition were decreased and this was found to be statistically significant when compared to resting stage. In case of backward digit span test and RAVLT total score, delayed and average recall no significant change was observed. The immediate recall time changed significantly after acute exercise.

Conclusion: A single bout of moderate intensity acute exercise has its effect on selective attention subset of cognitive control.

Key-words: Acute aerobic exercise, Memory, Attention, Cognitive control

Effect of Isometric hand grip exercise training on blood pressure in young adults

P85

Ganesh Kamath M¹, Farah Nursyahirah binti Nordin², Nur Hafizati binti Mohd Sarif², Siti Hajar binti Jamil²

¹Department of Physiology, ²MBBS Students, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, India.

E-mail: ganesh.kamath@manipal.edu

Background: Studies have shown that isometric hand grip (IHG) exercise training for five weeks, enhances the cardiovascular functioning and helps in reducing blood pressure (BP).

Objectives: To assess the effects of two weeks IHG exercise training on blood pressure in young adults

Methods: This prospective cohort study was conducted in 30 healthy young adults. The systolic and diastolic BP was determined, to calculate the mean arterial BP (MABP). Heart rate (HR) was assessed in beats/minute. MABP and HR were determined at rest (≥ 5 minutes of rest) in sitting position. The same parameters were assessed after 2 weeks of IHG exercise training using a foam ball. The variables were expressed in mean \pm standard deviation. The paired t-test was used to compare values, at rest and after 2 weeks of training. $p < 0.05$ was considered as statistically significant.

Results: The mean age group of the subjects was 22.0 ± 0.5 years. The MABP was 78.4 ± 09.4 mm Hg and 79.5 ± 09.2 mm Hg at baseline and 2 weeks after IHG training, respectively. No statistical significance was observed ($p = 0.66$). The HR was 74.0 ± 10.5 beats/minute and 78.8 ± 08.8 beats/minute at baseline and two weeks after IHG training respectively. No statistical significance was observed ($p = 0.08$).

Conclusion: Two weeks IHG training was insufficient to alter the BP and HR in young adults as compared to previous studies with a longer training duration.

Key-words: Isometric exercise, hand grip, blood pressure

Body Composition and Aerobic Capacity of Judokas and Controls. A Comparative Study

P86

Jayasudha K¹, Veeresh Itagi²

¹Dept of Physiology, ²Dept of Anatomy, SSIMSRC, Davangere, Karnataka, India

Background: Anthropometric profile of judokas is a relevant factor for success in competition and for performance in specific judo tests. Aerobic capacity is important in terms of better use of the judoka's system and the prompt recuperation process.

Objectives: To compare body build and aerobic capacity of judokas with untrained peers and understand changes in judokas due to training.

Methods: Thirty-one Judo players with minimum 3 years of training and regular practice and 31 age matched medical students were enrolled as controls. Students who practice regular exercise regime were excluded. Anthropometric profile was assessed by measuring height, weight, body mass index, body circumferences at seven sites, seven site skin fold thickness and body fat percentage as per standard accepted protocol. Aerobic capacity VO₂max was determined by Bruce protocol using treadmill.

Results: Skinfold thickness, body density and body fat % was significantly more in control group than judo group. Seven site circumference was more in judo group. VO₂max was more for Judo group 63.9ml/ kg/ min, than control 48.9ml/kg/min.

Conclusion: The results of study can be used as a tool to understand the changes in judoka due to training and optimize the training programs for the attainment of the best performance of the judoka.

Key-words: judo, anthropometry, VO₂Max, skinfold thickness, body fat

Pulmonary function tests in flour mill workers

P87

Savita Somani

Toshniwal Accident Hospital Meenatai Thakare Chwok, Bansilal nagar Ambajogai, Dist-Beed, Maharashtra 431517, India

Background: Due to industrialization and ineffective pollution control measures, indoor pollution is major health problem in developing countries. Flour dust occurs across the range of food industries, its exposure induces acute or chronic respiratory problems.

Objective: The aim of the study is to assess the effect of flour dust on lung functions of flour mill workers and compare it with normal subjects not exposed to flour dust.

Methods: Body Composition and Aerobic Capacity of Judokas and Controls. A Comparative Study We evaluated 50 flour mill workers between the age of 20-50 years. Age and sex matched 50 healthy subjects were taken as control. The Pulmonary Function tests (PFT) were carried out with a Computerized MEDSPIROR. The data was collected, compiled, statistically analysed and a valid conclusion were drawn.

Results: The present study showed a significant decrease in the mean values of FVC (Forced vital capacity), FEV₁ (Forced expiratory Volume in first second), FEV₁%(FEV₁/FVC percentage), FEF₂₅₋₇₅%(Mean Forced expiratory flow during the middle of FVC), PEFR (Peak expiratory flow rate),MVV (Maximum voluntary ventilation) in flour mill workers as compared controls.

Conclusion: Flour dust causes broncho-pulmonary inflammation which is responsible for the obstructive as well as restrictive type of pulmonary impairment of lung functions.

Key-words: Flour dust, Flour Mill Workers, MedSpiror, Pulmonary Function tests (PFT)

Study of pulmonary functions in adolescents with type 1 diabetes mellitus

P88

H. Ahluwalia, A.Syed¹, J. Suri², K. Biswas³, R. Kapoor¹

¹Department of Physiology, ²Department of Pulmonary Medicine, ³Department of Endocrinology, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India

Background: Hyperglycaemia is an important factor in initiation and progression of metabolic and microvascular complication in Type 1 Diabetes Mellitus (T1DM). Since pulmonary functions and gas exchange depends partly on the integrity of connective tissue and microcirculation within lungs, changes involving these structural components could lead to lung dysfunction and impaired gas exchange.

Objective: To study pulmonary functions (spirometry, ABG analysis and DLCO) in adolescents with T1DM
Methods: Thirty cases of T1DM of either sex (age range 10-19 year), age and sex matched thirty-three healthy subjects as controls were selected. The pulmonary function tests [PFT] including diffusion study and ABG (arterial blood gas) analysis were done.

Results: All the absolute values of PFT parameters FVC, FEV₁, FEV₁/FVC ratio (FEV%),PEF, MEF, MEF₂₅%, MEF₅₀%, MEF₇₅%, SVC, TLCO or DLCO, KCO or DLCO/ Va in the T1DM group were lower as compared to the healthy subjects. The difference was highly significant (p value < 0.000).

Conclusion: All the absolute values of spirometry values and diffusion study parameters in the T1DM group were lower as compared to the healthy subjects. The difference was highly significant (p value < 0.000). But there was no significant correlation observed with HbA1c and duration of disease in T1DM.

Key-words: T1DM, Adolescent, PFT, DLCO

A comparative assessment of effects of various physiologic strategies to prevent fainting responses in orthostatic hypotension after whole blood donation

P89

Ganashree C P¹, Aparna M¹, Kanyakumari D H¹, Prashanth G², Basavaraj Savadi³, Rashmi B M⁴

¹Department of Physiology, ²Department of Medicine, ³Department of Biochemistry, ⁴Department of Community Medicine, Basaveshwara Medical college & Hospital, Chitradurga.

Background: Donating blood is a generous life-saving gift. It is important to take care of blood donors as health care aspect. Vasovagal reactions occur in 2-5% blood donations. Syncope occasionally leads to injury. Prevention of vasovagal reaction in blood donations is thereby an important issue. The orthostatic effects superimposed on a hypovolemic state after the donation. Hence this study may become reference base for the protocol.

Objective: To compare orthostatic hypotension without and with various physiologic strategies to prevent fainting responses during or after whole blood donation.

Methodology: The present study was conducted from July 2016 to Feb 2017. 200 subjects were divided into four groups: A, B, C, D (50 each). Group A as controls (without physiology strategies) and group B (Salt water was given), group C (Lower body muscle tension was advised. (leg crossing, leg and abdominal muscle tensing, buttock clenching). Group D (Both the strategies are applied). Orthostatic hypotension was measured before and immediately after blood donation, 5 minutes, 10 minutes and 15 minutes after blood donation. Data collected was tabulated and subjected to statistical analysis.

Results: 1. There was orthostatic hypotension after blood donation, with and without physiologic strategies compared to before blood donation. 2. There was decline in number of donors getting orthostatic hypotension after applying these physiologic strategies compare to without any physiologic strategies. 3. Number of blood donors with orthostatic hypotension were maximum immediately after blood donation compare to after 5,

10 and 15 minutes after blood donation but improvement was not statistically significant.

Conclusion: By above results, we conclude that, physiologic strategies may be advised to prevent fainting responses but need further studies to consider as protocol & compulsory and it is better to advise rest for minimum of 15 minutes.

Key-words: Orthostatic hypotension, blood donation, Physiologic strategies, salt water supplementation, lower body muscle tension

The effect of mine tailings on the respiratory symptoms and lung functions of the residents of a gold mining town in south India

P90

Usha G Shenoy, Dr Karthiyane Kuty
Sri Devaraja Urs Medical College, Tamaka, Kolar

Background: Gold mine tailings contribute to particulate matter concentration in air for years which when inhaled increases respiratory morbidity.

Objectives: The aim of the present study was to study the impact of mine tailing on particulate matter concentration in the air and its effect on respiratory symptoms and functions of the exposed residents.

Methods: After institutional ethical clearance and informed consent, 400 volunteers between the ages of 18 & 60 years, living in the gold mining town for over 3 years were selected as exposed community and a similar control group was selected from a non-mining town (unexposed community). Respiratory symptoms were assessed using ATS questionnaire and spirometry for lung functions. Dust samples were collected from both areas and analysed by office of National Health of Miners Health for particulate concentration using gravimetric method.

Results: The mean respirable area dust concentration was significantly higher in mine tailing area compared to none mine tailing area. ($p < 0.003$). Respiratory symptoms except cough were significantly higher in the exposed community compared to unexposed. ($P < 0.0001$). The Forced expiratory volume in 1 s (FEV_1), forced expiratory volume (FVC) and peak expiratory flow rate were significantly decreased and $FEV_1/FVC\%$ was significantly higher. Increase Respiratory symptoms and decrease spirometric measurements were significantly associated with duration of exposure in the exposed community.

Conclusion: Exposed community showed a significant decrease in spirometric parameters and increase in respiratory symptoms which were associated with increased duration of exposure.

Key-words: Mine tailing, respirable dust, spirometer, particulate matter

Study of Dynamic Lung Function in perimenopausal and menopausal women working in RIMS, Jharkhand

P91

Manjulata, Poonam Singh

Dept. Physiology, RIMS, Ranchi, Jharkhand.

Background: Several factors affect respiratory health of women. Amongst them hormones play a vital role throughout their life. Though, there are several studies regarding pulmonary function in women of reproductive years, there are very few, pertaining to the peri-menopausal and menopausal women and none of them are elucidating it in population of Jharkhand which comprises of 28%-30% tribal community.

Objective: To assess and compare the dynamic lung function of perimenopausal and menopausal women of Jharkhand.

Methods: Women working in RIMS, represent the cross-sectional population of Jharkhand. A case-control study was conducted on 200 women; control – aged 20-35 years n = 100 and case = aged \geq 36 years, n = 100 (perimenopausal = 50 menopausal = 50). Parameters measured were FVC, FEV₁, PEFr, FEF25-75%, & FEV₁/FVC ratio.

Result: A significant difference in all the parameters between the case and control and more between the control and perimenopausal women was observed. On intra-case group comparison, it was found that, except for changes in the FVC and PEFr, the other parameters were not significantly different with age.

Conclusion: Menopausal transition (perimenopause) is the period, when maximum decrease in the ventilatory function is found. FVC continues to fall beyond this period while the other parameters remain almost same.

Keywords: perimenopause, menopause, dynamic lung function, Jharkhand

Comparative study of spirometric pulmonary function test in tribals and non-tribals of Ranchi, Jharkhand

P92

Supreet Sonali Topno, Poonam Singh

Department of Physiology, Rajendra Institute Of Medical Sciences, Ranchi, Jharkhand.

Background: Spirometry is the commonest and most useful pulmonary function test used by respiratory physicians for qualitative and quantitative evaluation

of lung function in patients or healthy adults. Ethnic differences in lung function has been suggested in many studies. However, till date no study has been done in the population of Ranchi, Jharkhand for lung function.

Objectives: To study and compare the dynamic lung function parameters in tribal and non-tribal population of Ranchi, Jharkhand.

Methods: The study was conducted on 100 (53 non-tribal and 47 tribal) healthy adults between 20-60 years of age. The pulmonary function parameters analysed were Forced Vital Capacity (FVC), Forced Expiratory Volume in 1 second (FEV₁), Peak Expiratory Flow Rate (PEFR), FEV₁/FVC, Forced Expiratory Flow Rate (FEF25-75).

Results: In this study, the results revealed that FVC, FEV₁, FEV₁/FVC, FEF75, FEF50 were significantly higher in tribal males than non-tribal males. Height, weight, FVC, FEV₁ were found to be higher in tribal females.

Conclusion: From the present study it can be concluded that the Pulmonary function parameters shows variance in different ethnicities and were better in tribal population.

Key-words: Spirometry, FVC, FEV₁, FEV₁/FVC

To find out the variation of FEV₁/FVC ratio with respect to BMI in healthy young individuals in Department of Physiology, Gauhati Medical College

P93

Arijit Mazumdar, Reeta Baishya

Department of Physiology, Gauhati Medical College.

Background: Spirometry is indispensable in the diagnosis & monitoring of airway obstruction. Lung volumes & ventilatory flows vary with age, stature, gender, ethnicity. BMI or Quetelet Index is an attempt to quantify tissue mass in an individual.

Objectives: The aim of the present study was to assess the variation of FEV₁/FVC ratio with respect to BMI & find out significance, as FEV₁/FVC ratio depends on height, gender, age etc.

Methods: A total of 100 healthy individuals between 18-25 years were selected for the study. Non-smoker & not having chronic respiratory illnesses. After signing the written consent, height, weight were found out by Stadiometer & digital weighing machine respectively. FEV₁ & FVC were found out by digital spirometer & BMI calculated by standard formulae, readings were analysed for statistical significance.

Results: FEV₁/FVC ratio in respect of BMI was analysed. The test result revealed a non-significant 'p' value of 0.544 ($p > 0.05$), & no variability in respect of correlation between BMI & FEV₁/FVC ratio, which suggested that BMI & FEV₁/FVC ratio are independent of each other (as per this study).

Conclusion: Our study showed that, there was no alteration in lung function with the increase/decrease of BMI. However, on analysis it was found that in obese /overweight individuals the ratio was decreased with rise of BMI implying both the variables might have some negative correlation but here individuals taken were normal individuals so the outcome was normal.

Key-words: FEV₁, FVC, Stadiometer, Digital Spirometer, BMI

A cross-sectional gender based study of forced expiratory volume and forced vital capacity in young healthy individuals in relation to height in the department of physiology, Gauhati medical college

P94

Priti Puspa Das, Reeta Baishya

Department of Physiology, Gauhati Medical College, Guwahati

Background: Pulmonary function Test (PFT) plays a pivotal role to diagnose many respiratory disorders. Forced expiratory volume in one second (FEV₁) & Forced vital capacity (FVC) are expressed as percentage of predicted value for height, age and sex and may be influenced by them.

Objective: To study the influence of gender and height on FEV₁, FVC and FEV₁/FVC

Methods: A total of 50 healthy subjects in the age group of 18-25 years were selected by simple random sampling. The healthy subjects were allowed to sit comfortably. The mouthpiece was placed snugly in the mouth and nose-clip applied to their nose so that the subject breathes only through the mouthpiece. The subject was asked to take normal inspiration and expiration and slow vital capacity recorded. Then the subject was asked to take deep maximal inspiration and then expire forcefully up to its maximum point and forced vital capacity noted.

Results: Statistical analysis was done by using unpaired t test and Pearson's correlation. There was a significant variation ($p < 0.05$) in FEV₁, FVC and FEV₁/FVC for male and females. Height has a significant positive correlation ($p < 0.05$) with FVC and FEV₁ but showed non-significant ($p > 0.05$) positive correlation with FEV₁/FVC ratio.

Conclusion: The study showed that the values of FEV₁, FVC and FEV₁/FVC are significantly more in males than females. The study also showed that with increase in height of the individual FVC and FEV₁ increases but FEV₁/FVC has a non significant increase with height.

Key-words: Pulmonary Function Test, Forced expiratory volume, Force vital capacity

A comparative study of pulmonary function tests in freestyle wrestlers and age matched sedentary individuals

P95

Deepa H S

Department of Physiology, Vydehi Institute of Medical Sciences & Research Centre, Bangalore, Karnataka

Background: Lung function tests in normal sedentary individuals have been studied extensively in India. However, no studies have compared the PFT in Freestyle wrestlers with sedentary individuals. Indian data on this subject is very limited.

Objective: Objective of the current study was to determine the differences in Pulmonary function tests in Freestyle wrestlers and sedentary individuals.

Methods: Study included 40 male Freestyle wrestlers and 40 male sedentary individuals who are not interested in any sport branches actively. The parameters assessed as the determinants of the lung function were Forced Vital Capacity (FVC), Forced Expiratory Volume in 1st second (FEV₁), Peak Expiratory Flow Rate (PEFR) and FEV₁ % were recorded using HELIOS 401 MEDSPIROR.

Results: The arithmetic mean and standard deviations of the data were obtained for statistical evaluation. Results were analysed statistically using unpaired 't' test. Male wrestlers showed statistically significant higher values of FEV₁ 4.09 ± 0.109 , FVC of 4.96 ± 0.45 , PEFR of 4.570 ± 0.119 and FEV₁ % of 82.48 ± 0.600 as compared to sedentary group.

Conclusion: Higher values of Pulmonary function test in Freestyle wrestlers when compared to sedentary individuals suggest that regular exercise has a significant role in improving lung functions.

Key-words: freestyle wrestling, pulmonary function test, sedentary individuals

Assessment of spirometric pulmonary functions in type 2 Diabetes Mellitus in Manipur

P96

Nongmaithem Sushila Devi, W. Kanan

Department of Physiology, Regional Institute of Medical Sciences, Imphal

Background: Diabetes mellitus (DM) is a metabolic disorder precipitating micro-vascular, macro-vascular changes which affects eyes, kidneys, heart, blood vessels and peripheral vascular diseases. Less has been known about the after effect of diabetes on lungs. So this work was carried out to know the effect of diabetes mellitus on pulmonary function tests in Manipur.

Objective: To assess the effect of diabetes mellitus on pulmonary functions.

Methods: A case-control study was conducted at Departments of Physiology and Medicine, RIMS, Imphal from June to August 2018 on 46 subjects; 23 type 2 DM as case group and 23 non-diabetics as controls. Parameters like FVC, FEV₁, FEV₁/FVC, FEF 25-75%, PEF, and MVV, were recorded to compare between the two groups. A p<0.05 was taken as significant.

Results: Mean age of cases was 55.87 ± 10.02 years and for control was 53.30 ± 8.45. Mean BMI of cases was 25.38 ± 2.17 and for control was 25.42 ± 3.23 (p=0.956). FVC showed a significant decrease (p=0.004) in the cases (34.52 ± 4.42) when compared to the controls (36.00 ± 4.50). MVV showed a significant decrease (p=0.001) in the cases (66.46 ± 16.64) when compared to controls (75.82 ± 15.54). Other parameters like FEV₁, FEV₁/FVC, FEF 25-75% and PEF showed a non-significant decrease in the case group.

Conclusion: Our study showed a significant reduction in FVC and MVV in diabetics when compared to non-diabetics, in a restrictive pattern. Other parameters showed a non-significant reduction.

Key-words: diabetes mellitus, BMI, pulmonary function tests, spirometry

Effect of different postures on breath holding time (bht) in healthy individuals

p97

Krishnamoorthi Prabhu, Gautham Kundaje, Sivakumar G

Department of Physiology, Kasturba Medical College, Manipal, Manipal Academy of Higher Education (Email: km.prabhu@manipal.edu)

Background: Lung function is varied by the position of the body as a result of influence by gravity. If we know the position of the body at which BHT will be highest, the same position can be followed while measuring the BHT in various clinical scenarios, as these values will be more accurate and reliable.

Objectives: To explore whether there is any change in BHT with the change of body posture and to assess in which position the BHT will be the highest-among positions of standing, sitting, supine and prone, in healthy individuals.

Methods: 30 healthy volunteers (15 male & 15 female) of age group 20-40 years were chosen randomly from the population for the study. In them, BHT (after deep inspiration) was recorded using a stop-watch- in sitting, standing, supine and prone positions, with 5 minutes of rest given to them between the various tests.

Results: By ANOVA, the comparison of BHT among the 4 postures was found to be significant (p < 0.001). From sitting to prone, standing to supine and standing to prone there was very highly significant (p < 0.001) difference. From sitting to supine, it showed significant (p=0.029) difference. BHT was BEST in standing (mean 51.10sec) followed by sitting (mean 47.60sec) followed by supine (mean 39.73sec) and it was the LEAST in prone (mean 35.90sec).

Conclusion: BHT after deep inspiration has shown a significant change with the change of body posture. The consistency of the positions for BHT are in the order of standing>sitting>supine> prone.

Key-words: Breath holding time, body posture, lung function

A study on the acute effects of formalin vapours on the Pulmonary function tests of first year Medical students

P98

Katta Roja, M Rama Devi, G.S. Prema

Department of Physiology, Gandhi Medical College, Secunderabad
rojareddykatta@gmail.com

Background: Formalin is widely used in the anatomy dissection hall as a preservative and embalming agent for preserving the cadavers. Many studies report that formalin vapours effect the upper respiratory tract which can be detected by pulmonary function testing.

Objective: To study the effect of acute exposure of formalin vapours on pulmonary function tests.

Methods: Study was conducted on 100 first year healthy medical students of age group 17-21 years, randomly selected after taking informed consent. Students with respiratory, musculoskeletal disorders were excluded. Readings were taken before and after 2hours of their first dissection class using the Medspiror, computerised spirometer (Schiller healthcare India pvt ltd). Students were instructed and demonstrated about the procedure. Age, anthropometric measurements were collected before starting the test. Subject was instructed to take a deep inhalation and then nose clip was applied and was allowed to blow into the mouthpiece maximally. The test was repeated three times, and the best effort was taken for analysis.

Results: The data were analysed using the SPSS SOFTWARE. Student's t-test was used for statistical analysis. The result showed an increase in FVC ($p < 0.05$), decrease in FEV_1 ($p > 0.05$) and, statistically significant decrease in the FEV_1/FVC ratio ($p < 0.01$).

Conclusion: It was shown that formalin has adverse effects on the upper respiratory tract.

Key-words: Formalin, FVC, FEV_1 , FEV_1/FVC

Study of platelet count in first trimester of pregnancy in relation to non-pregnant women

P99

Arpana Hazarika

Department of physiology, Gauhati Medical College

Background: Thrombocyte or platelets are essential for hemostasis in normal body. Either increase or decrease in their total count may have adverse effect especially during pregnancy. Usually platelet count has been observed to be lower than normal by the end of pregnancy and return to normal soon after birth. It is usually quite mild and not threatening to the mother or the baby. This was termed gestational thrombocytopenia which occurs due to hemodilution.

Objective: To rule out maternal and pregnancy factor that contribute to platelet count change in first trimester of gestation

Materials and method: The study was carried out in 60 cases, 30 cases were pregnant and 30 were non pregnant. The samples of blood were collected from antenatal outpatient department and also from indoor patient of Maternity and Child health care hospital, Guwahati. Blood platelet count was done according to methods of Brecher and Cronkite.

Results: A relevant finding of our study was that platelet count is lower in pregnant women than a non-pregnant woman. Out of the 30 pregnant women 22 had thrombocytopenia with platelet count below $50000/\mu L$ decrease in platelet count in pregnant women was highly significant p value $< .01$

Conclusion: Platelet count is lower in pregnant compared to healthy non pregnant women. It is believed that immunological mechanism at the time of placentation are involved in the process. The problem with low platelet count is that it is impossible to diagnose thrombocytopenia of pregnancy or any underlying disease

Key-word: Platelet, Thrombocytopenia, Hemodilution

Hemoglobin levels among male smokers and non-smokers – A Comparative Study

P100

Kaustuv Jyoti Bhuyan, Reeta Baishya

Department of Physiology, Gauhati Medical College

Background: Cigarette smoking is one of the major leading causes of death throughout the world. Smoking has various effects on hematological parameters. The concentration of hemoglobin varies with age, sex and habitat. It is also affected by ethnicity and smoking pattern.

Objectives: The aim of the present study was to compare the hemoglobin levels among the male smokers and non-smokers and also to find out whether there is any correlation between the intensity of smoking and hemoglobin levels.

Methods: Total 290 healthy male individuals between 20-40 years participated in the study, 145 were non-smokers and 145 were smokers. Hemoglobin estimation was done by Cyanmethemoglobin method. "p" and "r" values were obtained by unpaired t test and Pearson correlation coefficient test respectively.

Results: Hemoglobin level was found to be significantly higher in smokers as compared to non-smokers ($p < 0.05$). Mean hemoglobin level in smokers was 13.33 ± 1.54 g/dl while in non-smokers it was found to be 11.27 ± 1.24 g/dl. Significant increase in the hemoglobin level was also found among smokers than non smokers when it was compared in three different age groups ($p < 0.05$). Positive correlation was found between intensity of smoking and hemoglobin level ($r = 0.48, p < 0.05$).

Conclusion: The study showed that habit of cigarette smoking has got significant effect in the hemoglobin level. Before giving any diagnosis based on blood hemoglobin levels we must take into account the proper cigarette smoking history including the number and duration of smoking.

Key-words: male Smokers, hemoglobin, cyanmethemoglobin

A Cross sectional study of the effect of Von Willebrand Factor among ABO blood group of Guwahati city

P101

Bijit Dutta, Reeta Baishya

Department Department of Physiology, Gauhati Medical College, Guwahati

Background: Cardiovascular disease is one of the major causes of mortality in the world. In India the global burden of disease showed an increase incidence of all deaths attributed to cardiovascular

disease from 24.8% to 27.03% between 2010 to 2015. This increasing trend suggests newer risk factor formulation and prevention. There has been a linear relationship between von Willebrand Factor and thrombosis and ABO locus exerts a major role on plasma vWF levels.

Objectives: Distribution of Von Willebrand factor among ABO blood groups in Guwahati city.

Methods: A total of 200 healthy adults was taken for the study. For estimation of vWF, Minividas machine was used along with vWF estimation kit and for determination of Blood Group direct method was used with appropriate anti-serums. Statistical analysis was done using Analysis of variance (ANOVA).

Results: The mean vWF levels for blood group B was the highest (92.47 ± 16.55 IU/dl) and statistically significant followed by blood group AB (79.31 ± 13.97 IU/dl); blood group A (72.16 ± 10.12 IU/dl) and was lowest in blood group O (66.47 ± 8.96).

Conclusion: The increase in the vWF levels in non-O blood group especially in B blood group indicates the influence of ABO in vWF concentrations and warrants further studies to identify vWF as an important risk factor of Cardiovascular disease.

Key-words: von Willebrand Factor, ABO blood Group, cardiovascular disease, Minividas Machine, thrombosis.

A comparative study evaluating the levels of serum prolactin in premenopausal and postmenopausal women of Guwahati

P102

Mousumi Chakrabarty, Reeta Baishya,
Department of Physiology, Guwahati Medical College, Guwahati.

Background: Menopause is the time in most women's lives when menstrual periods stop permanently and occurs due to a decrease in the ovarian production of hormones- estrogen and progesterone. Estrogen inhibits hypothalamic Prolactin Inhibitory Factor. Therefore, Prolactin levels are lowest in prepubertal and menopausal women.

Objectives: To determine the levels of Prolactin in premenopausal and Postmenopausal women and also to determine any change in Prolactin level with menopause in women of Guwahati.

Methods: Total 100 healthy female individuals between 35-75 years were included in the study, of which 50 were in premenopausal group and 50 were

in postmenopausal group. Serum Prolactin estimation was done in MINIVIDAS. Statistical analysis was done by unpaired t-test.

Results: Prolactin levels were significantly higher in premenopausal females as compared to postmenopausal women. The difference between premenopausal (23.36ng/ml) and postmenopausal (11.98 ng/ml) Prolactin levels was statistically highly significant.

Conclusion: Our study showed that a higher level of serum Prolactin is seen in premenopausal women and a lower level in postmenopausal women. This is due to estrogen inhibition of Prolactin Inhibitory Factor. Detection of higher serum Prolactin levels in postmenopausal women may help to identify women at risk of venous thrombosis and breast carcinoma.

Key-words: menopause, prolactin, MINIVIDAS

A comparative study evaluating association of serum estrogen with haemoglobin in reproductive and menopausal women of Guwahati

P103

Reeta Baishya¹, Mousumi Chakrabarty²
¹Department of Physiology, Gauhati Medical College, Guwahati, ²Department of Physiology, GMCH

Background: Menopause occurs due to a decrease in the ovaries' production of hormones- estrogen and progesterone. Several studies have shown that haemoglobin levels are less in reproductive age group women as compared to menopausal women. Both natural and synthetic estrogens depress erythropoiesis.

Objectives: To determine changes in serum estrogen and haemoglobin levels with menopause and to analyze the independent association of estrogen with haemoglobin in reproductive and menopausal women of Guwahati, if any.

Methods: Total 100 healthy female individuals between 25-75 years were included in the study, of which 50 were in reproductive age group and 50 were menopausal. Serum Estradiol was estimated in MINIVIDAS. Haemoglobin was estimated by Cyanmethaemoglobin method. Statistical analysis was done using unpaired t-test.

Results: Estradiol levels were higher in reproductive females as compared to menopausal (p value <0.001). Mean haemoglobin level in reproductive group was 11.52 ± 1.44 and in menopausal women 12.13 ± 1.52 (p value was significant). Negative correlation was found between serum Estradiol and Haemoglobin in reproductive females (r value -0.44)

and negligible correlation between the two in menopausal women (0.03).

Conclusion: Our study showed that a higher level of estrogen in reproductive women is associated with a decreased Haemoglobin level while a fall in serum estrogen in menopausal women raises the haemoglobin levels. Thus estimation of these simple parameters may help in detection and correction of anaemia in reproductive women and osteoporosis, cardiovascular diseases etc in menopausal women.

Key-words: menopause, estrogen, minividas, haemoglobin.

Growth profile among children with Thalassemia major on regular transfusions and oral chelation therapy

P104

Vignya, G.S. Prema

Department of Physiology, Gandhi Medical College.
Email: svignya13@gmail.com

Background: Thalassemias are the most common genetic disorder world-wide. It has been estimated that over 6000-8000 children, who are homozygous for thalassemia are born in India every year. An attempt was made to study the relationship between transfusion & growth profile in children with thalassemia major.

Objectives: 1) To assess the growth pattern in children with thalassemia major on oral iron chelation therapy
2) To compare the growth patterns across children with Mean Pre-Transfusion Hemoglobin <8gm/dl & \geq 8gm/dl.

Methods: Study was done on 100 transfusion dependent thalassemia major children, 2-10yrs of age on regular iron chelation therapy attending Gandhi Hospital.

Results: In children with Mean Pre Transfusion Hemoglobin <8g/dl, mean weight for age Z score is 1.32 ± 0.506 and in children with mean pre transfusion $HB \geq 8$ gm/dl, mean weight for age Z score is -0.537 ± 0.579 . There is significant difference in WAZ scores between the two groups. In children with $MPTH < 8$ gm/dl, mean height for age Z score is -1.728 ± 0.616 and in children with $MPTH > 8$ gm/dl height for age Z score is 0.943 ± 0.561 . There is significant difference in HAZ scores between the two groups.

Conclusion: Although the patients were on regular blood transfusions, they were maintaining low

hemoglobin levels which is evident from positive association with growth parameters. Z scores for both height & weight ranged between -1SD & -2SD and there was obvious regression in these scores with advancing age.

Key-words: Thalassemia major, mean pre transfusion hemoglobin (MPTH), weight for age Z score (WAZ), height for age Z score (HAZ)

Gender variation of stress coping capacity among first year students of Gauhati Medical College, Assam

P105

Indrani Das, Bonti Bora

Department of Physiology, Gauhati Medical College, Assam

Background: Stress is best described as a situation where environmental demands exceed the capacity for effective response by the individual and can potentially have physical and psychological consequences. Stress is an inevitable component during undergraduate medical training and lack of adequate stress-coping skills may affect the students variedly.

Objective: To assess the stress coping capacity among male and female students who took admission on the same session.

Methods: A cross sectional study was done among randomly selected 25 male and 25 female first year students of 2016 batch at Gauhati Medical College. The Stress Coping Resources Inventory: A Self-Assessment questionnaire were given to them and assessed.

Results: Data was analysed by SPSS test. The two-tailed P value was 0.8533, considered not significant.

Conclusion: Results revealed that there was no difference of stress coping capacity among male and female medical students.

Key-words: Stress, Stress coping capacity, Male, Female

A cross-sectional study to assess anemic status of pregnant women at 12-16 weeks of gestation

P106

Ranjani Kulkarni, Parwati Patil, Shivaprasad S Goudar

Department of Physiology, JNMC, Nehru Nagar, Belagavi, Karnataka

Background: During pregnancy there is hemodilution which results in physiological anaemia of pregnancy. According to World Health Organization (WHO), haemoglobin level below 11g/dl should be labelled as anaemia in pregnancy. The Indian prevalence of anaemia in pregnancy as estimated by WHO is 65-75%. The adverse outcomes of anaemia in pregnancy are spontaneous abortions, preterm labour, low birth weight babies and intrauterine growth retardation.

Objective: To detect prevalence of anaemia in pregnant women in 12-16 weeks of gestation.

Methods: This study was conducted during the period of January 2017 to December 2017 after obtaining institutional ethical clearance and patient's consent. Pregnant women of 12-16 weeks gestation confirmed by USG were included. The information regarding the Age, Gestational age, Gravida, Parity, Previous abortions, Anthropometric measurements were taken from the participants. The blood investigations were performed on pregnant women by taking venous blood sample from 8AM to 11AM. The parameters measured in the study were Haemoglobin (Hb) in g/dl and Peripheral blood smear. Correlation between Body Mass Index and anaemia was done by using Karl Pearson's correlation coefficient method.

Results: Out of 380 pregnant women, 240 women were Anaemic (63.16%) with mean hemoglobin 11.17g/dl.

Conclusion: Early diagnosis of anaemia can prevent spontaneous abortions, preterm labour, low birth weight babies, and intrauterine growth retardation. In Indian scenario, universal screening for anaemia is essential as there is significant increase in the need of iron and nutrients (Vitamin B12, Folic Acid) during Pregnancy.

Key-words: Pregnancy, anaemia, hemoglobin

Yoga and its effect on BMI and glycemic status in type 2 diabetes mellitus

— P107

Tyngshainlang Sutnga, Sarada Ningthoujam

Department of Physiology, Regional Institute of Medical Sciences, Imphal.

Background: Yoga, primarily focused on simple physical exercises, breathing exercises, and meditation and is simple and potentially economical therapy that may be used alongside medical treatment of type-2 diabetes.

Objective: To assess the effect of yoga on BMI and glycemic status in type 2 diabetes mellitus patients.

Methods: An interventional study conducted at Department of Physiology and Medicine in collaboration with Yoga Training and Research Centre Kweekithel, between January 2018 - June 2018, on 180 type-2 diabetes mellitus patients, classified into case [n=90] with yoga intervention and control [n=90] with no yoga, by non-randomized trial. Baseline parameters were recorded at the start and after 3 months. Paired 't' test was done for comparison of means before and after 3 months. A $p < 0.05$ was taken as significant.

Results: 72.2% in the case and 70% in the control were females with mean age of 51.52 ± 12.49 and 51.89 ± 11.66 years respectively. BMI of case showed a significant decrease, 24.84 ± 3.17 to 24.15 ± 2.97 ($p < 0.001$) whereas BMI of control showed a significant increase, 25.15 ± 3.05 to 25.46 ± 3.05 ($p < 0.001$). Fasting blood sugar showed non-significant decrease in case ($p = 0.101$) and non-significant increase in control ($p = 0.098$). Post-prandial blood sugar showed non-significant decrease in case ($p = 0.365$) and non-significant increase in control ($p = 0.52$) and a significant decrease in glycosylated haemoglobin in the case ($p = 0.009$) and non-significant decrease in the control ($p = 0.195$).

Conclusion: Yoga can be added to the treatment regime of type-2 diabetes, and can be educated on the positive effects of yoga knowledge and techniques on physical, mental and emotional health.

Key-words: Yoga, BMI, glycemic status, type-2 diabetes mellitus

Relationship of intraocular pressure with age, blood pressure and central corneal thickness in subjects with open angle glaucoma

— P108

Zubaida PA¹, Padma B Prabhu², Venkatesh K³

¹Dept. of Physiology, ²Dept. of Ophthalmology, ³Dept. of Physiology, Calicut Govt. Medical college, Kerala

Background: Glaucoma is the leading cause of irreversible blindness in the world. Intraocular pressure (IOP) is the only modifiable factor and is influenced by various factors like age, blood pressure (BP), central corneal thickness (CCT). Hence, this association has to be considered in patients with glaucoma for treatment.

Objectives: This main objective is to study and compare the following parameters: IOP, age, BP and CCT in primary open angle glaucoma subjects (POAG) and in control subjects and to compare the correlation between CCT and IOP between the two groups.

Methods: A case control study was conducted in 144 subjects in the age group of 40-75 years of which 72 were newly diagnosed with POAG not on treatment and 72 were control subject. Informed consent was taken. IOP was estimated by Goldmann applanation tonometry and CCT by specular microscopy. The data were analyzed using SPSS version 18.

Results: IOP levels were significantly elevated while mean CCT values were significantly lower in the POAG subjects when compared to the control subjects. Correlation coefficient between IOP with CCT was 0.241 ($p = 0.041$) and 0.462 ($p = 0.000$) in the two groups.

Conclusion: Among the many risk factors, IOP is the only modifiable one. CCT directly influences the measurement of IOP by GAT as corneas thicker than normal require a greater force to flatten and results in overestimation of IOP and vice-versa. However, our study showed that subjects with thinner corneas have more prevalence of glaucoma.

Key-words: Open angle glaucoma, intraocular pressure, central corneal thickness

Effect of body mass index on intraocular pressure and ocular perfusion pressure in individuals with pre-hypertension

P109

Sudha B Sreenivas, Vinitha K R

Department of Physiology, JSS Medical College, Affiliated to JSSAHER (JSS Academy of Higher Education & Research)-(deemed to be University).

Background: Obesity is a rapidly emerging global epidemic with profound public health consequences. Prehypertension is an asymptomatic silent killer that can cause subclinical atherosclerosis. Elevated intraocular pressure (IOP) and reduced ocular perfusion pressure (OPP) are major risk factors in the development and progression of glaucoma, the second leading cause of blindness in the world according to WHO. Though both obesity and prehypertension are risk factors in elevating IOP, very few studies have analyzed the effects of obesity on IOP and OPP in prehypertensive individuals.

Objective: To assess the effects of body mass index (BMI) on IOP and OPP in pre-hypertensive individuals.

Methods: One hundred voluntary participants with pre-hypertension (systolic blood pressure of 120–139 mmHg or diastolic blood pressure of 80–89 mmHg) in the age group of 20 – 50 years, were selected from an ophthalmology clinic in Mysuru. They were categorised into two groups based on their BMI. Group 1 comprised of pre-hypertensive subjects with BMI greater than 22.9 Kg/m². Group 2 included pre-

hypertensive subjects with normal BMI between 18.5 to 22.9 Kg/m². IOP was recorded using rebound tonometer and OPP was calculated.

Results: Statistically significant elevation in IOP and slight reduction in OPP values of both the eyes were observed in obese pre-hypertensive group.

Conclusion: Obesity compounds the effect of pre-hypertension on IOP and OPP probably by early disruption of the auto regulatory mechanisms that maintain constant ocular blood flow. Understanding of the complex relationship between IOP and OPP in obese, pre-hypertensive population might help in preventing the risk of developing glaucoma.

Key-words: BMI, Pre-hypertension, IOP, OPP

Effects of ambient air pollutants on cardiopulmonary system of traffic policemen

P110

Tarun Kumar, Manish Kumar, Ashok Sharan and Sunita
Department of Physiology, Indira Gandhi Institute of Medical Sciences, Patna

Background: Air pollution is a major threat to human health. World Health Organization estimated 4.2 million premature deaths due to ambient air pollution in 2016. It's a serious problem in metropolitan cities in India. Average daily exposure of traffic policemen to dust particles and toxic gases from automobile exhaust exceeds about 8-10 hr/day.

Objectives: The purpose of this study was to determine the effects of air pollutants on the cardiopulmonary system of the traffic policemen.

Methods: A cross-sectional study with 100 traffic policemen was conducted in May 2018 in Patna. The inclusion criteria were non-smoker males, aged between 25–50 years. The exclusion criteria included history of chronic obstructive pulmonary diseases (COPD), tuberculosis, cardiovascular diseases or declined participation. Forced vital capacity (FVC), Forced expiratory volume in 1st second (FEV₁) and FEV₁/FVC of the subjects were determined by using computer based spirometer. Blood pressure (mmHg) was measured by using automatic BP monitor OMRON HEM-7130L. The association of FEV₁/FVC and Blood pressure with the duration of exposure to air pollutants was analysed by using Pearson correlation.

Results: There was a very significant correlation between FEV₁/FVC and duration of exposure to ambient air pollution ($r = -.349$, p value = .000). The correlation between Systolic blood pressure and duration of exposure was also significantly high ($r = .281$, p value = .005).

Conclusion: Prolonged exposure to ambient air pollutants leads to COPD and rise in systolic blood pressure among traffic policemen.

Key-words: Ambient air pollutants, FEV₁/FVC, COPD and Systolic blood pressure

Endothelial dysfunction in non-alcoholic fatty liver disease: an updated meta-analysis

P111

Anita S Malhotra¹, Ajay Duseja², Neelam Chadha³

¹Dept of Physiology, GMCH, Chandigarh, ²Department of Gastroenterology, PGIMER, Chandigarh, ³PGIMER, Chandigarh

Background: Endothelial dysfunction is a precursor to atherosclerosis and flow-mediated dilatation (FMD) in the brachial artery is the commonest method to evaluate endothelial function in humans. Non-alcoholic fatty liver disease (NAFLD) is one of the most common liver disorders encountered in clinical practice. An earlier meta-analysis had quantitatively assessed the degree of endothelial dysfunction using FMD. However, two of the largest studies investigating the relation of FMD with NAFLD were published after that meta-analysis. Therefore, updating the previous meta-analysis was important.

Objective: To determine the risk of cardiovascular disorders in NAFLD.

Methods: We searched PubMed, Cochrane library, Embase, Scopus, SCI, Google Scholar, conference proceedings, and references of included studies till June, 2017 to identify observational studies evaluating endothelial function using FMD in patients with non-alcoholic fatty liver disease. Data was analyzed using MedCalc. Fourteen studies were included in the meta-analysis

Results: Patients with NAFLD had lower FMD as compared to controls, standardized mean difference (random effects model) being -1.362%; 95% confidence interval (CI), -2.064 to -0.661. The effect size became smaller after addition of the recent study with the largest sample size was included compared with the earlier meta-analysis.

Conclusion: Patients with NAFLD had low FMD values indicating a higher risk of cardiovascular disease although our results suggest the effect size is not as large as reported previously.

Key-words: endothelial dysfunction, flow mediated dilatation, non-alcoholic fatty liver disease, meta-analysis

A comprehensive report on the toxicity of *Cleistanthus collinus* poisoning

P112

Neetu Prince¹, Soosai Manickam Amritham¹, Anna B. Pulimood², Binu Susan Mathew³, Victoria Job⁴, Sathya Subramani¹

¹Department of Physiology, ²Department of Pathology, ³Department of Clinical Pharmacology, ⁴Department of Clinical Biochemistry. CMC Vellore
drneetuprinced@gmail.com

Background: *Cleistanthus collinus* is a toxic plant and its toxicity has not been deciphered yet. It is consumed as a boiled decoction or a freshly ground paste, for suicidal or homicidal purposes.

Objective: To study the pharmacokinetics and toxicological effects of the *C. collinus* extract in rats.

Methods: Two doses were administered – a high dose which caused death within hours and a low dose which did not cause death; Animals in low dose group were sacrificed after 2 weeks. Blood and tissues were assessed for biochemical and pathological changes respectively. Blood was collected at different time points and the fluorescent compounds in were detected by HPLC and were compared with extract profile.

Results: Time to death was found to be 6-8 hrs in the high dose group. HPLC results showed a higher peak of Cleistanthin A than Cleistanthin C in plasma of tests, though Cleistanthin C is the major compound in the boiled extract. This may be due to differences in absorption. A new compound was also seen in test group, suggesting a metabolite. There was significant metabolic acidosis and increase in blood urea in test group suggesting renal involvement. While total bilirubin levels did not show any significant difference, direct bilirubin levels in test rats were lower. This suggests impairment of liver function, while lack of elevation of liver enzymes in test rats suggests that there is no frank liver injury. Examination of organs revealed congestion without any specific changes.

Conclusion: Information on the toxicity profile of these compounds becomes relevant in the context of regulatory toxicology too, as these compounds are being considered for cancer therapeutics also.

Key-words: *Cleistanthus collinus*, HPLC

Prevalence of visible signs of rip currents

P113

Manish Parihar

Department of Physiology, Dr. S.N. Medical College, Jodhpur

Background: While on beaches even if you are only in knee-deep water, you may be swept off your feet by strong ocean waves and rip currents (large volume of water returning back out to sea after onshore wave action). Drowning due to Rip Currents is measure preventable cause of death.

Objectives: The objective of this study was to observe prevalence of visible signs of rip currents.

Methods: Naturalistic observational cross sectional comparative study was carried out in Arabian sea in two groups at Calangute Beach & Vagator Beach at Goa India by observing prevalence of presence of following visible sign out of randomly selected 100 rip currents, as given in NOAA & US Life Saving Association, Rip Current Wikipedia & Oxford Text Book of Medicine. In statistics Excel sheet, IBM SPSS windows version 20, Z-test & $p < 0.05$ were used.

Results: Prevalence of visible signs were [1] A channel of Churning Chopping water was observed at Calangute Beach in 36% & at Vagator Beach 80% of Rip Currents [2] A line of Sea Foam look almost like a road or a river running out to sea, away from the shore was observed at Calangute Beach in 99% & at Vagator Beach in 100% of Rip Currents [3] A Rip showing Different Coloured Sea water beyond the surf zone depending on the angle of the Sun was observed at Calangute Beach in 5% & at Vagator Beach in 27% of Rip currents [4] A break in the incoming Sea wave pattern as waves role into shore was observed at Calangute Beach in 90% & at Vagator Beach in 93% of Rip currents .While in comparison, at Vagator Beach; Rip showing ;channel of Churning Chopping water & Different Coloured Sea water was significantly more than at Calangute Beach.

Conclusion: A line of sea foam looks almost like a road or a river running out to sea, away from the shore was the most frequently occurring identifying sign of observed rip currents. Rip's visible sign like chopping of water & different coloured sea water was different at Calangute Beach & Vagator Beach.

Key-words: Rip currents, visible sign, sea foam, running to sea, incoming breaking waves

Assessment of phagocytic index of polymorphonuclear leucocytes in hospitalized stages 4 and 5 chronic kidney disease patients

P114

Arpana Bhide¹, Usha Kalawat², Ram³, Sivakumar⁴

¹Department of Physiology, ²Department of Microbiology, ³Department of Nephrology, ⁴Department of Nephrology SVIMS, SPMC(W), Tirupati

Background: Infections are the main reason for hospitalization and the second common cause of death in chronic kidney disease (CKD) patients. Infections develop primarily as a consequence of deranged innate immunity. In this study we assessed the efficiency of phagocytic function of polymorphonuclear (PMN) leucocytes in severe CKD patients.

Objectives: To assess the phagocytic index and lytic index of PMN leucocytes in stages 4and 5 CKD patients and to compare the above indices with healthy age and sex matched controls.

Methods: The study was carried out in 60 adults in the age group of 18-60 years of which 30 (15 males and 15 females) were chronic kidney disease patients in stages 4 and 5 taking conservative treatment (not on dialysis) and other 30 were age and sex matched controls. After screening for inclusion and exclusion criteria, 5 ml of venous blood was collected and taken immediately for evaluation. Phagocytic index which is the number of neutrophils positive for ingested microbes per 100 neutrophils and lytic index which is the total number of microbes per 100 cells were calculated. These are indices of neutrophil functioning.

Results: Statistically significant decrease in both phagocytic index and lytic index were found in stages 4 and 5 CKD patients as compared to controls.

Conclusion: In the present study we were able to establish that phagocytic capacity of PMNLs is adversely affected in severe CKD patients. This gains importance in the light of immune dysfunction being considered as a major cause of premature deaths resulting from infections in severe CKD.

Key-words: chronic kidney disease, phagocytic index, lytic index

A study on prevalence of computer vision syndrome among first year medical students

P115

Ashwini N. Patil, Bhavya

Department of Physiology, Dr. DY Patil Medical College, Hospital and Research Center, Pune, Maharashtra, India.

Background: The extensive use of computers as medium of teaching-learning necessitates in universities needs introspection into the extent of computer related health disorders among student population.

Objectives: To find out the prevalence of computer vision syndrome (CVS) in MBBS students.

Methods: A cross sectional study was conducted in 250 1 year MBBS students with a self-administered questionnaire. Institutional ethical clearance was obtained. Written informed consent was taken. Students who used computers in the month preceding the date of the study were included.

Results: Sample size was 247 as 03 denied consent. Mean age was 19.6 years. Prevalence of CVS was 69%. Various symptoms of CVS in their descending order of occurrence were eye strain (73.4%), neck pain (71.2%), dryness of eyes (55.1%), shoulder pain (49.6%), back pain (46%), blurred vision (33.3%), difficulty focusing (30.6%), headache (27%), burning sensation (26.1%), eye irritation (25.5%), double vision (24.2%), pain in or around the eyes (19.3%), contact lens related problems (9.6%), redness of eyes (5.6%). Severity of CVS was mild (few minutes to hours) in 46.7%, moderate (few hours and subsides after rest or sleep) in 38.7%, and severe (needed medical consultation) in 14.6%.

Conclusion: The high prevalence of computer vision syndrome in medical students is alarming and suggests incorporating ergonomic knowledge and practice among them.

Key-words: Computer vision syndrome, medical students, prevalence

Study of health status of children of labourer in sagar city

P116

Ragini Shrivastava¹, Pranjal Shrivastava², Jagrati Kiran Nagar³

¹Department of Physiology, AIIMS Bhopal. (M.P.)

²Department of PSM Bundelkhand Medical College Sagar 470001.(M.P.) ³Department of Obstetrics and Gynecology, Bundelkhand Medical College Sagar 470001.(M.P.)

raginishrivastava5@gmail.com

Background: The future of the society depends on the quality of life children. Nutritional problems like protein energy malnutrition (PEM), anemia and vitamin A deficiency continue to plague a large proportion of Indian children. The diets and nutritional status of urban slum children in India is far away from

being satisfactory.

Objective: To assess the health status of children of slum area and to assess major causes of malnutrition.

Methods: The study comprised of 100 children of age group 1-10 from slum area in Sagar city. Detailed clinical examination, anthropometric measurement and Hemoglobin (Hb) estimation of all children were done

Results: All the families were belonging to low socioeconomic group. Most children (50%) were partially immunized and 28% were not immunized and only 23% were completely immunized. Total (50%) of children were malnourished, of which (18%) had third degree malnutrition. More than 80% children showed skin and hair changes and other signs of malnutrition. Most common micronutrient deficiency was anemia. 20% had normal Hb, 30% mild, 29% moderate and 21% had severe anemia.

Conclusion: Malnutrition is still major health problem in India. The major cause of it is poverty and lack of awareness in low socioeconomic group.

Key-words: Malnutrition, Urban slum, Low socioeconomic group

Relationship of bone mineral density (BMD) with age, weight and body mass index (BMI) in premenopausal women of Manipur

P117

Yendrebam Gyani Devi, Ksh. Gomti Devi

Department of Physiology, Regional Institute of Medical Sciences, Imphal

Background: Osteoporosis is a bone metabolic disorder that is characterized by reduced bone mineral density (BMD), with deterioration of bone micro-architecture, leading to increased skeletal fragility and risk of fracture. It is more common in older people, especially in menopausal women.

Objective: To evaluate the relationship of BMD with age, weight and BMI in premenopausal women.

Methods: This study was conducted on 30 healthy women between the age group of 18 and 45 years. The height (m) and weight (kg) of all the subjects were recorded and BMI was calculated. BMD of lumbar spine was measured using enCORE based X ray bone densitometer (Lunar Prodigy Advance, GE Medical Systems, USA) based on DEXA scan. Statistical analysis was done by using SPSS software version 21.

Results: Negative correlation was found between BMD and age but it was not significant ($r = -0.163$,

$p > 0.05$). There was no significant correlation between BMD and BMI. However, significant positive correlations were found between age and weight ($r = 0.386$, $p < 0.05$) and also with BMI ($r = 0.367$, $p < 0.05$).

Conclusion: BMD decreases as age advance which indicates that advancing age is a risk factor for osteoporosis. In our study weight and BMI increases as age progresses.

Key-words: Bone mineral density, body mass index, menopausal, premenopausal

Study on physical and psychological health of medical students

118

Swati Sinha, Tarun Kumar, Pooja Sakshi, Ashok Sharan, Manish kumar, Sunita

Department of Physiology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar

Background: In this era of junk food, sedentary lifestyle, smartphones, computer and mobile games and the break neck competition for clearing entrance examinations and then the pressure of academics in a professional college, the physical and mental health of today's youth might be considerably compromised. This study has been designed to investigate the level of cardiorespiratory fitness and psychological stress in MBBS students, a representative group of our youth.

Objective: To study the level of physical fitness and mental stress among medical students and correlate them.

Methods: This cross-sectional study employed a diverse sample of 200 male and female medical students from different semesters of IGIMS College in Patna to study their physical fitness assessed by modified Harvard Step test and their stress levels assessed by Medical Student's Stressor Questionnaire (MSSQ).

Results: Significant gender differences were found in levels of physical fitness and perceived stress. Hierarchical linear models showed significant negative relationship between physical fitness and stress.

Conclusion: Considering the deleterious effects of stress and sedentary lifestyle on health, these results have implications on physical and mental health. Thus, health promotion programs, lifestyle modification and social support for college students may benefit the youth.

Key-words: physical fitness, stress, medical college students, Harvard step test

The effect of histamine on exocytosis in bovine chondrocytes

P119

Mahatabb Nundy, Vinay Oommen, Sathya Subramani

Department of Physiology, Christian Medical College, Vellore

Background: Osteoarthritis involves cartilage damage. Chondrocytes are known to secrete matrix metalloproteinases (MMP). It is also known that osteoarthritic synovial fluid contains high levels of histamine (from sources like mast cells). The aim of the study was to analyse a possible role for histamine in chondrocyte exocytosis.

Objective: To investigate the role of histamine in exocytosis, in bovine chondrocytes.

Methods: Bovine chondrocytes were sourced from the local slaughter house. Cartilage shavings were obtained from these and digested. Chondrocytes were maintained in Dulbecco's Modified Eagle's Medium (DMEM) with Ham's F12 additive, ascorbic acid and L-Glutamine. The isolated cells were then used for patch clamp studies. Capacitance of cell membrane was recorded. An increase in capacitance indicates a net increase in cell surface area and therefore a net exocytosis. The effect of histamine on cellular capacitance was recorded.

Results: Cell membrane capacitance was found to increase in the presence of histamine. The effect of histamine inhibitors on capacitance is currently under study.

Conclusion: Exocytosis of matrix degrading enzymes has been observed in osteoarthritic joints. Several studies have shown that histamine levels are also significantly high in the same. From our study we conclude that histamine does induce exocytosis. This might open new avenues of treatment of arthritis.

Key-words: Patch clamp, capacitance, exocytosis, histamine

Analysis of muscle strength and endurance in healthy young adults (18 – 21 years) of both sexes and association of muscle strength with muscle endurance

P120

Jolly Bhattacharjya, Reeta Baishya

Department of Physiology, Gauhati Medical college, Guwahati

Background: Muscle strength has been studied as a predictor of general health and many diseases. Data on muscle strength of healthy adults are scarce in Assam.

Objectives: To describe normative data for hand grip muscle strength and endurance among healthy young males and females of age group 18-21. Also to find out any correlation between muscles strength and endurance.

Methods: We selected 79 healthy volunteers of both sexes of age group 18 – 21 years. We have measured muscle strength by hand grip dynamometer. Muscle endurance was calculated by asking the subjects to hold the dynamometer at one third of their muscle strength as long as they can.

Results: In this study there were 46 males and 33 females. Mean muscle strength among the males is 27.09(SD7.05) and among the females is 10.76(SD6.19). Similarly mean endurance among males is 41.78(SD31.72) and among females is 16.15(SD9.81). This higher values of muscle strength and endurance in males are statistically significant. We have also found positive correlation between muscle strength and endurance in both the sexes.

Conclusion: In this study we have seen that muscle strength and endurance of healthy young males are more than that of females. And also muscle endurance increases with increase in muscle strength.

Key-words: Muscle strength, muscle endurance hand grip dynamometer

Quality of life of elderly south Indian population with regard to their residence

P121

Anju Shaju Areeckal¹, Nayanatara Arunkumar² and Sheila R Pai²

¹Department of Physiology, Believers Church Medical College Hospital, Thiruvalla, Kerala, India,

²Department of Physiology, Kasturba Medical College, Manipal Academy of Higher Education, Mangalore, Karnataka, India

Background: Life satisfaction is an important aspect of psycho-social study of aging. Social relationships and participation in activities are key protective factors in maintaining functional and cognitive ability in elderly people.

Objectives: To investigate the quality of life among (1) the elderly population living in old age homes and those living with their family in Mangalore, and (2) among the elderly men and women.

Methods: Study group consists of 160 elderly subjects above the age of 60 years, selected from old-age homes and urban families in Mangalore. The quality of life is assessed using the questionnaires from the World Health Organisation Quality of Life

(WHOQOL) Group. Student's unpaired t-test is used to determine the significance in QOL parameters among the two groups.

Results: The elderly persons living with their family had a better social relationship and social participation than those living at old age homes ($p < 0.001$). The elderly at old age homes had a better personal and intimate relationship than those living with their family ($p < 0.001$). The elderly men had a better social relationship compared to elderly women ($p < 0.05$). The social participation and intimate relationship was not significantly different for elderly men and women.

Conclusion: Lack of support from family degrades quality of life of the elderly. The elderly who experience social isolation and loneliness are at greater risk for morbidity, depression and cognitive decline. Hence, it is the responsibility of every individual to work towards the improvement of quality of life in the elderly population.

Key-words: Quality of life, elderly, old-age home, family

Effect of chronic unpredictable stress on wound healing in adult zebrafish

122

Sreevatsan KK, Sathya Narayanan G

Department of Physiology, Dr. ALM Post Graduate Institute of Basic Medical Sciences, University of Madras, Taramani, Chennai-113, Tamil Nadu. Email:sreevatsankk@gmail.com

Background: Wound-healing is a critical process involved in the recovery from day to day injury and surgical procedures. Poor healing increases the risk for wound infections or complications. Transition from the inflammatory to the proliferative phase represents a key step during wound healing. Prolonged inflammation is detrimental and may result in decreasing the progression of wound healing process.

Objectives: To study the effect of chronic unpredictable stress (CUS) on wound healing in adult zebrafish.

Materials and methods: Adult zebra fishes were divided into control and chronic unpredictable stress group with 20 fishes in each group. CUS includes predator stress, crowding stress, low water level stress, chasing stress, heat stress and cold stress. A full thickness wound was introduced onto the left flank directly anterior of anal and dorsal fins. Wound were made on day 1 and after the procedure the stress group fishes were subjected to a chronic unpredictable stress for 15 days. The size of the wound was analyzed every fifth day and documented. Data were analyzed by using Student's 't' test.

Result: Wound images were analyzed by image J software. A significant decrease in wound healing was observed in chronic unpredictable stress exposed groups compared with the control fishes.

Conclusion: This present study denotes that chronic unpredictable stress has deteriorated the immune response and hence delay wound healing. Stress can significantly impede wound healing based on the stressors ranging in magnitude and duration.

Key-words: Chronic unpredictable stress, wound, inflammation

Effect of Learning Style on Picture Memory

P123

Chinmay Suryavanshi, Sindhoori Shetty, Kirtana R Nayak, Vineetha K Ramdas Nayak, Priyesh C

Department of Physiology, Kasturba Medical College Manipal, Manipal Academy of Higher Education, Manipal, Karnataka-576104, India

Background: Theory of learning styles asserts that learners have distinct preferences for how they receive, analyse, and assimilate knowledge. VARK model, proposed by Fleming, categorizes learners by their preferred sensory modalities: visual (V), aural (A), read/write (R), and kinaesthetic (K). Learning styles are characteristic to individuals since they prefer a modality for perception and processing of the information in different learning situations. VARK has been used in various educational field to study the students preferred learning style. Association between learning styles and learning achievement outcomes remains contentious, since there is lack of objective evidence in support of the VARK learning style.

Objectives: To investigate whether short-term picture memory varied in students with Aural learning style and Visual Learning Style.

Methods: The VARK questionnaire (Version 7.3) was used to analyse the preferred learning styles of the subjects. Thirty-eight participants with unimodal V and A learning style were selected using VARK questionnaire scoring chart. Coloured Picture Memory and Black-White Picture Memory was tested using help of Microsoft PowerPoint software.

Results: One-way ANOVA was used to compare memory scores between the two learning style groups. The Mean scores for both Coloured Picture and Black-White Picture memory tests were higher in Visual Learners as compared to Aural learners, but they were not statistically significant.

Conclusion: Visual learners performed better in picture memory tests, but the results were not statistically significant.

Key-words: Learning Style, Coloured Picture Memory, Black-White Picture Memory

L - ascorbic acid supplementation ameliorates oxidative & Nitrosative stress in hypoxia induced male albino rats exposed to sodium fluoride

P124

Jaya simha Reddy¹, Kusal K Das¹, R Chandramouli Reddy², Raju H, Taklikar³

¹Department of Physiology, ²Department of Biochemistry, Shri B.M. Patil Medical college, Hospital & Research centre, BLDE (Deemed to be University), Vijayapur-586103, Karnataka, India, ³Department of Physiology, Navodaya Medical College, Hospital & Research centre, Raichur-584103, Karnataka, India

email –reddyjayakmc@gmail.com

Background: Oxidative stress, which is a consequence of hypoxia, can be controlled by L-ascorbic acid. NaF induces intoxication of tissues like heart, liver and lung.

Objectives: To investigate the exposure of sodium fluoride or hypoxia alone or in combination with or without administration of L- ascorbic acid on biochemical, cellular transcriptional & Gene expression pathways (VEGF & NOS3).

Methods: Male albino rats weighing about 156 ± 2 g were divided into 8 groups (n= 6 in each group). Rats were exposed to hypoxia (10% oxygen) or sodium fluoride (20mg/kg/day of body weight, intraperitoneally) alone or in combination with or without administration of L- ascorbic acid (50mg /100 g body weight). Rats were weighed on first day of the treatment and the day of sacrifice, oxidant and enzymatic antioxidant status were assessed. Serum levels of vascular endothelial growth factor (VEGF) and nitric oxide synthase 3 (NOS3) was done by ELISA technique.

Results: Sodium fluoride & hypoxia exposure has led to decrease in body weight, hepatosomatic index, altered serum SOD, MDA, vitamin C, vitamin E, nitric oxide, serum VEGF & NOS3 and hepatic vitamin C. At the same time, L- ascorbic acid supplementation showed remarkable improvements to all these alterations.

Conclusion: Supplementation of L-ascorbic acid is salubrious to combat both sodium fluoride and hypoxia induced oxidative & Nitrosative stress

Key-words: L-ascorbic acid, hypoxia, sodium fluoride, oxidative stress, Nitrosative stress

Anatomic and Radiological Study of the Coeliac Trunk

P125

Rohini Punja¹, Vrinda Hari Ankolekar¹, Rajagopal K V², Sneha Guruprasad Kalthur¹

¹Department of Anatomy, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, ² Department of Radiodiagnosis, Kasturba Medical College, Manipal, Manipal Academy of Higher Education
Email: rohini.punja@manipal.edu

Background: The vascular pattern of the branches of the abdominal aorta exhibit a wide range of anatomical variations. These anatomical variations are due to unusual embryological development.

Objectives: To study the morphometry and morphology variations of the coeliac trunk in cadaveric as well as radiological specimens.

Materials and methods: The present work was undertaken on 30 embalmed and formalin fixed cadavers from the Department of Anatomy, KMC, Manipal, and 50 patients of Kasturba Hospital, Manipal who underwent MDCT (Multidetector computed tomography) imaging to examine the prevalence of vascular patterns of the coeliac trunk.

Results: The normal branching pattern was observed in 22 (73.4%) of the 30 cadaveric specimens. The remaining 8 cases (26.7%) had variations. There were no variations observed in the MDCT images. For the cadaveric specimens of the celiac trunk the mean stem length was 1.24 cms (SD 0.64), diameter 0.85 cms (SD 0.15), distance from aortic bifurcation 12.43 cms (SD 1.16). In MDCT images of celiac trunk mean stem length was 1.35 cms (SD 0.49), diameter 0.65 cms (SD 0.11), distance from aortic bifurcation 11.64 cms (SD 1.33).

Conclusion: Diameters of the celiac trunk measured via MDCT were found to be lower than measured in cadaveric specimens possibly because radiology measures the internal diameter compared to external diameter in cadaveric specimens. The knowledge of the variations in morphology and morphometry of the celiac trunk are useful in the planning and performance of all the upper abdominal surgical procedures. It is also useful in planning and executing radiological interventions.

Key-words: Coeliacography, ventral branch, foregut, vascular

Association between Mobile Phone Use and Stress, Sleep Disturbance and Symptoms of Depression among Medical Students

P126

Manjunath H¹, Sushmita Bande²

¹Department of Physiology, Maharajah's Institute of Medical Sciences, Nellimarla Vizianagaram District,

Andhra Pradesh.²Navodaya Medical College, Raichur, Karnataka.

E-mail ID: aaryanmunch@gmail.com

Background: Because of the quick development and widespread use of mobile phones, and their effect on communication and interactions in work and private life, it is important to study possible negative health effects mobile use. Most of the studies have been done by considering the quantitative variables of mobile phone usage like frequency of calls made and frequency of messaging. Rarely qualitative variables of mobile phone usage have been considered. Hence in this study we investigate the association between psychosocial aspects of mobile phone use and mental health among the users.

Objectives: To examine the association between the frequency of the mobile phone use and qualitative aspects of the mobile phone use with reported stress, sleep disturbance and symptoms of depression.

Methods: The study group consisted of medical students 20-22 years old (100 male & 100 female), who responded to a questionnaire. Mobile phone exposure variables included frequency of use, but also more qualitative variables: being awakened at night by the mobile phone, and personal overuse of the mobile phone. Mental health status included current stress, sleep disturbance and symptoms of depression. Chi square test was used to find the association between the variables at 5% level of significance.

Results: There was statistically significant association between high mobile phone use and qualitative aspects of the mobile phone use with sleep disturbances and symptoms of depression in both males and females with p value < 0.05.

Conclusion: High mobile phone use and qualitative variables have association with sleep disturbances and symptoms of depression.

Key-words: Mobile use, Sleep disturbance, Stress, depression

Cost effective technique of removal of platelets for HLA cross matching by density gradient centrifugation

P127

Murali Adiga

Department of Physiology, Kasturba Medical College, MAHE, Manipal.(Email:adigamurali@gmail.com)

Background: Success of Renal transplantation in renal failure patients depends on HLA cross matching between the renal recipient & donor. For this test, RBCs

& platelets are removed and only donor lymphocytes are incubated with recipient's serum and the complement and percentage of dead lymphocytes is documented.

Objective: Removal of platelets for cross matching is a very expensive procedure as commercially available thrombin is very costly, which increases the financial burden of the patients. Therefore we tried to develop a cost effective technique to remove platelets by density gradient centrifugation in patients & donors visiting the Nephrology department of Kasturba Hospital, Manipal.

Methods: After removing plasma and red blood cells, cell suspension in MCT vials is centrifuged @ 1000rpm for 5mins using micro centrifuge. After this, supernatant is discarded & cell pellet is resuspended with buffer and again centrifuged @ 1000rpm for 5mins. This step is repeated 4 or 5 times until the cell suspension is completely cleared off platelets.

Results: A total of 96 HLA cross matching tests was done on renal transplant patients & donors visiting Kasturba Hospital, Manipal after separation with the current procedure. Out of this, only two cases showed 5% platelets even after 5 times centrifugation.

Conclusion: With centrifugation at @ 1000 rpm for 5mins, less denser platelets remained in supernatant & more denser lymphocytes sediment to the bottom. When this is repeated 4 or 5 times, all the platelets are removed. This is a very cost effective technique compared to commercial thrombin used earlier, which has reduced the cost of HLA cross matching.

Key-words: HLA crossmatch, transplantation, microcentrifuge

Study of types of drugs prescribed to different age groups among patients with headache

P128

Shreevatsa Bhat M¹, Muhammad Faris Bin Fauzi², Nur Farhah binti Mohd Asri², Paveetra a/p Rajah² Mohamad Affiq Azzuddin bin Zaidi²

¹Department of Physiology, ²MBBS students, MMMC, MAHE, Manipal, India. ms.bhat@manipal.edu

Background: Headache is one of the common complaints among incapacitating diseases. Types of drugs used in headache includes analgesics, antimigraine agents and prophylactic medications. Many of these drugs sold over-the-counter have started to be used in an abusive manner by patients, representing one of the major causes of headache chronicity.

Objectives: To evaluate the use of drugs in patients with headache in different age groups and to ascertain other associated symptoms.

Methods: In the present retrospective study, the medical records of 131 patients with headache aged 4 to 78 admitted at Neurology department, Kasturba Hospital, Manipal have been reviewed.

Results: 68% of patients were prescribed with various drugs in combination or alone. NSAIDs/non-opioids, antidepressants and antimigraine agents were prescribed to 51%, 24% and 12% of patients respectively. Patients below 18 years were prescribed with non-opioid analgesics other than NSAIDs whereas patients above 18 years were prescribed with NSAIDs, antidepressants and anti-migraine agents. Only 1-5% patients were prescribed with opioids, sedatives and anxiolytics. 72% of patients had symptoms like nausea, vomiting, fever, photophobia, phonophobia, sleep disturbances, giddiness, earache or blurring of vision.

Conclusion: All patients were treated as per international guidelines. NSAIDs, antidepressants and antimigraine agents were found to be more frequently prescribed whereas opioids were less frequently used. Prolonged use of these drugs are known to have side effects on vital organs and some drugs are highly addictive. Therefore, other alternative therapeutic strategies may be useful for the safety and wellbeing of patient with headache.

Key-words: Headache, analgesic, antidepressant, antimigraine

The impact of video games on cognitive abilities among medical students

P129

Sujatha Bhat¹, Ashmitha Thinakaran², Leevyadhashiny Ganasan², Pirativ Rao Jagathesa Rao²
¹Department of Microbiology, ²MBBS Students, Melaka Manipal Medical College, Manipal Campus, Manipal Academy of Higher Education, Manipal, India.

Background: In recent days, video games have become a popular mode of entertainment; especially in children. Proficient video gaming demands fast reflexes, good visual-motor coordination, and fast decision making abilities to cope with its tricky challenges. Large number of studies suggest that video games can influence several cognitive processes, as they have an impact on grey matter in the hippocampus, a structure important for healthy cognition. In the present work, we evaluated the impact of video games on the cognitive abilities of brain.

Objectives: This study aimed at assessing the impact of video games on reflex action, memory, visual, verbal, numerical and abstract reasoning abilities of brain.

Method: Reflex time was recorded using a phone application. A questionnaire designed to test the cognitive abilities with respect to visual, verbal, numerical and abstract reasoning were distributed to self-reported 95 gamers and 100 non-gamers. Following this, the volunteers participated in a memory test for assessing the short term/ active memory. Based on the scores evaluated as percentage, the participants were categorized into three groups: gifted, average performers and poor performers.

Results: Gamers were found to have significantly lower reflex time ($p < 0.05$). 35% of gamers were genius and only 16% of them showed poor performance. Among the non-gamers, only 29% of them were genius and 22.5% of them showed poor performance. Active memory was seen to be significantly better ($p < 0.05$) among the gamers.

Conclusion: This study shows that video gaming has beneficial role on the cognitive functions of the brain.

Key-words: Video games, cognitive abilities, reflex

Wound Healing in Diabetes: An Approach using Traditional Medicines

P130

Sushma R Kotian¹, K Sreedhara R Pai², Jayakrishna Nayak³, Karthik Gourishetti², Kumar MR Bhat⁴

¹Dept. of Anatomy, Kasturba Medical College Manipal, MAHE, ²Dept. of Pharmacology, Manipal College of Pharmaceutical Sciences, MAHE, Manipal, ³Sri Dharmasthala Manjunatheshwara Ayurvedic College, Udyavara, Udupi, India. ⁴Dept. of Anatomy, RAK College of Medical Sciences, RAK Medical & Health Sciences University, Ras Al Khaimah, UAE
e-mail id of the presenting author: sushma.rk@manipal.edu

Background: Wound management is complicated especially when the wound is of a non-healing type, i.e., diabetic wounds. Diabetic wounds, unlike typical wounds, heal slowly resulting in treatment with conventional topical medicines a painstaking process. The regulators of wound healing become dysfunctional in diabetes resulting in delayed refurbishment. Traditional medicinal systems like Ayurveda and Indian folk medicine have used Honey, Ghee, *Glycyrrhiza glabra*, & *Nerium indicum* effectively for treating such wounds. However, the mechanism of actions at the tissue level, the biochemical and molecular mechanisms of healing is not well explored and documented.

Objectives: The present study was therefore designed to study the efficacy of these traditional medicines singly and in combinations on excision wounds in diabetic Wistar rats.

Methods: At two different intervals (i.e., day 8 & 16), biomechanical, histological, immunohistochemical (IHC), biochemical and molecular parameters were assessed at the wound site. IHC focused on the inflammatory rate by evaluating the level of cytokine, IL1, and the tissue remodeling by studying the activity of myofibroblasts. Biochemically the hydroxyproline and antioxidant levels were measured. Further, the expression of the growth factors such as TGF, FGF2, PDGF, and VEGF was also measured.

Results: Rapid epithelization, better remodeling, favorable inflammatory changes, adequate myofibroblast activity, better expression of antioxidants and growth factors at the wound site was observed in all the treated groups compared to control.

Conclusion: The present study is therefore useful in exploring the mechanism of action of these traditional medicines in healing diabetic wounds and providing valuable scientific evidence.

Key-words: Wound Healing, Honey, Ghee, *Glycyrrhiza glabra*, *Nerium indicum*

Prescribing Pattern of Ophthalmological Medication in Geriatric Inpatients of a Tertiary Care Hospital

P131

Sudhindra Prathap.A, Radhika MS

Dept of Pharmacology, SDM college of medical sciences & hospital, Dharwad
Email id: sudhivijaya@yahoo.co.in

Background: Older people are potentially at greater risk of medication error. Gaining insight into the prescribing pattern especially in eye diseases as they are a common problem in elderly, in order to identify prescribing related problems is the fundamental step in improving the quality of prescription and patient care.

Objective: To assess drug prescription pattern in geriatric inpatients of department of ophthalmology of a tertiary care hospital.

Methods: Case records fulfilling inclusion criteria were collected from hospital Medical record department (MRD) and analyzed using the World Health Organization (WHO) core prescribing indicators for rationality and pattern of prescribing.

Results: Among 811 case records analysed, 52.7% (428) were of male patients. Those aged 60–70 years were 77.2% (626), patients with only cataract constituted 77% (625). Prescriptions with oral antibiotics were 57.1% (334); topical antibiotics were 35.8% (429) and topical analgesics 46.2% (553). Out of 1182 FDCs noted, 479 (59 %) were found to be

rational and 34.6% (281) were from Essential Medicines List 2014. Only 61 (2%) drugs were prescribed using generic name while 60.9% of drugs were from the WHO Model List of Essential Medicines (April 2015). Average number of drugs per encounter was 3.7. Percentage of encounters with antibiotics and injections were 43.8 % and 0 % respectively.

Conclusion: Although usage of antibiotics and topical drugs was conforming the WHO recommended standards, there is a need to improve prescription pattern by generic name and drugs from Essential Drug List.

Key-words: Geriatric, Ophthalmological medication, Eye diseases

Prescription pattern in patients with rheumatoid arthritis attending rheumatology opd of govt.medical college Kozhikode

P132

Anuradha M, .Neeraj Manikath Sruthi N

Department of Pharmacology, Govt. Medical College Kozhikode.

Email id : sslrsruthi@gmail.com

Background: Rheumatoid arthritis is a very debilitating disease, affecting 0.5-1% of the population globally. We have many efficacious agents available for treating Rheumatoid arthritis and certain standard recommendations put forward by ACR/EULAR. More than symptomatic management disease modification has become the basis of all treatment strategies. So conducting a study on prescription pattern will help to improve and revise the present strategies.

Objectives: The aim of this study is to analyze the prescription pattern in rheumatoid arthritis patients visiting rheumatology OPD of Govt. Medical College Kozhikode.

Methods: This observational study was conducted in the rheumatology OPD for one month (August 2018). Prescriptions were collected from all the patients with rheumatoid arthritis excluding fresh cases (treatment duration less than 3 months) and analysed using ACR/EULAR recommendations.

Results: A total of 70 prescriptions were collected. Among the 70 patients 71.4% were RA factor positive. Methotrexate was prescribed as first line drug for 61.4% of the patients, hydroxychloroquine were prescribed for 32.9%, leflunomide for 1.4% and sulfasalazine for 4.3%. Hydroxychloroquine was the common second line drug prescribed (37%) and sulfasalazine was the third line DMARD of choice (7.1%). Novel biological agent rituximab was prescribed for 1.4%. Short term steroids and NSAIDs were prescribed for all patients according to standard

recommendations. Among the 70 prescriptions collected 61.4% of prescriptions were in line with standard recommendations.

Conclusion: Most of the prescriptions were according to ACR/EULAR standard recommendations; hydroxychloroquine was also prescribed as first line drug instead of methotrexate. Use of novel drugs were comparatively less. So considering population characteristics and compliance present treatment strategies can be revised.

Key-words: Prescription pattern, rheumatoid arthritis, ACR/EULAR recommendations, DMARDs

GCMS analysis and hepatoprotective activity of *Mussaendaerythrophylla* in ethanol intoxicated rats

P133

Rojin T.S, Rajendra Holla

Dept of pharmacology, KSHEMA.

Email id- tsrojin@gmail.com

Background: Medicinal plants are potent natural source of medicinal products in traditional medicine and are the chemical entities for the development of drugs. In the present days, people are attracted more towards herbal medicines and their consumption. Considering all these, the present study was undertaken to investigate hepatoprotective effect of *Mussaendaerythrophylla*.

Objectives: To evaluate the protective effect of *Mussaendaerythrophylla* on alcohol induced hepatotoxicity and to study the phytochemical composition by Gas Chromatography-Mass Spectrometry (GC-MS)

Methods: The rats were administered with ethanolic extract of ME (200mg/kg b.wt) prior to alcohol (50% of 2g/kg b.wt) for 21 days. Biochemical parameters such as serum total bilirubin, AST & ALT, total antioxidant, SOD & GPx were performed. Also GC-MS of *M.erythrophylla* were carried out.

Results: Alcohol treated group had elevated levels of total bilirubin, AST, ALT, and decreased levels of total antioxidants, SOD and GPx when compared with control group. After treatment with 200mg/kg ME extract, significantly restored the altered levels of biochemical parameters towards normal. 21 constituents were eluted by GC-MS of ME leaf extract. Phenol, 2,4-bis(1,1-dimethylethyl) (25.55%), n-Hexadecenoic acid (9.54%) and Phytol (5.57%) were major compounds.

Conclusion: From the results, can be concluded that ethanolic extract of ME possesses significant hepatoprotective activity

Key-words: hepatotoxicity, alcohol, ethanolic extract

In vitro assessment of sesamol to elucidate its mechanism of healing in wounds

P134

Karthik Gourishetti, Nandakumar K, Rekha R Shenoy
Department of Pharmacology, Manipal College of Pharmaceutical Sciences, MAHE
Email: rekhaarunt@gmail.com

Background: Wound healing is an interactive process that involves a series of phases aiding in recovery of the wounded region. These phases of wound healing are namely coagulation, inflammation, tissue formation and tissue remodeling.

Sesamol: It is a potent phenolic (lignan) antioxidant which is a component of sesame oil. Sesamol has been reported previously to exhibit radio-protective, anti-mutagenic, gastro-protective, neuro-protective, anti-diabetic and wound healing activities. However the mechanism is still unclear.

Objectives: Effect of Sesamol on

1. Cell proliferation
2. Expression of growth factors (PDGF, VEGF & TGF- β)
3. Expression of (MAPK P38, Akt) in Normal Human Epidermal Keratinocytes

Methodology: Cell Proliferation assay (MTT): MTT assay was carried out to determine in vitro cytotoxicity of the polyphenols in keratinocytes. From MTT assay the safe dose values of the compounds were determined for further assays.

Scratch Wound assay: Scratch wound assay was carried out to determine the effect of polyphenols on wound closure (Dose 50 μ M of each Polyphenol)

Expression studies: To determine the effect of polyphenols PDGF-BB, VEGF-B, TGF- β , MAPK38 and AKT expression was determined by Western blotting (Dose levels 25 and 50 μ M)

Results: Cell viability assay: The IC₅₀ assay of sesamol was found to be more than 500 μ M, in scratch wound assay more than 80% wound closure was observed within 24 hours when compared to the control and sesamol treatment statistically increased the expression of TGF- β and PDGFBB and Phosphorylation of Akt when compared to the normal control

Conclusion:

- With 24-hour treatment, sesamol was able to increase the expression of TGF- β and PDGFBB while having a minimal effect on VEGF.
- It was observed that sesamol increased the phosphorylation of Akt which is important mediator involved in migration which is required in the early phase of wound healing.

Key-words: Wound healing, sesamol

Nephroprotective activity of *Betulinic acid* in gentamicin induced murine model of Renotoxicity

P135

Nadira Nosuhida, Preethi J Shenoy, Rashmi R Rao, S Teerthanath¹, Sudhishma

Department of Pharmacology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, ¹Department of Pathology, K S Hegde Medical Academy, Nitte University, Mangalore
email id: rashmi.rao@manipal.edu

Background: Antioxidant rich herbs possess significant activity against various disease conditions induced by oxidative stress. Betulinic acid, a naturally occurring triterpenoid, is currently a molecule of great research interest with significant pharmacological activities including antioxidant action.

Objective: To evaluate the nephroprotective effect of betulinic acid in a murine model of gentamicin induced renal damage.

Methods: Nephrotoxicity was induced with gentamicin 80mg/kg, intraperitoneally for 8 days and the test drug, betulinic acid was administered at doses, 0.5, 1.5 and 3 mg/kg, intraperitoneal for 8 days, the test being administered 3 days prior and concurrently with gentamicin for 5 days in wistar albino rats. Biochemical parameters studied included serum urea, creatinine, uric acid and blood urea nitrogen and also corroborated with histopathological examination of the kidney.

Results: The disease control group treated with gentamicin showed marked renotoxicity as evidenced by raised serum urea, uric acid, creatinine and blood urea nitrogen (107.5 \pm 16.92 mg/dl, 0.88 \pm 0.09 mg/dl, 3.05 \pm 0.29 mg/dl and 47.80 \pm 9.07 mg/dl respectively) when compared to the saline treated groups. Betulinic acid showed protective effects at doses 0.5, 1.5, 3 mg/kg when given with gentamicin by significantly ($p < 0.05$) reducing the biochemical parameters. Histopathological study revealed dilated tubules, denuded epithelium and extensive tubular necrosis in the disease control, whereas betulinic acid in higher doses mitigated gentamicin induced renal damage and showed evidence of renal tubular regeneration.

Conclusion: To conclude, the results of the present study indicates that betulinic acid has significant nephroprotective effect in animal models of gentamicin induced renal damage.

Key-words: Antioxidant, Betulinic acid, Gentamicin, Murine model, Nephroprotective

A self-medicating scale (SMS) and questionnaire based drug use survey among healthcare professional students

P136

Radhika M.S, Mayur S.S¹, Priyadarshini Kop

Dept. of Pharmacology, SDM College of Medical Sciences and hospital, Dharwad, ¹Dept. of Community Medicine, SDM College of Medical Sciences and hospital, Dharwad

Email id: drradhika78@gmail.com

Background: Studies report the health professional students to be a vulnerable community for self-medicating practices. However, paucity of studies suggesting remedial measures to help this susceptible group prompted this study.

Objectives: To determine the pattern, attitudes, factors modulating and frequency of self-medication prior to and after interventional awareness workshops, among medical, dental and nursing students of SDMCMS & H, Dharwad.

Methods: A prospective interventional study was conducted to quiz the second year medical, dental and nursing students of SDMCMS & H using a questionnaire and modified SMS tool to inquire about self-medicating pattern, attitudes towards self-care before and after the educational workshop consisting of interactive lecture, role plays and onsite hospital visits. Results analysed using Graph pad Prism software.

Results: Of 393 participants of medical, dental and nursing students, 70% were females. 93.89% reported practicing self-medication, which reduced to 78.63% after the interventional workshops. Average number of medications consumed was 3.86 ± 0.27 , 3.94 ± 0.39 and 4.03 ± 0.30 in medical, dental and nursing students respectively. NSAIDs were most commonly used. The modified SMS tool pointed out the immediate practice of self-medicating soon after falling sick without physician consultation. All the modified SMS scores were significantly reduced ($p < 0.05$) after interventional workshops. Only 60.20% of students knew about OTC drugs, ADRs, expiry date, package inserts etc. which was found to be increased after the workshop to 76.42%.

Conclusion: Self-medication practices are highly prevalent among professional healthcare students. Educational workshops conducted regularly highlighting the risks and benefits of such practices significantly reduce them.

Key-words: Self-medication, Health professional students, self-medicating tool

Poultry Antibiotics- An emerging multidrug resistant superbug threat in Delhi

P137

Premkumar C, Das U, Moksha L, Halder N, Velpandian T

Ocular Pharmacology & Pharmacy, All India Institute of Medical Sciences, New Delhi, India.

Email: ckumarprem@gmail.com

Background: Usage of antibiotics in poultry industry as growth promoter and productivity enhancer especially in developing countries like India, a major contributor to the emergence of multidrug resistant superbug.

Objective: To determine the level of antibiotics present in chicken samples in Delhi.

Methods: Chicken samples were collected from eight different major locations around Delhi and were analysed for traces of nine selected fluoroquinolones (ciprofloxacin, ofloxacin, norfloxacin, lomefloxacin, enrofloxacin, sparfloxacin, moxifloxacin, gatifloxacin, gemifloxacin). Antibiotics were extracted from the tissue samples and were analysed using Liquid chromatography coupled Tandem Mass Spectrometry (LC-MS/MS).

Results: In this preliminary study, the amount of antibiotics present in samples varies from $.025-177.22 \mu\text{g}/\text{kg}$. Interestingly, high levels of ciprofloxacin, enrofloxacin, gemifloxacin, and gatifloxacin have been detected in all the eight selected locations. Further, enrofloxacin level was found to be alarmingly high ($177.2 \mu\text{g}/\text{kg}$) from location 3. Surprisingly, sample from location 8 was found to have higher levels of all the antibiotics ranging from 1.46 to $45.1 \mu\text{g}/\text{kg}$.

Conclusion: This study suggests that the rampant usage of antibiotics in poultry is causing excessive accumulation of drug in the animals, leading to antibiotic resistance among the organisms. This may potentially lead to emergence of multidrug resistant superbug threat to mankind.

Key-words: Poultry, antibiotics, resistance, fluoroquinolones, Delhi

Evaluation of Efficacy And Safety of Two Antiretroviral Regimens in HIV Patients

P138

Nandith PB¹, Usha Adiga², Sachidananda Adiga³, Malawadi BN⁴

¹Central Research Lab, KS Hegde Medical Academy, Nitte - Deemed to be University, ²Dept of Biochemistry, KS Hegde Medical Academy, Nitte - Deemed to be University, ³Department of Pharmacology, KS Hegde Medical Academy, Nitte -

Deemed to be University, ⁴ Dept of Biochemistry, Karwar Institute Of Medical Sciences, Karwar
Email: nandithpb@gmail.com

Background: CD4 count is an important marker to assess the effectiveness, mortality and survival rates in HIV patients. Drug Induced Liver Injury(DILI) in HIV patients receiving anti-retroviral therapy(ART) is one of the common adverse effect. The objective of the study is to assess the efficacy of Tenofovir (TDF) versus Zidovudine (AZT), in combination with Lamivudine (3TC) and Efavirenz (EFV) taking basal and after treatment CD4 count levels as tools and to compare transaminase levels of HIV patients in the above two ART regimens.

Methods: In this retrospective study, 24 HIV patients receiving AZT+3TC+EFV (ZLE) (group-I) and 16 patients receiving TDF+3TC+EFV (TLE) (group-II) were included from ART centre of District Hospital Karwar after obtaining permission from IEC and MRD. Serially monitored CD4 count and AST values at basal, 6months, 1year and 2years were recorded. Statistical analysis was done using GraphpadInstat version 3.

Results: A significant increment ($p=0.031$) in CD4 count was observed in group-I after treatment. Improvement in CD4 count was also significant in group-II ($p=0.037$). The extent of improvement was significantly higher ($p<0.05$) in group-I as compared to group-II. AST levels were significantly raised at 6 months ($p=0.0432$) and 1 year ($p=0.0112$) in patients on TLE regimen as compared to those on ZLE.

Conclusions:We conclude that ZLE regimen was superior to TLE in terms of improvement in CD4 count. Drug induced elevation of liver enzymes in the TLE regimen also suggests that ZLE may be a superior regimen.

Key-words: efficacy, antiretroviral, safety, HIV

Prescription pattern of cannabis use and comorbidities: a retrospective study in a tertiary care hospital

P139

Manasa H T, Mangala Rao

Department of Pharmacology, St. John's National Academy of Health Sciences, Bengaluru, Karnataka
Email id: manasaacharya14@gmail.com

Background: Cannabis is the most commonly used illicit drug worldwide.

Objectives: To determine the pattern of pharmacotherapy and assess the concomitant psychiatric illness of cannabis use

Methods: A qualitative test to detect cannabis in the urine is conducted at our institution. A list of all the patients who tested positive for cannabis between Jan 2016-Aug 2018 was prepared. Data regarding pharmacotherapy and co-morbidities of these patients were collected from case record retrospectively.

Results: Of the 109 patients, 100 were males. Mean age was 25.9 ± 7.9 years. Consumption was in the form of smoking, average number of 1-8 joints/day. 8.3% of patients had family history of substance use. Mean age of initiation and duration of cannabis use was 21.01 ± 6.39 years and 5.275 ± 5.03 years respectively. Tobacco was the most common substance (62.3%) used along with cannabis, followed by alcohol (57.8%). Most common concomitant psychiatric illnesses were mental and behavioural disorders (67%), schizophrenia (19.3%) followed by bipolar affective disorder (12.8%) and antisocial personality (5.5%). Overall 59 received atypical antipsychotics, of which risperidone (45.8%) was commonly prescribed followed by olanzapine (38.9%). Among benzodiazepines, lorazepam was prescribed in 66.1% of patients. Haloperidol (24.8%) was prescribed only when patient was agitated. Sodium valproate (7.3%) and levetiracetam (2.7%) were used as mood stabilizers.

Conclusion: The use of cannabis starts at a young age and is associated with psychiatric illness. Effective treatment of chronic mental disorders particularly among heavy users may help reduce cannabis abuse. Educating the youth about hazards of cannabis use is the need of the hour.

Key-words: substance abuse, marijuana, pharmacotherapy, cannabis use

A comparative study of safety of intravenous paracetamol versus diclofenac as postoperative analgesia in laparoscopic cholecystectomy

P140

Pallvi¹, Jarnail Singh¹, Rajesh Godara²

¹Department of Pharmacology, ²Department of Surgery, Pt. BD Sharma PGIMS Rohtak-124001 (Haryana)

Email-ID: drjarnail@gmail.com

Objective: To compare the safety of intravenous paracetamol versus diclofenac as postoperative analgesia in laparoscopic cholecystectomy.

Materials and methods: This was a prospective, randomized, single blind and comparative clinical

study conducted in the department of Pharmacology and Surgery at PT. BD Sharma PGIMS, Rohtak on 80 patients of either sex, scheduled for elective laparoscopic cholecystectomy. A total of 107 patients was screened as per inclusion and exclusion criteria of the study, and were randomly divided into two groups; Group A and Group B (40 patients in each group completed the study). Group A received I.V. Diclofenac (75 mg in 100 normal saline over 15-20 minutes) at the end of surgery and at 12 hours interval after shifting the case to the ward. Group B received I.V. Paracetamol (1 g in 100 ml infusion) at the end of surgery and at 8 hour intervals after shifting the patient to the ward. In both the groups primary end point was analgesic efficacy at 6, 12, 18 & 24 hours using the Visual Analog Scale (VAS) and Visual Rating Scale (VRS). Safety was assessed in the two groups in an adverse drug reactions (ADR) monitoring chart based upon the known ADRs to the study drugs and a provision for recording new ADRs.

Results: In this study nausea or nausea and vomiting were reported, in the postoperative period in Group A (6 patients, 15%) and Group B (5 patients, 12.5%), and there is no significant difference. No other ADRs were reported in the two groups.

Conclusions: Postoperative nausea and vomiting, by analgesic diclofenac (I.V.) was slightly more common than by paracetamol (I.V.) in laparoscopic cholecystectomy patients; with no other ADRs in the study.

Key-words: paracetamol, diclofenac, laparoscopic cholecystectomy

The economic need of modern medicine - An overview of Drug Repurposing role, barriers and approaches

P141

Dey Gargi, R Jyothi

Department of Pharmacology, Kempegowda Institute of Medical Sciences, RGUHS Karnataka
email- gargidey16@gmail.com

Background: Drug repurposing offers faster, affordable and accessible treatments. Despite its beneficial role, there are some bottlenecks hindering its growth. The current study reviews the barriers and approaches to promote it.

Objective: To signify the critical role, barriers and steps to overcome the barriers of drug repurposing.

Methods: A literature search for articles in last 1 year

with keyword drug repurposing was carried out in the PubMed. Publications were selected if they were in English and open access.

Results: Repurposing reduces the cost and duration of clinical trials. Barriers are 1) Financial - Patent protection, small target population for rare diseases, low economic returns. 2) lack of awareness. 3) Legal and ethical- lack of legal expertise among clinicians, imbalance between confidentiality and disclosure issues. 4) Avidity for de-novo research- new research brings more accolades than reviving the old. The steps to overcome barriers are 1) Collaboration between government, private and non-profit sectors 2) Favorable legislation. 3) Motivating drug makers. 4) Public awareness and activities. 5) Multiple target tests for single drug

Conclusion: Drug repurposing is the economic need of the hour for rare, neglected and malignant diseases. It needs to be developed and expanded.

Key-words: Drug repurposing, rare diseases, Intellectual Property Laws

Effect of *Momordica charantia* and *Trigonella foenum-graecum* Supplements in Type-2 Diabetics taking Allopathic drug

P142

Rauniar GP, Sinha R, Maskey R, Panday DR

Department of Clinical Pharmacology and Therapeutics, Department of Pharmacology, BP Koirala Institute of Health Sciences, Ghopa, Dharan, Nepal
E-mail: gprauniar2004@yahoo.com

Background: Bitter gourd fruit and Fenugreek seeds are well known with blood sugar and lipid-lowering properties. Lack of abundant previous works on supplementary effect of Bitter gourd and Fenugreek in Type-2 diabetics taking allopathic drugs.

Objective: To see the effects of Bitter gourd and Fenugreek supplements in Type-2 diabetics taking allopathic drugs on blood sugar and lipid profile.

Methods: Open-label, 4-parallel-group, prospective interventional clinical trial was conducted on 48 Type-2 diabetics. They were divided into four groups of 12 each. Group I received allopathic drugs alone, Group II, III and IV received supplementation of Bitter gourd juice, Fenugreek seeds and Bitter gourd juice + Fenugreek seeds together respectively. Fasting Blood Sugar (FBS), Postprandial Blood Sugar (PPBS) and Fasting Lipid Profile were measured on day 0, day 7, day 15, day 30 and on day 90. Statistical analysis was done with IBM SPSS 19. P-value set at 0.05 level of significance, one-way ANOVA followed by post-hoc multiple comparison by Tukey was applied.

Results: Forty-two participants completed the study with no adverse events. Supplementation with Bittergourd juice + Fenugreek on day 90 significantly decreased FBS by 19% (p-value=0.021) and PPBS by 35% (p-value=0.001). Supplementation with Fenugreek and Bittergourd juice + Fenugreek both on day 90 significantly (p-value=0.000) decreased Serum cholesterol by 16% and 14%, Serum Triglyceride by 16% and 21% and LDL-cholesterol by 18% and 17% respectively. However, only Fenugreek supplementation significantly (p-value=0.015) increased HDL-cholesterol by 10%.

Conclusion: Bittergourd juice and Fenugreek seeds can decrease FBS, PPBS, Serum cholesterol, Triglyceride and LDL-cholesterol. However, only Fenugreek seeds were capable of increasing serum HDL-cholesterol.

Key-words: Bittergourd, Fenugreek, Antidiabetic, Hypolipidemic

Prescribing pattern of fixed drug combinations (fDCs) in the department of medicine of a tertiary care centre

P143

Ancy George, Anuradha, Thulasidharan

Department of Pharmacology, Government Medical College, Kozhikode

Department of Medicine, Government Medical College, Kozhikode

Email id: ancygeorge1991@gmail.com

Background: Drugs are combined in a fixed ratio into single dosage form called Fixed Drug Combination (FDC). The advantages -potentiating therapeutic efficacy, reducing adverse events and pill burden. Out of 414 medicines included in the 19th list of WHO List of Essential Medicines, 27 are FDCs.

Objective: To study the prescribing pattern of FDCs in Department of Medicine in Government Medical College, Kozhikode.

Methods: This prospective observational study was conducted among patients in Department of Medicine, Government Medical College, Kozhikode for 4 weeks. Prescriptions were collected and recorded after getting informed consent. The pattern of use and the conditions for which they are prescribed were assessed.

Results: The prescriptions of 374 patients analysed, 284(76%) were op-patients and 90(24%) were Ip-patients. 263 (70.3%) patients were prescribed FDCs which was more for Op-patients (72.5%) than for Ip-patients (63.3%). FDCs were given almost equal for males (51.7%) and females (48.2%) and were

prescribed more for below 60yrs age (57.4%). The most common FDC prescribed Aspirin+ Clopidogrel (21.6%) for both op and Ip-patients, followed by Etophylline + Theophylline (14.8%) and Aspirin+ Atorvastatin (13.3%) and the conditions were cardiovascular diseases followed by obstructive lung disorders. Among antibiotics, Amoxicillin + Clavulanate was prescribed most (5.3%) and among the injectable, Cefaperazone + Sulbactam (8.7%) in Ip-patients stood first. The other FDCs were multivitamins (14.8%) and Pantoprezole + Domperidone (10.6%). An average of 1.4 FDC was prescribed per patient.

Conclusion: FDCs prescriptions are on the rise among op-patients and used more for cardiovascular diseases. Their use reduces the pill burden and increased the adherence of drug for the patient.

Key-words: Fixed drug combinations, essential medicines

Clindamycin with tretinoin versus clindamycin with nicotinamide in acne vulgaris: a comparative study

P144

A T Priyanka, KR Mamatha, T N Revathi¹

Department of Pharmacology, Bangalore Medical College & Research Institute, Bengaluru-560002

¹Department of Dermatology, Bangalore Medical College & Research Institute, Bengaluru-560002

Email id: prinkyanil@gmail.com

Background: Acne is characterized by non-inflammatory follicular papules or comedones and by inflammatory papules, pustules, and nodules in its more severe forms and is estimated to affect 9.4% of the global population. Topical combination therapy is the first-line approach for facial acne.

Objectives: To compare the efficacy and safety of topical clindamycin 1% with tretinoin 0.025% and clindamycin 1% with nicotinamide 4% in mild to moderate acne vulgaris

Methods: This is a comparative study conducted at BMCRI including 70 subjects who were randomized (1:1) into two groups. Group A received clindamycin with tretinoin and Group B received clindamycin with nicotinamide. Efficacy was assessed by mean change in Acne Severity Index (ASI) from baseline and at 4, 8 and 12 weeks. Safety was assessed by adverse events reported.

Results: This is an interim analysis of an ongoing study consisting of 30 patients. Both treatment groups showed statistically significant improvement. Baseline ASI of Group A was 82.2 ± 7.46 and of Group B was

81.5±7.22, which were comparable. At end of 12 weeks, ASI of Group A and Group B was reduced to 29.6±3.58 and 24.4±3.22 respectively. Group B produced statistically significant reduction in ASI than Group A (p=0.028). Both treatments were well tolerated and few reported Mild scaling of skin (30%) in group A and Mild itching (20%) in group B.

Conclusion: Both the combination therapies are effective in mild to moderate acne vulgaris however clindamycin with nicotinamide showed favourable efficacy.

Key-words: Acne vulgaris, clindamycin, nicotinamide, tretinoin

Effect of Losartan On Rosuvastatin Induced Myopathy In Rats

P145

Smita Shenoy¹, Sahil Sahay¹, Arshad Basha Shaik¹, Anuhya TV¹, Praveen SE¹, Deepak Nayak²

¹Department of Pharmacology, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, ²Department of Pathology, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal
Email: smita.shenoy@manipal.edu

Background: Statins are known to produce myopathy by various mechanism. An increase in muscle atrophy gene expression and changes in mitochondrial content and/or function have been proposed to play a role. Studies have shown that losartan, an angiotensin receptor blocker (ARB) protects against atrophy in skeletal muscle. Also, losartan has been shown to exert protective effect on mitochondria in tissues. It has been found to protect against carbon tetrachloride induced skeletal muscle injury.

Objective: The study was carried out to evaluate the effect of losartan on statin induced myopathy in Sprague dawley rats.

Methods: A total of 16 adult, male Sprague Dawley rats were divided into 4 groups, each having 6 rats. Group I received 2% gum acacia (10 mL/kg of body weight of rat). Groups II – IV received rosuvastatin 150 mg/kg. Groups III and IV received losartan 10 and 20 mg/kg respectively. All drugs were given orally daily for 10 days. Blood sample collected on 10th day was used for creatine kinase estimation. Histopathology of soleus was done.

Results: Combination therapy of losartan with rosuvastatin significantly lowered the serum CK levels as compared to rosuvastatin alone treated group. Rosuvastatin treated group showed loss of nuclei, inflammation, homogenization, and eosinophilic

infiltration of soleus muscle which was ameliorated by coadministration of losartan.

Conclusion: Losartan reversed rosuvastatin induced biochemical and structural myotoxicity. This could be an added advantage for its use in cardiovascular diseases in patients who are also on statins.

Key-words: creatine kinase, soleus, myotoxicity

Effect of vitamin D analogue on rosuvastatin induced myopathy in rats

P146

Bharti C Magazine, Balaji O, Sreen RT

Department of Pharmacology, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Karnataka, India
Email id :bharti.magazine@manipal.edu

Background: Myopathy is one of the common side effects seen in patients on statins. A number of studies have linked Vitamin D insufficiency to statin myopathy.

Objectives: The present study aimed at evaluating the effect of vitamin D3 analogue alfacalcidol on rosuvastatin induced myopathy in rats.

Methodology: Animals were divided into four groups with each group having 6 rats. Group I was administered 0.5% hydroxypropyl methylcellulose (control 1), group II was administered 0.5% polyoxyl 40 hydrogenated castor oil (control 2), group III Rosuvastatin 120mg/kg/day dissolved in 0.5% hydroxypropyl methylcellulose, group IV Alfacalcidol 0.1g/kg/day dissolved in polyoxyl 40 hydrogenated castor oil + Rosuvastatin 120mg/kg/day dissolved in 0.5% hydroxypropyl methylcellulose. All the drugs were administered orally daily for 15 days. Blood was withdrawn on day 10 and 15 for plasma chemistry. Blood sample were collected to evaluate plasma creatinine kinase activity using spectrophotometer.

Results: On day 10, Group IV (Statin 120mg/kg + Vitamin D3) showed a significantly increased levels of serum creatinine kinase as compared to control groups and a significantly decreased (p<0.001) plasma CK levels compared to group III (statin 120mg/kg). However on day 15, group IV showed significantly decreased (p<0.001) plasma CK levels compared to statin 120mg/kg group but the CK levels in group IV were not significantly different in comparison to control group (p>0.05)

Conclusion: The present study shows that vitamin D analogue alfacalcidol prevents statin induced myopathy. The serum creatinine kinase levels were

comparable to control group after 15 days of administration of Vitamin D3

Key-words: Rosuvastatin, myopathy, creatine kinase, alfacalcidol

Detection of M protein gene, a virulence factor in *Streptococcus anginosus*

P147

Kusumakshi Nayak¹, Shobha K. L², Vishnu Prasad³

¹Department of Medical Laboratory Technology, SOAHS, MAHE, Manipal, ²Department of Microbiology, MMMC, MAHE, Manipal, ³Department of Microbiology, KMC, MAHE, Manipal

Email: ks.nayak@manipal.edu

Background: Molecular mimicry and autoimmunity probably play a crucial role in the pathogenesis of Acute rheumatic fever (ARF) and carditis. M protein in streptococci shares structural similarities with cardiac proteins such as myosin and the antibodies produced in patient cross-react with both M protein and heart tissue leading to ARF and its sequel, rheumatic heart disease (RHD) that causes significant morbidity and mortality in developing countries. The incidence of ARF peaks between 5-15 years of age and high burden of RHD is seen in Asia. *Streptococcus anginosus* being the most common beta hemolytic group C streptococcus isolated from the human throat. The detection of M protein genes in *Streptococcus anginosus* essential part of epidemiology which could aid in developing preventive measures.

Objective: To detect M protein genes in *Streptococcus anginosus* colonized in throat among healthy school going children.

Method: Throat swabs were collected after taking consent from the children. The organism was isolated in sheep blood agar and identified as *Streptococcus anginosus* by automated system Vitek 2 compact. DNA was extracted and M genes were amplified by PCR technique using Bioserve Biotechnologies (India) Pvt Ltd., Hyderabad.

Results: Out of 3416 throat samples six samples were isolated as *S. anginosus*. All the six isolates had M genes.

Conclusion: The present study showed all the six strains of *S. anginosus* had M genes which could predispose to Rheumatic heart disease. Further study regarding M genes are required for knocking the virulence factors by developing suitable vaccines.

Key-word: *Streptococcus anginosus*, M protein gene, Acute rheumatic fever

Evaluation of antiarthritic activity of coriander seed essential oil in wistar albino rats

P148

Swathi Acharya, Deepa B, Rajendra Holla

Department of pharmacology, KSHEMA

Email id: acharyaswathi4@gmail.com

Background: Arthritis is the diseases affecting all age groups with the worldwide prevalence of 3% and 20% in India. Drugs used for the management of arthritis have various adverse effects. Due to their low side effects, low costing, and ready availability the interest in producing herbal formulations for medicinal purposes is developed. *Coriandrum sativum* is a medicinal herb possessing many activities with anti-inflammatory action being one among them.

Objectives: To evaluate antiarthritic effect of coriander seed essential oil using Complete Freund's adjuvant (CFA) induced arthritic model in wistar albino rats.

Methods: 24 rats were divided into 4 groups and the Experimental arthritis was induced by injecting 0.1 ml of CFA into the subplantar area of the left hind paw. Vehicle and drugs (indomethacin & CSEO) were given for 20 days to animals of all the group, the Joint diameter and paw volume was measured at day 0, 3, 7, 14 & 21 days and IL 6, TNF levels were measured baseline & day 21 by ELISA kit.

Results: Significant decrease in joint diameter and paw volume was seen within both the groups, but there was no statistical significance in joint diameter reduction among the groups whereas paw volume was significantly reduced in CSEO group on day 7 compared to Indomethacin group. The TNF levels were statistically reduced by CSEO group compared to Indomethacin group.

Conclusion: CSEO has antiarthritic effect due to its anti-inflammatory property which needs to be evaluated further with different doses and histopathological correlation.

Key-words: Antiarthritic, *Coriander Sativum*, CFA

Treatment adherence in people living with HIV/AIDS on antiretroviral therapy at ART Plus centre, Udupi district

P151

Jessica Sushma D'Souza¹, Shobha K. L¹ Ramchandra Kamath²

¹Department of Microbiology, MMMC, MAHE, Manipal, ²Department of Community Medicine, Institute of Medical Sciences, Kodagu
email: jessica.dsouza@manipal.edu

Background: HIV prevalence among adults in India is estimated to be 0.26 %. Although antiretroviral treatment (ART) has reduced morbidity and mortality of HIV/AIDS, non-adherence may result in treatment failure. Adherence to ART is essential for improved virological and clinical outcome.

Objective: To determine the proportion of AIDS patients that adheres to ART & factors that hinder adherence to ART among patients in Udupi district

Methods: The study population (n= 347) included adult HIV/AIDS patients at ART plus center in Udupi district hospital. Questionnaire administered in the form of interview comprised of treatment aspects including ART regimen, duration of ART, Two- day self-report recall, 30 day recall, Dose adherence test, reasons for non-adherence and adverse drug reactions.

Results: In this study (n=347), majority of the respondents were women (59.4%), with low socioeconomic background from rural areas (98%), between 30-50 years (75%) mean age of 43.3(8.07 S.D) and low level of education (primary schooling 46.7%). Majority of the cases were on first line treatment of Zidovudine+Lamivudine+ Nevirapine (50.7%). 6.6% of the patients were on second line treatment of Tenofovir + Lamivudine + Ritonavir /Aztanavir. 41.9% of these patients were found to be non-adherent to ART doses. Reasons for non-adherence included forgetting to take medicines on time (46.5%), social stigma (14.1 %) and irregular work timings (15.5%)

Conclusion: Most factors affecting adherence to ART relate to several issues, which can be addressed by education and counselling.

Key-words: non-adherence, recall, regimen, social stigma

Effect of high frequency yoga breathing and breath awareness on performance in the trail making test

P153

Ram Kumar Gupta, Kumar gandharva, Shirley Telles, Acharya Balkrishna

Patanjali Research Foundation, Patanjali Yogpeeth, Haridwar, India

Background: Previously high frequency yoga breathing (HFYB) and breath awareness (BAW) have been found to increase attention. A combination of yoga breathing practices improved the performance in the trail making test (TMT). Hence the present study aimed at assessing the effects of HFYB and BAW on TMT performance separately.

Materials and Methods: Thirty male participants with ages ranging between 18 to 46 years (group average \pm S.D., 26.0 ± 6.2 years) were recruited for the study. The participants were assessed for both parts of the TMT (A and B) and state anxiety before and after all three sessions (i) high frequency yoga breathing (HFYB), (ii) breath awareness (BAW) and (iii) quiet sitting (QS), on three separate days. Paired t-tests were performed to compare the effects of all three sessions on TMT (A and B) and state anxiety.

Results: The time taken to complete TMT part A significantly reduced after the HFYB session ($p < 0.001$). The level of state anxiety was reduced after both HFYB ($p < 0.05$) and BAW ($p < 0.01$).

Conclusions: Both *pranayamas* HFYB and BAW reduced state anxiety. HFYB improved psychomotor speed, sustained attention and visual scanning.

Key-words: Breath awareness, High frequency yoga breathing, Trail making test (TMT)

Effect of yoga on quality of sleep among middle aged adults- a pilot study

P154

Annapurna.K¹, Swarnalatha P.K²

Department of Physiology, Academy of Medical Sciences, Pariyaram, Kannur, Kerala

Background: Yoga, first documented in the Yoga Sutras of Patanjali, written around 500-100 B.C, is a practice for spiritual development that originated in ancient India. It is a comprehensive system which aims in achieving physical, psychological and spiritual health and well-being. Quality of sleep and sleep related problems tends to decrease with increasing age. Several scientific investigations have shown the effectiveness of Yoga in improving sleep quality.

Objective: To evaluate the effect of Yoga on quality of sleep in middle aged adults.

Methods: Study Design: Descriptive study; Study Setting: Yoga center, Payyanur, Kerala; Study Period: 1 month. August 2018; Study Population: 30 middle- aged adults, who have enrolled for yoga classes under a certified trainer at the Kaavilbhavan Yoga Center, Payyanur;

Study Tool: Pittsburgh Sleep Quality Index (PSQI). The questionnaire was used twice, once in the beginning, and second time at the end of one month of regular yoga.

Results: On comparison of mean values of PSQI before and after Yoga, it was found that PSQI component changed significantly with a p value of < 0.001 . The mean values of PSQI before Yoga was found to be higher than the PSQI after Yoga.

Conclusion: There has been found to be an improvement in quality of sleep following one month of Yoga practice.

Key-words: middle-age; Pittsburgh Sleep Quality Index (PSQI); quality of sleep; yoga

Estimating regularity and complexity of HRV time-series in *Prakriti* classified healthy individuals using approximate entropy and sample entropy

P155

Prathiban Rengarajan¹, Dinu S Chandran¹, Bhavana Prasher², Ashok Kumar Jaryal¹, Kishore Kumar Deepak¹

¹Autonomic & Vascular function lab, Department of Physiology, All India Institute of Medical Sciences, New Delhi. ²CSIR-TRISUTRA Unit, Council for Scientific and Industrial Research-Institute of Genomics and Integrative Biology, New Delhi
e-mail id – aatreypathiban@gmail.com

Background: The approximate entropy and sample entropy techniques usually quantify regularity in time series. The Ayurvedahas documented observable phenotypical characters of humans and named as *Prakriti*. Previous studies showed variations in gene expression, biochemical processes among healthy *Prakriti* individuals. We hypothesize regularity and complexity of time series may vary among different *Prakriti* individuals.

Objective: To estimate and compare approximate & sample entropy in short-term HRV of *Prakriti* classified healthy individuals

Methods: The *Prakriti* were identified using CSIR-IGIB *Prakriti* questionnaire. Totally 245 healthy individuals screened for predominant *Prakriti* identification and 8 *Kapha* (age = 21.43 ± 0.65), 12 *Pitta* (age = 22.43 ± 0.53) & 12 *Vata* (age = 22.29 ± 1.29) predominant *Prakriti* individuals identified. The 5 min HRV recorded in the supine resting state in lead II configuration using Biopac MP-150. The raw data analyzed by software HRV analysis v.1.1.

Results: The *Vata Prakriti* has lower ApEn than *Kapha*, *Vata vs Kapha*; Mean ± SD (1.13 ± 0.05 vs 1.20 ± 0.07) with p-value = 0.024 and also *Vata Prakriti* has lower SampEn than *Pitta*, *Vata vs Pitta*; (1.30 ± 0.29 vs 1.59 ± 0.29) with p-value = 0.039.

Conclusion: Time series having repetitive patterns has small ApEn and lower value of SampEn also indicates more self-similarity in the time series. Our results suggest *Vata Prakriti* HRV has repetitive, self-similar pattern showed by the lower value of ApEN and SampEN than other *Prakriti* HRV. Further study needed to understand these implications in health and disease states.

Key-words: Approximate Entropy, Sample Entropy, HRV, *Prakriti*

Prophylactic effect of *Kadukkaimaathirai* (*Terminalia chebula* based polyherbal siddha formulation) in D-galactosamine induced liver damage in rats

P156

Manjunath Shetty¹, Smita Shenoy², Vasudha Devi¹, Nitesh Kumar³, Arul Amuthan¹

¹Department of Pharmacology, Melaka Manipal Medical College (Manipal Campus), Manipal Academy of Higher Education, Manipal, ²Department of Pharmacology, Kasturba Medical College Manipal Academy of Higher Education, Manipal, ³Department of Pharmacology, Melaka Manipal Medical College (Manipal Campus), Manipal Academy of Higher Education, Manipal
Email: manju.shetty@manipal.edu

Background: D-galactosamine induced hepatotoxicity model is used to mimic fulminant hepatitis. *Kadukkaimaathirai* (KM) is used in the treatment of various liver diseases. There is no literature available about its effect in this model.

Objective: To study the prophylactic effect of KM in D-galactosamine (D-gal) induced hepatotoxicity in rats.

Methods: 7 groups (n = 6 in each group) of adult female Sprague Dawley rats were used. Group I -2% gum acacia kept as control. Group II -KM-144 mg/kg kept as test drug control. Group III -kept as toxic control (D-gal) 2% gum acacia. Group IV-VI received KM (36, 72, 144 mg/kg respectively). Group VII -silymarin (50 mg/kg). All rats received drugs orally for seven days. On the eighth day, rats of groups III to VII received I.P D-gal 400 mg/kg. After 24 h, blood was collected for the estimation of liver enzymes and liver for histopathology. Data were analysed using one-way ANOVA followed by Post hoc Tukey's test.

Results: As compared to D-gal treated rats, KM treated groups showed significant (p < 0.05) decrease in liver enzyme levels. In D-gal treated group, liver parenchyma showed effaced architecture with focal necrosis and apoptosis of hepatocytes. In KM treated groups, biopsy showed mild chronic inflammatory infiltrate in the lobules and portal tracts without necrosis and apoptosis similar to silymarin.

Conclusion: This study demonstrates the hepatoprotective effect of KM. Which may be attributed to its antioxidant and anti-inflammatory properties reported earlier.

Key-words: Siddha, *Kadukkaimaathirai*, D-galactosamine

Prophylactic effect of *Vetpalai thailam* and *Sivanar vembu kuzhi thailam* (Siddha herbal preparations) in imiquimod induced psoriasis like inflammation in mice

P157

Ganesh Shenoy K¹, Smita Shenoy², Satish Pai³, Nitesh Kumar⁴, Arul Amuthan¹, Manjunath Shetty¹

¹Department of Pharmacology, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, ²Department of Pharmacology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, ³Department of Dermatology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, ⁴Department of Pharmacology, Manipal College of Pharmaceutical Sciences, Manipal Academy of Higher Education, Manipal.

Email: kg.shenoy@manipal.edu

Background: Imiquimod (IMQ)-induced psoriasis in mice, represents a model that mimics the human plaque type psoriasis. This study was taken up as there is lack of preclinical scientific evidence on the antipsoriatic effects of test drugs.

Objective: To study the prophylactic effect of *Vetpalai thailam* (VT) and *Sivanar vembu kuzhi thailam* (SVKT) in IMQ induced psoriasis like inflammation in mice.

Methods: 6 groups (n=6 in each group) of female BALB/c mice were used. Group 1 - normal control; group 2 - psoriasis control - topical IMQ cream (62.5 mg) on the shaved dorsal skin; group 3, 4 - topical IMQ with oral VT (200 mg/kg and 400 mg/kg respectively); group 5, 6 - topical IMQ with oral SVKT (100 mg/kg and 200 mg/kg respectively). The study duration was 12 days. Psoriasis Area Severity Index (PASI) scoring was recorded daily. On the 13th day, the animals were sacrificed, their skin samples were collected for immunohistochemistry and histology.

Results: PASI score was significantly ($p < 0.001$) reduced from day 2 and lesions normalized on day 9. In comparison to psoriasis control group, the epidermis in VT groups showed mild hyperplasia in some areas; SVKT groups did not show hyperplasia. The features of inflammation seen in psoriatic control group were absent in test drug treated groups. The VT groups showed few nuclear staining with Ki-67 in basal cells.

Conclusion: The test drugs efficaciously attenuated the symptoms and processes underlying psoriasis in mouse model.

Key-words: *Vetpalai thailam*, *Sivanar vembu kuzhi thailam*, imiquimod

Histopathological alterations of lungs due to various preparatory stages of Nagabhasma

P158

Lydia S. Andrade¹, Kumar M.R. Bhat²

¹Department of Anatomy, Kasturba Medical College, MAHE, Manipal, Karnataka – 576104, ²Department of Anatomy, RAK Medical and Health Sciences University, Ras Al Khaimah, UAE – 11172
Email id – lydia.quadros@manipal.edu

Background: *Nagabhasma*, is an ayurvedic form of traditional medicine, that uses lead in its purified form. The crude lead undergoes several stages of purification until it is fully processed. The *Nagabhasma*, imported in the western countries, have shown toxic effects due to high amount of unprocessed lead. However, we believe that *ayurveda*, our ancient form of traditional medicine, would not have overlooked the issue of toxicity of lead in *Nagabhasma*.

Objectives: The present study was designed to evaluate the histopathological alterations in lungs due to various preparatory stages of *Nagabhasma*.

Methods: *Nagabhasma* was traditionally prepared and five stages were procured for the study. Commercially available *Nagabhasma* was also taken for the study. Adult Wistar rats, weighing 150 grams, were divided into seven groups – Control, Branded *bhasma*, Stage 1, Stage 2, Stage 3, Stage 4, Crude lead. Human equivalent doses were administered orally to the rats for a period of 30 days. At the end of the treatment period, the rats were sacrificed and the lungs were collected for histopathological studies.

Results: Thickening of alveolar due to inflammatory infiltrates and sloughing of epithelium was observed in branded *bhasma*, stage 1, stage 3 and crude lead. Congestion of pulmonary blood vessels was observed in stage 2. Larger but fewer alveoli and giant bullae were observed in all the stages except control and stage 4.

Conclusion: The results clearly indicated that the adverse histopathological changes reduced as the preparatory steps of processing/purification proceeded towards the final preparatory stage.

Key-words: Lead, Lungs, Nagabhasma

Thamira kattu chendooram (a Siddha herbomineral anticancer drug) prolongs the life span in Ehrlich ascites carcinoma tumor mice

P159

Vishal Bhat^{1,2}, Arul Amuthan^{1,2}, Praveen³, Narayanan K³

¹Department of Pharmacology, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, ²Center for Integrative Medicine

and Research, Manipal Academy of Higher Education, Manipal, ³ Department of Pharmaceutical Biotechnology, Manipal College of Pharmaceutical Sciences, Manipal Academy of Higher Education, Manipal
Email: vishaal.bhat@manipal.edu

Background: *Thamira kattu chendooram* (TKC) is a traditional formulation clinically used by siddha practitioners against cancer. The present work evaluates its *in vivo* anticancer potential in Ehrlich ascites carcinoma (EAC) micemodell.

Methods: EAC was induced by injecting viable EAC cells intraperitoneally. Four groups of twelve mice were used for the study. Group 1 received vehicle. Group 2 received single dose of cisplatin on 1st day. Group 3 received seven doses of TKC on alternate days from day 1. Group 4 had normal mice. Body weight was measured daily to assess the tumor development. On 14th day, blood was withdrawn from six animals in each group for hematology. Peritoneum was incised to assess peritoneal capillaries, tumor volume and tumor weight. Kidney and liver were collected for histopathological evaluation. Remaining EAC mice in each group were monitored twice daily for 45 days to assess Mean Survival Time (MST) and percent increase in mean life span (IMLS).

Result: Cisplatin and TKC significantly ($p < 0.05$) reduced the body/tumor weight, tumor volume, and peritoneal capillaries compared to Group 1. Blood parameters and MST were reduced in Group 1, significant ($p < 0.05$) compared to cisplatin and TKC. Significant ($p < 0.05$) increase in IMLS due to Cisplatin and TKC treatments compared to the EAC control animals. Cisplatin treatment showed hepato-renal toxicity. TKC treatment did not show any such toxicity.

Conclusion: TKC prolongs the lifespan of mice affected by Ehrlich ascites carcinoma and further evaluation can help provide an affordable treatment option in cancer therapy.

Key-words: Cancer, Siddha, Thamira kattu chendooram, Animal study

Pre diabetes and its correlation with family history- A cross sectional study in medical students

P160

Chowdhury Ajoy

Department of Physiology, A.J. Institute of Medical Sciences, Kuntikana, Mangalore

Background: Diabetes is a silent killer and a global public health crisis. WHO projects that diabetes will be the 7th leading cause of death in 2030. The number of people with diabetes in India is currently around 40.9 million and is expected to rise to 69.9 million by 2025. But pre-diabetes is a condition when blood glucose levels are higher than normal but not high enough to be diagnosed as diabetes. It has been projected that more than 470 million people will have pre-diabetes by 2030. 5-10% of people per year with pre-diabetes will progress to diabetes.

Objective: To study the prevalence of pre-diabetes among young medical students & to establish its correlation with family history of diabetes, gender variation and obesity.

Methods: 110 medical students (males and females) in the age group 20-24 years have volunteered to Physiology department of A.J. Institute of medical sciences and have given their informed consent for the study. The study is approved by the Institutional Ethical Committee. All participants were advised to test their fasting plasma glucose level from Biochemistry department of the institution, after an overnight fasting period of 8-14 hours. Height & body weight of each participant has been taken by standard methods to calculate basal metabolic index (BMI). The results obtained are statistically analyzed using chi-square test by cross tabulation.

Results: The analysis shows that a statistically significant percentage of medical students were pre-diabetic with positive association to gender. There was strong association of pre-diabetes with family history of diabetes, which is also statistically significant. There was also a statistically significant association of obesity and development of pre-diabetic condition.

Conclusion: Although diabetes mellitus is a multifactorial metabolic syndrome, some of its risk factors can be reduced by maintaining a healthy lifestyle like exercising, avoiding junk food and sedentary life style and giving up addictions like smoking and alcohol.

Key-words: Pre-diabetes, Obesity, BMI, Fasting plasma glucose, Family history, Diabetes mellitus

Gender – based comparison of fasting and postprandial blood and salivary glucose in diabetics and healthy adults

P161

Sharon M. P¹, A.S. Anilkumar², S. Srikanth³

¹Department of Physiology, Believers Church Medical College Hospital, Thiruvalla, Kerala, ²Department of Biochemistry, Kempegowda Institute of Medical

Sciences, Bangalore, Karnataka, ³Department of Physiology, Kempegowda Institute of Medical Sciences, Bangalore, Karnataka

Background: To examine effects of gender on salivary and blood glucose in type II diabetics and healthy adults.

Objective: To estimate the effect of gender on salivary and blood glucose levels in type II diabetics

Methods: 80 adults in the age group of 30 – 50 years were included in the study and divided into 2 groups – diabetics and healthy adults. Both groups were further divided into 2 groups based on gender – male and female. Blood and saliva samples were obtained from subjects after overnight fast and 2 hours postprandial. Blood samples were analysed with hexokinase enzyme (automated analyser) and saliva samples with glucose oxidase enzyme (colorimeter). Salivary glucose levels compared between diabetics and healthy adults by t – test. Relationship between salivary and blood glucose was assessed by correlation test. Difference in salivary and blood glucose levels between males and females was determined by t – test.

Results: Salivary glucose is significantly higher in diabetics ($P < 0.001$). Correlation flanked by salivary and blood glucose is not seen. Blood glucose is higher in female diabetics and salivary glucose is higher in male diabetics.

Conclusion: Salivary glucose levels are significantly higher in diabetics. Further studies will help in use of salivary diagnostics for early and non – invasive diagnosis of diabetes. Sex differences in fasting and postprandial blood glucose and salivary glucose suggest that differences in gender responses to therapy should be considered to achieve better and continuous glycaemic control in type II diabetics.

Key-words: Salivary glucose, blood glucose, gender

Relation between Vitamin D and HbA1c levels in patients with Type 2 Diabetes Mellitus

P162

Pooja Korath

Department of Physiology, SGMC & RF

Background: Vitamin D is a crucial factor in development of Type 2 Diabetes Mellitus. It regulates adipogenesis, stimulates insulin synthesis, protects pancreatic cells and decreases insulin resistance in muscles. HbA1c is the most important laboratory parameter indicating glycemic control. High RDW is associated with increased incidence of diabetes mellitus in middle aged individuals from general

population. The glycemic control is main measure in controlling diabetes mellitus. Now, vitamin D is an upcoming factor which is related to the glycemic control in diabetes

Objectives: To find out the relation between Vitamin D & HbA1C levels in patients with type 2 Diabetes Mellitus, to find out the relation between RDW & HbA1C and also to find out the relation between Vitamin D & selected risk factors of Type 2 diabetes like obesity & dietary habits.

Methods: Patients attending the Diabetology clinic of SGMC & RF were included in the study. 5ml of blood was collected from patients attending the OPD after getting the informed consent. From this, 2ml of blood was given to pathology lab for estimating RDW & 3ml of blood was made into serum, centrifuged & then given to lab for vitamin D estimation. Blood level of Vitamin D – ELISA, RDW – Flow cytometry, HbA1c-HPLC were done in the laboratory.

Results: 88% of the diabetic patients have vitamin D deficiency.

Conclusion: There was an inverse relationship of Vitamin D with HbA1c and also a significant increase in RDW with HbA1 C level was observed.

Key-words: HbA1c, RDW, Vitamin D

Effect of sleep deprivation on blood glucose levels in shift workers

P163

Shiva Shankar, A. Santa Kumari,

Department of Physiology, Osmania Medical College, Hyderabad. Telangana

Background: Shift work is extremely frequent in several services and industries. Shift work is necessary to optimize productivity and business competitiveness. One occupational factor that has potential health implications is shift work. Shift work is classified into two ways. Rotating, where employee's hours of work change (morning, afternoon, night shift). Permanent, where work pattern is constant but occupy unusual hours of the day. Insufficient sleep and poor sleep quality are common consequences of shift work are independent risk factors for development of insulin resistance.

Objective: To determine relationship between shift work and diabetes mellitus

Methods: Data of blood glucose levels of 110 day workers and 110 shift workers was collected in Rajvir industries limited in Mahabubnagar.

Inclusion Criteria: The age group criterion for this study population was 35-55 years. They were working for at least 5 years. **Exclusion Criteria:** H/O of diabetes mellitus before joining industry, Family history of diabetes mellitus, Gestational diabetes, Cushing's syndrome, Acromegaly, H/O of usage of psychiatric drug

Results: Unpaired students t-test was used. P value < 0.05 was considered statistically significant. Random blood glucose levels in shift workers (178 ± 13.04 mg/dL) is significantly higher than day workers (137 ± 16.7 mg/dL).

Conclusion: Shift work is associated with an increased risk of diabetes mellitus. Applicable intervention strategies are needed for prevention of diabetes mellitus in shift workers.

Key-words: day workers, shift workers, random blood glucose levels

Association of serum iron indices with Insulin resistance index in euglycemic offsprings of diabetic and non-diabetic parents

P164

Shobha MV, Jagadamba A, Karthiyanee Kutty, Prabhakar K, Shashidhar K N

Sri Devaraj Urs Medical College

Background: Diabetes is a metabolic disorder characterized by insulin resistance and insulin secretory defect. It is predisposed by both genetic and environmental factors. Excess iron within physiological limit is a potential risk factor for T2DM along with other risk factors like obesity, age and family history. Serum ferritin can be used as an alternative to HOMA index in assessing the insulin resistance.

Objectives: To compare serum iron indices in offsprings of diabetic & non diabetic parents and to associate HOMA index with serum iron indices in offsprings of diabetic & non-diabetic parents.

Methods: This is a comparative study having total 80 subjects – 40 with family history with at least one parent being of T2DM (cases) and 40 without family history of T2DM (controls). Subjects include both males and females in the age group 30-40 years. Fasting blood sugar, hemoglobin levels, serum iron parameters, lipid parameters, fasting insulin, HOMA-IR were compared and correlated between cases and controls.

Results: Age was matched. Fasting blood sugar and hemoglobin was comparable between both groups.

The present study showed a significant increase in serum iron parameters, serum insulin, HOMA-IR ($p < 0.000$) among offsprings of diabetic patients compared to non-diabetics. HOMA index shows a positive correlation with serum ferritin among cases compared to controls

Conclusion: Offspring of type 2 diabetics have high iron parameters even before the change in glucose metabolism become apparent which is an additional risk factor for developing T2DM.

Key-words: Diabetic patients, offspring's, serum ferritin levels

Effect of lifestyle intervention in type II diabetes

P165

Uma Vijayashankar, Rajalakshmi R

Department of Physiology, JSS Medical College, JSSHER, Mysuru.

Background: The primary treatment for adults with metabolic syndrome is lifestyle change and it was also suggested that lifestyle intervention have beneficial effects in preventing the incidence as well as the complications.

Objective: To evaluate the effectiveness of lifestyle intervention on metabolic control in patients with Type II Diabetes mellitus (Type II DM).

Methods: 200 patients recently diagnosed with Type II DM associated with obesity/overweight were divided into 4 groups and randomly assigned lifestyle intervention and educational programme with 6 months of follow up. Group I were assigned with yoga and Educational session, Group 2 – Yoga alone, Group 3 – Educational programme alone and Group 4 – Control. Intervention included 6mins of yoga per day for 5 days a week. Group 1 and 3 received 12 sessions on behaviour modification over the course of 6 months.

Results: Weight loss, reduced HBA1c, fasting blood glucose and insulin was achieved by Group 1, 2 and 3 but significantly with Group 1 and 2 and mild changes in group 3 and no changes were noticed in Group 4.

Conclusion: Both interventions produced positive modest changes in metabolic control. These results suggest that for weight loss and control of HBA1c, fasting blood glucose, insulin- an intervention along with motivation may be more effective.

Key-words: Type II DM, Intervention, metabolic control

Relative fold change in mRNA levels of genes related to stress, inflammation and ageing in obesity after yoga based lifestyle intervention

P166

Piyush Sharma, Raj Kumar Yadav

Department of Physiology, AIIMS, New Delhi

Background: Obesity is a low grade chronic inflammatory disease associated with various conditions like oxidative stress, cellular ageing, increased immune response & inflammation, etc. However, the role of yoga-based lifestyle intervention on gene expression related to stress, inflammation and cellular ageing in obesity is lacking.

Objective: To study the effect of yoga based lifestyle intervention with standard of care on relative expression of genes related to stress, inflammation and cellular ageing.

Material and Methods: The present study was conducted on subjects (n=31) of age (36.6 ± 6.9) and BMI (30.1 ± 3.0). Subjects were randomised into two groups i.e. Group A (n=16) in which subjects will get the standard of care for obesity and Group B (n=15) in which subjects will get the yoga based lifestyle intervention along with the standard of care for two weeks respectively. Blood samples were taken from the subjects of both the groups before and after the intervention followed by RNA extraction for the relative fold change expression analysis using Q-PCR

Results: Relative fold change of Tumour Necrosis Factor (TNF), Interlukin-6 (IL-6) are downregulated significantly in group B ($p=0.004$, $p=0.039$) respectively. Nuclear Factor erythroid type-2 (NFE-2), Human telomerase reverse transcriptase enzyme catalytic subunit gene (hTERT) are upregulated significantly in group B ($p=0.0009$, $p=0.0006$) respectively.

Conclusion: Yoga Based Lifestyle intervention might change the expression of genes by reversing the damaging effects of stress, inflammation and cellular ageing in obesity.

Key-words: Obesity, stress, inflammation, ageing

Risk factors associated with gestational diabetes mellitus: a case control study in a tertiary care hospital

P167

Veena Thamban, Kavana G Venkatappa, M G Bandelkar

Department of Physiology, Academy of Medical Sciences, Pariyaram, Kannur, Kerala.

Background: GDM (Gestational diabetes mellitus) refers to any degree of glucose intolerance with onset or first recognition during pregnancy. Women with GDM are very likely to ultimately develop type 2 diabetes. Diagnosis of GDM also identifies pregnancies at increased risk for perinatal morbidity and long-term obesity and glucose intolerance in offspring. Assessment of risk factors associated with GDM is thus important to allow for rational planning and allocation of resources and the preventive strategies that may be undertaken in future.

Objective: To assess the risk factors of Gestational diabetes mellitus in women attending antenatal clinic of a tertiary care hospital.

Methods: Ethical approval has been obtained from Institutional Ethical Committee. This case-control study enrolled 64 women with GDM and 64 without GDM, attending antenatal care clinic at a tertiary care hospital in Pariyaram. After obtaining informed written consent, socio-demographic characteristics and Obstetric history were noted. Anthropometric measurements, OGTT values were recorded. DIPSI criteria was used for diagnosing GDM.

Results: Univariate analysis revealed that, maternal age, pre-pregnancy BMI $\geq 25\text{kg/m}^2$, family history of diabetes mellitus, blood pressure, gravidity, previous history of GDM, history of abortion, menstrual irregularities and infertility were significantly associated with GDM. Multivariate logistic regression analysis identified pre-pregnancy BMI $\geq 25\text{kg/m}^2$ and family history of diabetes as significant determinants of GDM.

Conclusion: The present study assessed the risk factors of GDM where in, pre-pregnancy BMI $\geq 25\text{kg/m}^2$ and family history of diabetes were found to be significant risk factors for GDM.

Key-words: Gestational diabetes mellitus, Oral glucose tolerance test (OGTT), Risk factors

To evaluate the effect of yoga practice in obese individuals on anthropometric variables at baseline, three months and six months

P168

Alok Singh, Sachin Kumar Sharma, Deepak Kumar Pal, Shirley Telles, Acharya Balkrishna

Patanjali Research Foundation, University of Patanjali, Haridwar, India.

Background: The prevalence of obesity and risk of lifestyle related disorders has increased. An earlier study showed significant changes in anthropometric and biochemical variables in a yoga group as

compared to a walking group. Yoga practice was given to naïve individuals and the effect was assessed after three months and six months of yoga practice.

Objective: The present study was conducted to assess the effects of yoga practice on anthropometric variables in obese individuals at baseline, three months and six months.

Methods: Forty (40) naïve obese ($BMI \geq 25\text{Kg/m}^2$) individuals aged between 35 to 55 years (group mean \pm S.D, 44.58 ± 7.69 years) were recruited in the study. The individuals were randomized into two groups i.e., yoga ($n=20$) and control ($n=20$). Anthropometric variables (WC, HC, MAC, SAD and BMI) were assessed using anthropometric tape (Gülick Anthropometric tape Model J00305, Lafayette Instrument, U.S.A), abdominal caliper (Holtain-Kahn Abdominal Caliper 50 CM (98.60XL), U.K.) and Body mass index (BMI) was calculated as the body weight (in Kg), divided by the height (in meters squared) respectively.

Results: ANOVA and post- hoc (Bonferroni) analysis showed significant changes in anthropometric variables MAC ($p < 0.001$) and HC ($p < 0.05$), comparing the baseline with 3 months and 6 months of yoga practice. On the other hand there was no change (significant) in the control group.

Conclusions: Yoga practice appears to improve anthropometric variables after six months of yoga practice. This would be a possible use of yoga as a preventive measure for lifestyle related disorders.

Key-words: yoga, anthropometric variables, obesity

Risk of type 2 Diabetes mellitus in medical students

P169

Tejashwini.V.B

Department of Physiology, Basaveshwara Medical College & Research hospital, Chitradurga
Email: teju23091987@gmail.com

Background: Obesity is increasing day by day in the young individuals due to changes in their lifestyle. Together with family history of diabetes, it has become a major predictor of type 2 diabetes. This study was done to evaluate the risk of developing diabetes in medical students.

Objective: To evaluate the risk of developing diabetes among medical students using Indian Diabetes Risk score.

Methods: The study included 80 MBBS students. Detailed history was taken which includes information regarding their age, family history of diabetes and exercise. Waist circumference was measured. Risk of diabetes was calculated using Indian Diabetes Risk Score.

Results: Risk of developing diabetes was high in 6%, moderate in 87.3% and low in 9.7% of students.

Conclusion: Risk of diabetes was present in more than 50% of medical students as assessed by Indian Diabetes Risk Score.

Key-words: Type 2 Diabetes mellitus, Medical students

Analysis of Serum Lipid Profile and Electrolyte in Type II Diabetes Mellitus subjects – A Comparative Study Based on HbA1c Levels

P170

Nabeel Beeran Abdul Rahiman, Shobith Bangera

Department of Physiology, Yenepoya Medical College, Mangalore. nabeelbeeran@gmail.com

Background: Type II Diabetes Mellitus is one of the most common public health problem and a serious metabolic disorder in both developed and developing countries. Diabetic patients may suffer from imbalanced lipid profiles and electrolytes, making them vulnerable to serious complications like cardiovascular diseases. Glycosylated haemoglobin (HbA1c) is the average blood glucose during the past three months and is used to monitor the long term glycemic control.

Objective: To identify the status of lipid profile and serum electrolytes with HbA1c levels in type II

diabetic subjects with age ranging from 25-70 years, attending Yenepoya Medical College, Mangalore.

Methods: Total 100 subjects were included in the study. Subjects were divided into group A and group B. Group A (cases) consists of 50 diabetic subjects with HbA1c > 6.5% and group B consists of non-diabetic subjects (controls) with HbA1c < 6.5%. Fasting lipid profiles, fasting blood sugar, HbA1c and serum electrolytes were estimated. Statistical analysis was done by SPSS.

Results: There was a significant decrease ($p < 0.001$) of serum potassium and HDL levels; and a significant increase ($p < 0.001$) of serum triglyceride level in diabetic subjects compared to non-diabetic subjects.

Conclusion: Diabetic patients are more prone to lipid abnormalities and electrolyte imbalances. Hence diabetic subjects (group A) are at risk for cardiovascular diseases and other major health issues. Patients should be educated about the regular monitoring of lipid profile and serum electrolytes; and should be effectively treated at the earliest.

Key-words: Type II Diabetes Mellitus; HbA1c; Lipid profile; Electrolytes

Diabetic to Pre-diabetic: Case Study

P171

Sugata Jadhav¹, Geeta Dharmatti², Aniruddha Tongaonkar³

¹Dr.D.Y. Patil Medical College, Hospital & Research Center, D.Y. Patil Vidyapeeth, Pune-18, sugatajadhav12@gmail.com, ²Clinical Nutritionist Pune, ³Consulting Physician

Background: Type II Diabetes mellitus is caused by decreased sensitivity of target tissues to metabolic effects of insulin. The development of insulin resistance & impaired glucose metabolism is usually a gradual process, beginning with excess weight gain & obesity.

Objectives: 1. To control type II diabetes mellitus with minimum oral antidiabetic drugs and diabetic diet. 2. To revert diabetic patient to pre-diabetic state with lifestyle modifications.

Methods: Forty-eight yrs old female diagnosed with type II diabetes with blood sugar fasting 148mg% and postprandial 250 mg%. Her HbA1c was 7.2. She was put on tab. Glisol MF half BD by physician. She was advised diabetic diet and 8 kg weight loss by nutritionist. Her exercise regime included 40 minutes walking per day. Patient's blood sugar, HbA1c was assessed at regular intervals.

Results: With diet, exercise and medication with span of two years, patients fasting blood sugar was 106 mg%, postprandial blood sugar 113 mg% and HbA1c 5.6. Her dose was reduced to tab. glycomet 250mg once a day after lunch. Her total weight loss was 8 kg.

Conclusion: Type II diabetic patient can become pre-diabetic with planned diabetic diet and weight reduction.

Key-words: Type II diabetic, insulin resistance, pre-diabetic

Association between Glycaemic profile and Cognition status in diabetics

P172

Ramya C M, Rajalakshmi R

Department of Physiology, JSS Medical College, JSS Academy of Higher Education and Research, Mysuru. e-mail id - drramyacm@gmail.com

Background: Type 2 diabetes mellitus (T2DM) is currently the most prevalent metabolic disorder which may lead to macro and micro-vascular complications. Prevention and treatment strategies for the same have significantly improved than before & life expectancy of the population has increased, but with the emergence of new complications like dementia. Insulin resistance (IR) represents a pre-clinical stage on the path to diabetes and can affect cognition. Cognition is the ability to process information through perception. Cognition includes different cognitive processes like learning, attention, memory, language, reasoning, decision making, etc., which forms the part of intellectual development and experience.

Objectives: To study the relationship between glycaemic profile and cognition in diabetics.

Methods: A total of 200 subjects in the age group of 40-60 years of either gender were selected for the study after obtaining informed consent. Fasting serum glucose, Insulin, HbA1C were measured. Insulin resistance indices like The Homeostasis Model of IR (HOMA-IR), HOMA percent β -cell function (HOMA- β) and Quantitative Insulin-sensitivity Check Index (QUICKI) were calculated. Cognition levels were assessed by Modified Mini Mental Status (3MS) test.

Results: There was an association between the HbA1c levels and 3MS scores. Increased HbA1c and IR was positively correlated with decreased cognitive function.

Conclusion: The result of our study suggests that uncontrolled T2DM can affect cognition. Hence, early diagnosis and timely management are essential to

reduce incidence of cognitive dysfunction, further dementia.

Key-words: Insulin resistance, cognition, Type 2 diabetes mellitus

Diethyl nitrosamine induces liver cancer in rats and its modulation by Zingiber zerumbet rhizome extract

P173

Parnika D Dicholkar, Passang Yangkey, Yogendra Nayak

Department of Pharmacology, Manipal College of Pharmaceutical Sciences, Manipal Academy of Higher Education, Karnataka State, Manipal. India. Pin 576104

Email:yogendra.nayak@manipal.edu

Background: The carcinogen diethylnitrosamine (DEN) is reported in food products such as cheese, soybean, fish, meat and beverages. It is also produced in body by biotransformation of drugs such as chlorpromazine and chloroquine. Presence of DEN in food products and concurrent alcohol consumption was supposed to be enhancing the liver carcinogenicity. Zingiber zerumbet rhizome extract (ZZR) had good antioxidant and hepatoprotective effect hence we screened for DEN-induced liver cancer in rats.

Objectives: To induced liver cancer in rats by mimicking the natural exposure of DEN and to study the effect of ZZR.

Methods: The liver cancer was induced by feeding the DEN (0.01% v/v) in drinking water for 14-weeks. The ZZR, 200 mg/kg was administered for 15 days to the rats with DEN-induced liver cancer. The liver function test, inflammatory and oxidative stress markers were compared between the groups. Further confirmed by histopathological examination.

Results: After 14-weeks livers of the rats showed a significant number of cancerous nodules. The liver enzymes such as serum ALT, AST and total proteins were significantly altered by DEN. Further, the oxidative stress such as malondialdehyde, glutathione, superoxide dismutase, catalase, total and free bilirubin were significantly altered. The administration of ZZR significantly reduced the number of nodules and other parameters. Further, we confirmed the induction of apoptosis and free radical scavenging properties of ZZR.

Conclusion: DEN induces hepatocellular cancer by feeding in drinking water for 14 weeks. The Zingiber

zerumbet extract significantly modulated the cancer nodules by 15 days' treatment to rats with hepatocellular cancer.

Key-words: Inflammatory markers, Oxidative stress, Carcinogenicity, Genotoxic, Hepatocellular cancer

Proteomic profiling of aqueous humor in rat model of diabetes

P174

Sukrit Bhattacharyya¹, Nabanita Halder¹, S. Basker Singh², Rohan Chawla³, Thirumurthy Velpandian¹

¹Ocular Pharmacology & Pharmacy Division, Dr. R P Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi, India, ²Department of Biophysics, All India Institute of Medical Sciences, New Delhi, India, ³Department of Ophthalmology, Dr. R P Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi, India.

Email: sukritbhattacharyya31@gmail.com

Background: Disease progression related changes in the overall proteome in diabetic retinopathy has not been monitored. Proteomics being a high-throughput, analytical discipline to analyze complex biological data sets is well suited to the study of the pathogenic mechanisms and the biomarker identification of diabetic retinopathy.

Objective: The aim of the present study was to analyse the early stage proteomic profile of diabetes in the aqueous humor of streptozotocin-induced diabetic rat model.

Methods: Male Wistar rats(250-300g) were injected with streptozotocin (45mg/kg) i.p. followed by measurement of blood glucose to characterize the diabetic state. Fundus imaging was done to assess the retinal structure and vasculature. At periodic intervals, aqueous humor was collected and subjected for LC-MS/MS based global proteomics approach to map various proteins.

Results: At the 7th day post diabetes induction, fundus imaging showed normal retinal vasculature. Proteomics analysis revealed a greater number of peptide spectral matches in the diabetic group (400-800) than the control group (300-400). Defence response proteins were higher in the diabetic group (40 counts), than the control group (22 counts). Counts of proteins involved in metabolic processes were also more in the diabetic group (70 counts), as compared to the control group (49 counts).

Conclusion: The study shows that, even though, there are no physiological changes observed in the early stage of diabetes, changes at the overall protein profile

begin to appear, which is expected to contribute to the later stage diabetic complications. Further studies are in progress to evaluate and understand the late stage proteomic changes in diabetic rat model.

Key-words: Diabetic retinopathy, qualitative proteomics, aqueous humor, Orbitrap, rat model

Cytotoxic effect of a plant-derived compound on NB4 cells (Acute promyelocytic leukemia cell line)

P175

Soosai Manickam Amirtham¹, Neetu Prince¹, Kawin Padmaja¹, Vikram Mathews², Nithya², Sathya Subramani¹

¹Department of Physiology, ²Department of Clinical Hematology, CMC Vellore.

Background: The NB4 cell line, derived from a human promyelocytic leukemia is extensively used in the research on treatment for APL. While screening compounds isolated from plants (with the help of preparatory HPLC) for anti-cancer properties on NB4 cells, we have identified one compound which achieves 100% cytotoxicity within 72hrs of incubation at nano molar concentrations. The compound does not affect normal cells at that concentrations. Evidence of cytotoxicity of various doses of the compound and duration of incubation will be presented.

Objective: To demonstrate cancer specific cytotoxicity at very low concentrations of a pure compound derived from a plant.

Methods: NB4 cells were incubated with three different plant derived compounds isolated with prep-HPLC. Cells were incubated with the compounds for a period of 72hrs in RPMI1640 medium and live-dead assay was performed (FACS). Different doses of the compounds in micro and nano molar concentrations were used to study the cytotoxicity. PBMNCs was used as control cells.

Results: One of the three compounds was able to produce 100% cell death in leukaemic cells at nano molar concentrations. Normal cells were not affected at that dose as compared to the leukaemic cells.

Conclusion: This plant derived compound can be a potential anticancer drug. It can be tested on other solid tumors too. We have the technology to isolate compounds in sufficient amounts from crude extracts of plants for such studies.

Key-words: NB4 cells, APL, FACS

Hypertension and risk for Renal cell carcinoma in the South Indian population

P176

Deepika Chandrasekaran

Department of Physiology, Sri Ramachandra Institute of Higher Education & Research (Deemed University), Porur, Chennai.

Background: The incidence and mortality of renal cell carcinoma have increased in the Indian population over the last decade. This suggests the role of environmental factors associated with western lifestyle in the aetiology of this disease. The most important risk factor for renal cell carcinoma is hypertension.

Objective: To assess the relation between high blood pressure and renal cell carcinoma.

Methods and materials: This is a cross sectional study. The Ethics Committee, Sri Ramachandra Institute of Higher Education & Research (Deemed University) granted the ethical clearance. The study was conducted among 173 histopathologically proven renal carcinoma patients. The blood pressure levels were noted, among which 106 subjects were hypertensive under medication and 67 were normotensives.

Results: Statistical analysis was done using R software. Chi-square test was done. Among the renal cell carcinoma patients 61% were hypertensives. 63% were males ($p=0.59$), 58% were obese ($p=0.26$), 55% were smokers ($p=0.02$), 72% were above 50 years of age ($p=0.004$).

Conclusion: Preventing and controlling hypertension might reduce the renal carcinoma incidence. Further studies with a larger sample size, longer follow-up and repeated measurements of blood pressure are necessary.

Key-words: Hypertension, risk factor, renal cell carcinoma

Influence of Liv. 52 and docosahexaenoic acid alone and their combination against carbon tetrachloride induced hepatotoxicity in Wistar rats

P177

Shakta Mani Satyam¹, Ong Tze Ern², Yong Gin Yen², Aishuryia Kanasin², Thivyashini Muthaiah², UmashangariSangga Ratnam², Jay Prakash³

¹Department of Pharmacology, ²MBBS Students,

³Department of Physiology, Melaka Manipal Medical College, Manipal Campus, Manipal Academy of Higher Education, Manipal, Karnataka (India)

Email id of presenting author: smsatyam21@gmail.com

Background: Liv-52 is a polyherbal formulation used in hepatic dysfunction. Docosahexaenoic acid has diverse functions in normal metabolism and health and are used as nutritional supplement.

Objectives: The present study was undertaken to investigate the influence of oral supplementation of Liv. 52 and docosahexaenoic acid (DHA) alone and their combination against carbon tetrachloride induced hepatic injury in Wistar rats.

Methods: Hepatotoxicity was induced by administering 1:1 mixture of carbon tetrachloride and olive oil; 1 ml/kg/72 h i.p. A total of 54 adult female Wistar (150-200 g) rats were divided into nine groups of six rats each as follow- Group 1- Normal healthy control (1 ml/kg/day of 2% gum acacia), Group 2- Negative control (CCl₄ + 1 ml/kg/day of 2% gum acacia), Group 3- Positive control (CCl₄ + Silymarin 50 mg/kg/day), Group 4 to 9- CCl₄ + Liv. 52- 225 mg/kg/day, 450 mg/kg/day, DHA- 300 mg/kg/day, 600 mg/kg/day alone and their combination. The treatment duration was seven days. Hepatoprotective potential was studied by estimation of serum alanine transaminase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP) in experimental rats.

Results: Serum ALT, AST and ALP was significantly increased ($p<0.05$) in hepatotoxic control rats compared to normal healthy control rats. There was significant change ($p<0.05$) in serum levels of ALT, AST and ALP among Silymarin, Liv. 52 and DHA treated rats in comparison to hepatotoxic control rats.

Conclusion: The present study revealed that Liv. 52 and DHA alone as well as their combination ameliorates the hepatic injury induced by CCl₄ in Wistar rats.

Key-words: Fatty liver disease; Antioxidants; Oxidative stress; Liver function test

Relationship between sulfur amino acids and oxidative stress in chronic pancreatitis patients

P178

Girish BN¹, Rajesh G², Kannan V³, Balakrishnan V²

¹Department of Physiology, ²Gastroenterology and ³Biochemistry, Amrita School of Medicine, Amrita Institute of Medical Sciences and Research Centre, Amrita Vishwa Vidyapeetham, Kochi, Kerala

Background: Sulfur amino acids (SAAs) being important antioxidant could affect pancreatic function.

Objective: To investigate the relationship between blood SAAs and antioxidant levels.

Methods: One hundred and seventy-five CP patients and 113 healthy normal controls were prospectively studied. Disease characteristics and imaging features were recorded. Plasma SAAs were estimated using HPLC. Erythrocyte reduced glutathione, glutathione peroxidase, superoxide dismutase, plasma vitamin C; erythrocyte thiobarbituric acid reactive substance (TBARS), urinary inorganic sulphate and creatinine were estimated by spectrophotometry.

Results: Multivariate regression analysis shows plasma methionine and erythrocyte TBARS were inversely correlated whereas plasma cysteine and erythrocyte glutathione levels were directly correlated. In CP patients with pancreatic atrophy, plasma cysteine and vitamin C levels were significantly lower whereas TBARS was higher as compared to patients without atrophy. A significant positive correlation was observed between urinary inorganic sulfate/creatinine ratio and BMI.

Conclusion: Deficiency of SAAs was associated with increased oxidative stress in CP patients. Possible benefit of supplementation of SAAs needs to be elucidated.

Key-words: Chronic pancreatitis, methionine, cysteine, oxidative stress, inorganic sulphate

Oesophageal motility abnormalities in proven GERD Patients

P179

P. Kiranmayi, Y. Radha Krishna

Dr. Rao GI Physiology center, Vizag

Background: GERD (Gastro oesophageal reflux disease) has a worldwide prevalence of 8% to 33%. Indications of testing include treatment failure, diagnostic uncertainty and to prevent complications of GERD. In this study we analysed the importance of EGJ pressures and motility abnormalities (By High resolution oesophageal manometry (HRM)) in proven GERD patients (By 24 hr Ph).

Objectives: To study the prevalence of Oesophageal motility abnormalities in proven GERD in our center from June 2016-August 2018.

Methods: We have enrolled 69 proven GERD patients in our GI Physiology center. All patients included in the study underwent oesophageal manometry (Haberts water perfusion 16 channel) and 24 hr ph metry off PPI.

Results: In this study there were 41 males and 28 females with age range (22-55 years) out of which fifteen (21%) had weak peristalsis, six (8.6%) had Fragmented peristalsis, 10 had Hiatus Hernia (14%) and Normal peristalsis in 48 patients. EGJ-CI (Contractile integral) pressure ranging from 2.5 to 41.9 mm Hg with an average of 21 mm Hg.

Conclusion: In pH monitoring AET (Acid exposure time) is most reliably extracted from automated analysis. AET < 4% is considered definitively normal and > 6% be considered abnormal.

Key-words: High Resolution Oesophageal Manometry, 24 hr Ph monitoring

Increase incidence of hepatitis in the Garhwal region after Kedarnath flood disaster in Uttrakhand

P180

P K Modak, Haroon Ali, V S Gusain and K S Butola
VCSG Govt. Medical College

Background: Viral hepatitis is a major cause for health care burden in India. Hepatitis A virus and Hepatitis E virus are predominantly enterically transmitted pathogens and responsible for acute viral hepatitis. Hepatitis B virus and Hepatitis C virus are predominantly spread through parenteral route and responsible for cirrhosis of liver and hepatocellular carcinoma. Around 400 million people all over the world suffer from hepatitis and the Asia-Pacific region constitutes the epicenter of this epidemic. Hepatitis D virus (defective RNA virus) is present worldwide and affects all age groups.

Objective: The objective of the study was to determine the sudden increase of hepatitis in the Garhwal region after Kedarnath flood disaster.

Results: This retrospective study was carried out at HNB Base Hospital, Srinagar (Garhwal) revealed that out of 737 hepatitis infected patients, 419 (56.9%), 223(30.2%) and 95(12.9%) came in the year 2014, 2015 and 2016 respectively. Frequency of hepatitis among male and female patients are 47.2% (highest in age group 40-50 yrs) and 52.8% (highest in 30-40 yrs). The increase percentage of hepatitis is seen Uttarkashi, Pauri, Chamoli, Bageshwar, Tehri and Rudraprayag districts due to their close proximity to flood disaster area. Occupations (Land laborers being highest frequency) also played significant role for infections. Prevalence of HBV (33.8%) > HCV (30.9%) > HAV (22%) > HEV (10.5%) > HDV (2.8%).

Conclusion: Contamination may play an important criterion for this outbreak of viral hepatitis.

Key-words: Viral hepatitis, Prevalence, Garhwal region

Relationship between serum vitamin D levels and disease severity in chronic pancreatitis patients

P181

Archana S¹, Girish BN¹, Saraswathy L¹, Rajesh G² and Sajitha Krishnan³

¹Departments of Physiology, ²Gastroenterology and ³Biochemistry, Amrita Institute of Medical Sciences and Research Centre, Amrita Vishwa Vidyapeetham, Kochi, Kerala

Background: Chronic pancreatitis (CP) may lead to deficiency of fat soluble vitamins such as vitamin D. CP is more prevalent in India especially in Kerala state; however, there is limited data on vitamin D concentrations in these population.

Objective: The present study was to assess the vitamin D status and its predictors in CP patients and healthy controls.

Methods: Vitamin D status, serum calcium, protein, albumin, globulin and fecal elastase1 were measured in twenty-two CP patients and thirty control subjects. Anthropometric measurements and clinical details were recorded.

Results: The mean age of the subjects was 43.9 ± 15.58 years (range 19-65 years). Vitamin D level was significantly lower in CP patients as compared to healthy controls. Vitamin D status was significantly lower in Cambridge-grade III vs II (9.89 ± 4.5 vs 22.04 ± 3.13 ng/ml, $p = 0.001$) Cambridge-grade II vs I (22.04 ± 3.13 vs 27.1 ± 1.12 ng/ml, $p = 0.06$), Cambridge-grade I vs III (3.13 vs 9.89 ± 4.5 ng/ml, $p = 0.01$). Vitamin D levels positively correlated with serum calcium level ($r = 0.522$, $p = 0.02$). Fecal elastase1 directly correlated with serum calcium ($r = 0.558$, $p = 0.02$). No significant difference in vitamin D and serum calcium was observed between smoker vs non-smoker, diabetic vs nondiabetic or alcoholic vs non-alcoholic CP patients.

Conclusion: In conclusion, vitamin D deficiency is more prevalent in CP patients with more severity of the disease irrespective of etiology.

Key-words: Vitamin D, chronic pancreatitis, Cambridge classification, Fecal elastase1, calcium

Evaluation of effect of sitagliptin on triglyceride levels in diabetic rats

P182

Yasmeen Maniyar, Siddarameshwar CB

Dept. of Pharmacology

Email id : c.b.siddu@gmail.com

Background: The most common cause of complications in Diabetes is cardiovascular. One of the important contributor for this is dyslipidemia especially increased triglyceride levels. This study intends to observe the effect of Sitagliptin on triglyceride levels in Diabetic Rats

Objective: To evaluate effect of Sitagliptin on triglyceride levels in High fat diet [HFD]-low streptozotocin [stz] induced Diabetic Rats

Methods: Albino Wistar rats were selected randomly and divided into 3 groups with 10 animals each[n=10]. All the animals were induced with Diabetes. Group 1 served as control group 2 animals received Metformin orally. Group 3 animals were given Sitagliptin orally. Diabetes was induced by HFD-STZ. For hfd coconut oil and vanaspati ghee were mixed at 2:3 ratio, given at 10ml/kg orally. Feeding was done for 6 weeks. Streptozotocin was given at 35mg/kg intra peritoneally. Animals with RBS more than 200mg were considered diabetic. Treatment with Metformin 200mg/kg and Sitagliptin 10mg/kg was given for 21days. Lipid profile was done first before and after drug treatment. The triglyceride levels before and after drug treatment were statistically analysed.\

Results: There was reduction in Triglyceride levels in animals treated with Metformin and Sitagliptin compared with control

Conclusion: Sitagliptin significantly reduced Triglyceride levels in Diabetic Albino Wistar Rats

Key-words: High fat- Low Streptozotocin, Sitagliptin, Metformin

Non Adherence to Antidiabetic Medication: Assessing Reasons of Non Adherence

P183

Akshay Gali¹, Sushma M²

¹Department of Pharmacology, BMCRI

Email:saiakshi11@gmail.com

Background: Diabetes mellitus is heterogeneous group of disorders characterized by hyperglycemia due to an absolute or relative deficit in insulin production or action. The chronic hyperglycemia of diabetes mellitus is associated with end organ damage. Glycemic control has a main role in its management

which mainly depends upon patient adherence to treatment plan. It is important to identify the reasons contributing to non-adherence to frame adequate preventive measures in order to reduce its consequences.

Objectives: To evaluate Non-adherence to antidiabetic medication and reasons for non-adherence among patients with Type 2 Diabetes mellitus.

Methods: After obtaining approval from the Institutional Ethics Committee, patients diagnosed with Type 2 Diabetes Mellitus being treated with antidiabetic medications and provide Informed Consent were included in the study. Demographic, clinical and treatment related data were recorded in the study proforma. Their adherence levels were assessed using modified Medication Adherence Rating (MARS) scale. Each patient was questioned for the reasons of their non-adherence.

Results: A total of 100 patients satisfying inclusion criteria were involved in the study. The mean age was 54.21 ± 1.58 years Male: Female ratio was 46:54. Adherence to antidiabetic medications were found to be 71%. Most common reason for non-adherence was adverse effects (09%), non-availability being next (08%), cost of medication (06%), followed by patient feeling better (05%), alternative medication (02%), and Multiple drug therapy and lack of family support (1%).

Conclusion: Adherence to antidiabetic medication was found to be 71%. Adverse effects and availability of drugs mainly contributed non-adherence to antidiabetic medication.

Key-words: Non-adherence, Diabetes mellitus, MARS scale

Comparative assessment of the efficacy of morning dose versus evening dose levothyroxine in hypothyroid patients

P184

Reena Sherin Parveen

Department of Pharmacology, Kasturba Medical College, Manipal University of Higher Education, Manipal – 576104

Email id: reena.parveen@manipal.edu

Introduction: Primary hypothyroidism is a common endocrine disorder resulting from deficiency of thyroid hormone. Levothyroxine sodium being treatment of choice for hypothyroid patients is usually taken on empty stomach half an hour before breakfast to prevent impairment of absorption by food. Many

patients find it difficult to follow this regimen and prefer an alternative time. Very few studies have been done to explore benefits of evening dose levothyroxine.

Objectives: The aim of our study is to evaluate effectiveness of evening dose levothyroxine when compared to morning dose in hypothyroid patients.

Methods: After ethics committee approval, 60 hypothyroid patients on morning dose levothyroxine (1.6 mcg/kg/day) with normal TSH levels for a period of 3 months were recruited. They were started on evening dose (2 hours post-dinner) levothyroxine for a period of 6 weeks at the end of which serum TSH levels and TSQ (Thyroid Symptom Questionnaire) scores were assessed similar to baseline.

Results: All study subjects were females of which 45% were in the age group of 41-50 years. Following evening dose levothyroxine, 76.7% of patients maintained normal TSH levels. Also, there was no significant change in weight, BMI or TSQ scores before and after therapy. Only 31.7% of patients were willing to continue evening dose levothyroxine schedule after the study.

Conclusion: 77% of the participants had efficient TSH control and majority of them preferred to continue with morning dose levothyroxine as a personal choice. Individualized therapy is required which caters to patient's needs, based on their food habits, convenience and TSH control.

Key-words: hypothyroidism, levothyroxine, evening dose

Antibiotic prophylaxis in preterm premature rupture of membrane and its outcome: A observational study

P185

Lavanya Pawar,¹ Narayana Reddy S,¹ Ashakiran T Rathod²

¹Department of Pharmacology, Bangalore Medical College & Research Institute, Fort, K R Road, Bengaluru-560002, ²Department of OBG, Bangalore Medical College & Research Institute, Fort, K R Road, Bengaluru-560002

Email: pawarlavanya2@gmail.com

Background: Preterm premature rupture of membrane (PPROM) complicates around 3-10% of all deliveries and is associated with one third of preterm births. Intraamniotic infection plays a significant role in PPRM and onset of preterm labour. Antibiotic prophylaxis is known prolong the latency period and

reduces the rate of neonatal infections in addition to reducing maternal morbidity.

Objectives: To analyse the impact of antibiotic prophylaxis on maternal and neonatal outcomes in cases of PPRM.

Methodology: This is a prospective observational study including 40 pregnant women between 24-37 weeks of gestation with PROM. The duration of premature rupture of membrane, antibiotics prescribed, investigations like CRP, blood culture and sensitivity of all neonates were documented. Maternal and fetal complications were noted. The data was analysed using descriptive statistics.

Results: Mean age of pregnant women was 25.45 (4.76) years. Mean duration of latency period was prolonged by 56.4(28.01) h for 24-28 weeks and 66(52.57) h for 28-36 weeks of gestation. Prophylactic antibiotics used were cephalosporins, penicillins and metronidazole for 5-7 days. 70% of women delivered vaginally. Maternal complications like puerperal sepsis (12%), Chorioamnionitis (5%), Abruption placenta (5%) were seen. About 23(57%) neonates were admitted to NICU for complications like preterm birth (45%), RDS (32.5%), sepsis (10%) and intraventricular haemorrhage (2.5%).

Conclusion: Antibiotic prophylaxis prolonged the latency period and improved neonatal outcome. Maternal and neonatal complications related to PPRM is reduced with few cases of neonatal sepsis and chorioamnionitis which can be averted by periodic review of antibiotic policy.

Key-words: Antibiotic prophylaxis, Preterm premature rupture of membranes, Antibiotic policy

Relative expression of calcium dependent phospholipid binding protein Annexin A2, Annexin A1 and VEGF in placenta of Preeclampsia

P187

Komal Ruikar,
SDM College of Medical Sciences and Hospital,
Dharwad.

Background: Preeclampsia is associated with altered angiogenesis, fibrin homeostasis exacerbated inflammatory response. Annexin A2 which is a pro-fibrinolytic receptor play an important role in plasminolysis and extracellular proteolysis and is an indispensable requirement for formation of new blood vessels. Annexin A1 (AnxA1) is a glucocorticoid-regulated protein endowed with anti-inflammatory properties.

Objective: The objective of the present study was to examine the expression and correlation of Annexin A2 Annexin A1 and vascular endothelial growth factor (VEGF) in the third trimester placental bed of pregnancies with and without preeclampsia (PE).

Methods: The study group consisted of placental tissues obtained from women with (n = 20) and without (n = 20) PE. The normotensive controls without PE were matched for gestational age at delivery with patients with PE. The expression of Annexin A2, Annexin A1 and VEGF in the placental tissues was evaluated using Immunohistochemistry and Immunoblotting.

Results: There was no statistical difference between the PE group and the normotensive control group in age and body mass index (BMI). The expression of Annexin A2 and VEGF was significantly decreased, while Annexin A1 is significantly increased in the PE group compared with the normotensive control group (P < 0.05).

Conclusion: This result suggests that altered expression of these angiogenic and inflammatory proteins in placenta may be associated with the pathogenesis of PE.

Key-words: Annexin A2, Annexin A1, vascular endothelial growth factor, preeclampsia (PE)

Study of blood pressure changes in different phases of menstrual cycle in age group 18-30 years

P188

Devika K, R. Anitha, Geetha Shavali
Upgraded Department of Physiology, Osmania
Medical College. Hyderabad.

Background: Menstrual cycle is an integral part of life in Women. Hormonal changes associated with menstrual cycle are known to affect different systems. Fluctuations in the female sex hormones during different phases of menstrual cycle - follicular, ovulatory & luteal phases may affect the cardiovascular functions.

Objective: To study the Blood Pressure changes in different phases of menstrual cycle in 18-30 yrs with regular menstrual cycle (28-35 days' cycle).

Methods: BP recordings of 30 female subjects in different phases of menstrual cycle were recorded in Ladies Hostel, OMC, Hyderabad. Inclusion criteria: Subjects with regular menstrual cycle (28-35 days' cycle) were included in the study. Exclusion criteria:

History of Irregular periods, PCOD, H/O Thyroid dysfunction, Pregnant women were excluded from the study.

Results: Mean systolic BP was higher in follicular phase & decrease in luteal phase. Eventhough the differences were observed, there was no statistically significant difference in both systolic & diastolic BP during different phases of menstrual cycle.

Conclusion: Cardiovascular changes are brought about by the action of female sex hormones on heart & blood vessels. But these subtle changes are corrected by neurohumoral mechanisms. However, to substantiate our findings further investigation is required with more subjects.

Key-words: Blood pressure, phases of menstrual cycle

Analysing Quality of life with HPLP-II in patient with polycystic ovary syndrome (PCOS)

P189

Sunil Chouhan , Rajay N Bharshanker , Ruchi Singh, Rachna Parashar ,Sandip Meghnad Hulke, Ankur Joshi.

AIIMS, Bhopal.

(sunil.physiology@aiimsbhopal.edu.in)

Background: Various studies have shown Polycystic ovary syndrome (PCOS) patient have anxiety, depression, and sleeping problem, thus compromising health lifestyle. This study tries to evaluate relationships and behaviours pattern between different health-promoting lifestyle in POCS patients.

Objective: Assessment of quality of life with the help of HPLP-II (Health Promoting Lifestyle Profile) in the patient of polycystic ovarian syndrome (PCOS).

Methods: Sixty two PCOS patients (mean age = 24.54 ± 2.63 years) were evaluated for health-promoting lifestyle by HPLP-II in the OPD of Obstetrics and Gynaecology, AIIMS, Bhopal. The comparison of POCS patient was done with the control group, which was composed by 31 healthy women (mean age = 23.20 ± 3.9 years). The data obtained was analysed by descriptive statistics, one-way analysis of variance and Student's t test using SPSS software.

Results: The HPLP-II total means (SD) score overall in the POCS and control were 0.703 ± 0.34 and 1.43 ± 0.46 respectively. In the subscale of HPLP-II, interpersonal relations 22.55 ± 7.41 has the highest mean subscale score and Physical activity 12.35 ± 1.49 had the lowest mean subscale score. A significant correlation coefficient was seen in POCS patient and

HPLP-II subscale of physical activity, spiritual growth and stress management while non significant correlation coefficient was found in the health responsibility, interpersonal relations and nutrition subscale.

Conclusion: Based on these results different policy and strategies should be made apart from medical treatment to be implemented in women to change their life style into positive health behaviors, thus improving POCS patient wellbeing.

Key-words: polycystic ovarian syndrome, HPLP-II, women, Quality of life

Cost Variation Analysis of various brands of topical medications used in Acne vulgaris currently available in Indian Pharmaceutical Market

P190

Vishakha, A Geetha

Department of Pharmacology, Bangalore Medical College and Research Institute, Bengaluru

Email ID:drvishakhadv@gmail.com

Background: Acne vulgaris is a chronic inflammatory skin disease affecting 90% individuals between puberty and 30 years, causing significant physical & psycho-social impact. Cost of drugs are important factor influencing compliance with treatment.

Objectives: To analyze the cost variation of different brands of topical acne medications available in Indian market

Methods: Minimum and maximum cost of various topical medications used in treatment of Acne vulgaris of same strength and formulation were obtained from Current Index of Medical Specialties (CIMS) April- July 2018 edition, Drug Today July- September 2018 edition and PharmaSahiDaam mobile app (developed by National Pharmaceutical Pricing Authority, GoI). Drugs manufactured by only 1 company were excluded. Cost ratio (Maximum cost/ Minimum cost) and percentage cost variation ($\frac{\text{Max cost} - \text{Min cost}}{\text{Min cost}} * 100$) were calculated.

Results: The percentage cost variation was maximum for Clindamycin 1% 10grams gel (467%) with maximum cost ratio followed by Clindamycin 1% + Nicotinamide 4% 15 grams gel (335.8%) and Adapalene 0.1% 15 grams gel (190.6%). Percentage cost variation was minimum with Clindamycin 1% + Nicotinamide 4% 15grams ointment (7.1%),

Conclusion: This study highlights price variation among different brands of drugs in CIMS, Drug Today and PharmaSahiDaam app. Wide variation in the prices cause dissatisfaction with treatment and unnecessary economic burden on young population. There is a strong need to create awareness about this price variation among the general public and health care providers.

Key-words: Cost analysis, Acne vulgaris, Percentage cost-variation, PharmaSahiDaam

Cost comparison of antihypertensive drugs available in India with DPCO price list

P191

Rahul Kumar, Narendra Kumar, RK Dixit, Rajendra Kumar, Akhlaque Ahmed, Sarvesh Singh

King George's Medical University, Lucknow, India
Email id: rahulkgmu@gmail.com

Background: DPCO price list is issued by NPPA each year to guide the pharmaceuticals companies for controlling the prices in India. Some drugs cost more than the DPCO list. As antihypertensive drugs are taken lifelong once diagnosis made, price variation and costing above prescribed price cause a huge economic burden on such patients.

Objectives: This study is undertaken to know the number of antihypertensive drugs brands with price above the recommended DPCO price list 2017.

Methods: We collect the data from Medguideindia.com, CIMS, Drug Today, and compared the listed antihypertensive drugs of various available brands in India with DPCO price list 2017. We didn't compared the drugs price with latest DPCO list 2018 as it is recently released in April and Pharma companies and drug information books need some time to be updated.

Results: We collected the data of 30 formulations of 16 antihypertensive drugs. The total number of available brands of all formulations is 1365 out of which only 831(60.88%) brands found to have price < DPCO recommended list. 534 (39.12%) brands have price more than the recommended limit.

Conclusion: Large number of brands are not following the regulations and are violating the limit set by NPPA/DPCO.

Key-words: Drug Price, DPCO, NPPA, anti hypertensives

Cost analysis of commonly used antidepressant drugs under drug price control in India

P192

Narendra Kumar, Rahul Kumar, Sarvesh Singh, Alisha Abbas, Reshma Chaudhary, R K Dixit

Department of Pharmacology and Therapeutics, K.G.M.U, Shahmina road, chowk Lucknow-226003
Email id- narenkgmu@gmail.com

Background: Price of a drug is an important factor for compliance to the treatment. So to overcome the high prices of drugs National Pharmaceutical Pricing Authority (NPPA) under government of India has issued Drug Price Control Order (DPCO) list containing commonly used drugs. Pharmaceutical companies can be punished if they keep their prices higher than the ceiling price mentioned in the DPCO.

Objective: To find out the price variations of commonly used antidepressant drugs included in Drug Price Control Order (DPCO) List of 1st April 2017.

Methods: 1. A list of all oral antidepressant drugs included in DPCO of 1st April 2017 and available in Indian market was procured from www.medguideindia.com.

2. Analysis of number of total brands following as well as not following DPCO ceiling price was done.

Results: We found 15 formulations of three antidepressant drugs included in DPCO. Total 500 brands found out of which 83.6% were following the DPCO and 16.4% of brands prices were above the ceiling price of DPCO.

Conclusion: Though large number of companies are following the DPCO but still strict regulation is needed to further increase the compliance of guidelines.

Key-words: Antidepressants, NPPA, DPCO, Drug price

Roxithromycin Induced Stevens - Johnson Syndrome: A Case Report

P194

Venkatesh K M, Rajendra Holla

Department of Pharmacology, KSHEMA, Mangaluru, Karnataka
Email:venkyppc@gmail.com

Background: Adverse drug reaction is the hazardous outcome of a drug therapy which can occur with many

different classes of drugs. Stevens – Johnson syndrome is a life threatening delayed type of hypersensitivity adverse drug reaction characterized by fever, blisters, dysphagia, eye discharges and areas of exfoliation commonly implicated with anticonvulsants, antibiotics and Non-steroidal anti-inflammatory drugs (NSAIDS). Roxithromycin is a semisynthetic macrolide, rarely reported to cause Stevens - Johnson Syndrome. If left untreated, this can lead to complications like sepsis and multiorgan failure leading to death.

Objectives: To report a case of Stevens – Johnson Syndrome (SJS) in a man treated with oral roxithromycin for lower respiratory tract infection.

Methodology: A case report of an adverse drug reaction to roxithromycin. Patient's detailed history was collected and followed up till discharge.

Results: A 20-year-old male patient was treated with Roxithromycin for lower respiratory infection presented with symptoms of Stevens - Johnson syndrome. He was treated with immunosuppressants, antibiotics and other supportive measures which helped him in his recovery.

Conclusion: The case report emphasizes the need for observing the patients closely in the initial period of treatment which helps in early recognition and treatment of adverse drug reaction. An efficient adverse drug reaction reporting program on an institutional level contributes in developing a sound pharmacovigilance system in the country.

Key-words: Adverse drug reaction, Roxithromycin, Stevens- Johnson Syndrome

An Interesting Rare Case of Mirtazapine Induced Night Mares.

P195

Sree Sudha TY, Ch. Venkata Naga Saritha

Dept. Of Pharmacology, Santhiram Medical College, Nandyal, Kurnool, Andhra Pradesh - 518502.
Email: sudhambbs2010@gmail.com

Background: Depression is a disorder of mood and can affect people of all walks of life. Antidepressants elevate mood in depressive illness. Mirtazapine is an atypical antidepressant which enhances noradrenergic and serotonergic transmission by blocking central 2-adrenergic auto receptors and hetero receptors. It is called as "noradrenergic and specific serotonergic antidepressant" (NaSSA). It is highlighted as the best, fulfilling the needs for tolerability and safety in overdose; used for treatment of anxiety, depression with insomnia.

Case Presentation: A 48-year-old male patient who came to Psychiatry department with chief complaints of lack of interest i.e.; pervasive in nature, lack of pleasurable activity, sleep disturbances, crying spells, and socio-occupational functioning has been decreased. He was diagnosed as moderate depression with insomnia, and prescribed Tab. Mirtazapine 15 mg oral OD at night. After one week, patient presented with complaints of night mares (unknown person trying to kill him and was shouting, crying in his dreams). He was advised to stop the drug and prescribed Tab. Fluoxetine 20 mg OD. Thereafter no such complaints were raised by the patient.

This case was reported from Psychiatry department to the ADR Monitoring center at SRMCGH and was uploaded on Vigiflow as ADR. According to WHO-UMC causality scale, it was a probable reaction to Mirtazapine.

Conclusion: Mirtazapine induced nightmares is a rare adverse reaction. Temporal relationship being established, suggests a causal role for Mirtazapine in inducing ADR.

Key-words: Psychiatry; Mirtazapine; Nightmares; Adverse drug reaction; Depression

A Case Report On Fixed Drug Eruption with NSAID Cocktail.

P196

Anjaly Mary Varghese*, T.Y Sree Sudha, Vangoori Yakaiah, C.Deepalatha

Dept. of pharmacology, santhiram medical college, (dr.ntr university of health sciences), nandyal, kurnool. a.p. - 518502
Email: niya4niky@gmail.com

Introduction: Non steroidal anti-inflammatory (NSAIDs) are the class of analgesics that selectively relieves mild, moderate pain. NSAIDs are used rampantly as it is available even as over the counter medication. The present reaction is due to the NSAID combination used in a dental patient.

Description Of The Case: A 22 year old female patient took treatment for tooth ache from the local RMP (Aceclofenac 100 mg + Paracetamol 500 mg + Nimesulide 100mg). Within one day, she developed small fluid filled lesions over the right upper limb, slowly progressed to lower limbs, abdomen, genital area and aphthous ulcer over oral buccal mucosa.

After six days, she arrived at Department of Dermatology with multiple discrete vesicles, bilaterally symmetrical, distributed all over body and was admitted in the ICU. She was diagnosed as a case

of 'Bullous Fixed drug eruption' due to three drug NSAID combination. The drug combination was discontinued and she was treated symptomatically. She recovered within 30 days. This case was reported to the ADR Monitoring center at SRMCGH and was uploaded on Vigiflow. According to WHO- UMC causality scale, it was a probable reaction. It was a severe type of reaction which required prolonged hospitalization. Performing a rechallenge was not possible because the reaction was too risky and fatal.

Conclusion: NSAID induced 'Bullous Fixed drug eruption' can be fatal if untreated timely. Hence, it is suggested that NSAIDs should not be taken without physician's advice. It is imperative to check the use of NSAIDs as self medication as it poses health risk.

Key-words: NSAIDs; Bullous fixed drug eruption; Adverse drug reaction

An unusual case of human intravenous immunoglobulin induced erythema multiforme in a child

P197

Amrita Parida¹, Kamalakshi G Bhat², Ashwin Kamath¹, Rashmi R Rao¹

¹Department of Pharmacology, ²Department of Paediatrics, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Karnataka, India.

Email: amrita.parida@manipal .edu

Background: Human Intravenous immunoglobulin (IVIG) is currently used for diverse number of immunological and inflammatory conditions. It is considered a safe drug with fewer adverse effects. The adverse effects could be mild like headache, nausea and back pain or serious reactions like aseptic meningitis, renal failure, anaphylaxis and thrombotic events. We are reporting a rare case of IVIG induced erythema multiforme in a four year old female child.

Observations: She was diagnosed with acute disseminated encephalomyelitis and started on IVIG along with few other drugs. The child tolerated the initial doses of IVIG well, however following the fifth dose, she developed multiple erythematous maculopapular rashes over the trunk and upper limbs associated with itching. A diagnosis of IVIG induced erythema multiforme was made. Other drugs were continued. The skin lesions were treated with oral steroids, calamine lotion and antihistaminics. The child recovered completely within a week. The above case was assessed for adverse drug reaction (ADR) causality by use of the WHO-UMC scale and was categorized as a 'probable/likely'.

Conclusion: Though human IVIG is a relatively safe drug, physicians should be aware of its possible adverse effects and able to diagnose and treat them effectively.

Key-words: Human intravenous immunoglobulin (IVIG), erythema multiforme, drug allergy

Hand-Foot Syndrome Secondary to Sunitinib

P198

Sayan Kumar Das, Meena Kumari, Shalini Adiga

Dept. of Pharmacology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, India,

Email: dr.sayankumardas@gmail.com

Introduction: Sunitinib is a multi-target Tyrosine Kinase Inhibitor. By targeting receptors for platelet-derived growth factor (PDGF) and vascular endothelial growth factor (VEGF), it modulates tumour angiogenesis and instigates apoptosis of the cancer cells which ultimately results in tumour shrinkage. Inhibition of CD117 by Sunitinib makes it a drug in the second line of treatment of Imatinib resistant GIST. Although the development of dermatological adverse effect like Hand Foot Syndrome (HFS) are quite common with Sunitinib, the exact mechanism of occurrence is not known.

Objective: To report a case of Hand Foot Syndrome secondary to Sunitinib

Case Presentation: A 53-year-old male patient who is a known case of bilateral mucus adenocarcinoma of kidney with metastasis and had undergone left partial nephrectomy and palliative radiotherapy. He was started on Sunitinib for adenocarcinoma of the kidney following which he presented to the OPD with the complaints of ulcers over his legs, gluteal region and upper limbs and was diagnosed as a case of HFS. He was treated symptomatically for the lesions.

Result: The causality of the adverse drug reaction was analysed using Naranjo's algorithm, which gave us a score of 10, denoting a 'definite' causality.

Discussion: Although HFS is a common adverse effect which is encountered by the use of tyrosine kinase inhibitors, the exact pathogenesis of the manifestation is still unclear and theories have been hypothesised to delineate the mechanism of occurrence. The severity of HFS can be assessed by using the NCI-CTCAE scale of grading.

Key-words: Sunitinib, Tyrosine Kinase Inhibitor, Ulcer

Racecadotril Induced Hypersensitivity

P199

Prachi Priyadarshini, Reena Parveen

Dept. of Pharmacology, Kasturba Medical College, Manipal University, Manipal, India
Email:prachi792@gmail.com

Introduction: Racecadotril (acetorphan) is an antidiarrhoeal agent. As an anti-secretory agent, it inhibits excessive secretion of water and other electrolytes into the intestinal lumen by inhibiting enkephalinase, thereby preventing degradation of endogenous enkephalin. Racecadotril is known to have a favourable toxicity profile. There are very few reports regarding its hypersensitivity potential.

Objective: To report a case of Racecadotril induced Hypersensitivity

Case Presentation: As a part of Pharmacovigilance program at Kasturba Medical College, Manipal, information was collected about a female patient aged 45years, diagnosed as carcinoma head of pancreas post operative, post chemotherapy and radiotherapy. She was on oral pancreatic enzyme supplement Dimethicon. She was admitted with complaints of frequent watery stools, 5-6 episodes per day, associated with pain abdomen, fever with chills and rigors for past one month. Abnormal laboratory parameters indicated protein losing enteropathy. Tablet Racecadotril 100mg once daily was started. Few hours following the first dose, she complained of swelling over both cheeks and rash over both arms associated with itching. Racecadotril was withdrawn. Symptomatic treatment was given. Patient improved significantly over next day.

Result: The causality of the adverse drug reaction was analysed using Naranjo's algorithm, which gave us a score of 7, denoting "probable" causality.

Discussion: Various trials have shown skin irritation and hypersensitivity to racecadotril, but very few incidents have been reported. In view of the rarity of this adverse effect, this report illustrates the potential for hypersensitivity with use of racecadotril and the need for better vigilance.

Key-words: Racecadotril; Hypersensitivity; Itching

Study of adverse drug reactions (ADRs) due to NSAIDs on the basis of age and gender at secondary and tertiary care hospitals of Sikkim

P202

Chandrakala Sharma¹, Namgay Bhutia²

¹Department of Pharmacology, Sikkim Manipal Institute of Medical Science, Gangtok, Sikkim. ²Health

and Family Welfare Department, Government of Sikkim

E mail: smimsck@gmail.com

Background: ADRs are one among the leading cause of death. Detection and monitoring of ADRs is of vital importance for patient safety, as more than 50% of approved drugs are associated with some type of adverse effects that are not detected prior to their approval for clinical use.

Objectives: Study of adverse drug reactions due to (NSAIDs) among adults on both out and inpatient basis in hospitals of Sikkim.

Methods: A Cross Sectional study was conducted among out and inpatients, reporting to hospitals of Gangtok. The study was conducted upon approval by the Institutional Ethics Committee (IEC). The data for suspected adverse drug reactions was collected and recorded in case record forms and suspected ADRs forms circulated by CDSCO. The data were transferred to secure Excel data files and analyzed using SPSS 20.0

Results: Total 109 cases of adverse drug reactions to analgesics were collected. Majority of participants were females (62.38 %) and overall affected age group was 61 – 70 yrs (22.93 %). Common complaint were nausea/vomiting (31.19 %) followed by skin rash (27.52 %). GIT was the most affected organ. Majority of reaction were of mild type (72.48 %) with the outcome observed as "recovered". Diclofenac (n = 59) was involved in majority of ADRs followed by Paracetamol, Aceclofenac and Ibuprofen, least with Nimesulide.

Conclusion: Similar type of study can be undertaken with large sample size. Awareness can be brought about at all levels of health facilities for regular reporting of ADRs to Pharmacovigilance centre.

Key-words: Sikkim, adverse drug reactions, pharmacovigilance

Anxiolytic and Antidepressant Activity of Mosapride in Wistar Albino Rats

P204

Navin Patil¹, Vybhavakrishna², Sweenly Sunny²

Dept of Pharmacology, KMC Manipal
Email: navin.patil@manipal.edu

Background: Currently SSRIs are being used for anxiety and depression. But these drugs have a limitation that they take 2-4 weeks to exert their action. Studies on 5HT₄ receptor agonists have shown positive results as fast acting antidepressant. Mosapride is 5HT₄ agonist, and 5HT₃ antagonist. So,

objective of current study was to evaluate the effect of mosapride on behavioural animal models of anxiety and depression.

Methods: Two doses of mosapride (1.5mg/kg and 3mg/kg) were used in the current study Diazepam and imipramine were used as standard drugs to compare the results in anxiety and depression models respectively in Wistar albino rats. For anxiety, animals were tested first in open field followed by elevated plus maze model. For depression, forced swim test and chronic unpredictable stress with sucrose preference test were done. All the results were analysed by Analysis of Variance with appropriate post hoc tests.

Results: In elevated plus maze test, the mosapride treated animals showed significant anxiolytic effect at dose of 1.5mg/kg but in open field test, there was a significant anxiolytic effect at both 1.5mg/kg and 3 mg/kg compared to control group animals. In forced swim test there was a statistically significant increase in climbing and swimming was observed in mosapride treated animals. Sucrose preference was reduced in control which was reversed by mosapride.

Conclusion: Mosapride has shown significant anxiolytic and antidepressant effect at clinically used dose.

Key-words: anxiety, depression, serotonin

Study of Brain Stem Auditory Evoked Potential in Diabetic patients

P205

Mishra Indira Sushil

Dept of Physiology, Dr.BSA Medical College, Delhi

Background: Type 2 Diabetes Mellitus patients suffer from sensory neural hearing loss, more severe loss at higher frequencies. Brainstem Evoked Response of Audiometry (BERA) detects acoustic and central neuropathy.

Objectives: Primary: To study BERA in Type 2 Diabetes Mellitus. Secondary: To correlate the study parameters of Diabetic patients with the control group.

Methods: N= 25 control group matched with age of study group, N= 25 Type 2 Diabetes Mellitus patients of either sex, 35-50 years selected from the Diabetic Clinic of GMC, Aurangabad, Maharashtra. HbA1C for glycemic control and BERA to assess central neuropathy were done.

Statistical Analysis: Unpaired student t test.

Results: Mean \pm SD of the BERA waves and interpeak latency at 2 KHz and at varying intensity of 70db, 80db

and 90db in group 2 of Diabetic patients were delayed and significant as compared to control group of Diabetic patients.

Conclusion: If BERA is done in Diabetic patients, central neuropathy can be detected earlier in Diabetic group of patients and will reduce the morbidity rate.

Key-words: Type 2 Diabetes Mellitus, BERA (Brainstem Evoked Response of Audiometry)

Effect of progressive muscle relaxation on DASS score & reaction time

P206

Anitha OR, Umadevi B, Christofer Thomas

Department of Physiology, Sapthagiri Institute of medical Sciences & Research Centre

Background: Reaction time is a reliable indicator of rate of processing of sensory stimuli by central nervous system and its execution in the form of motor response. It is found to be altered by many factors which affect sensory as well as motor system like physiological stress, mood, etc. Many kind of meditation interventions have shown to reduce stress, but less has been proved about the effect of progressive muscle relaxation on stress and reaction time.

Objective: The present investigation was undertaken to study the effect of progressive muscle relaxation on visual and auditory reaction times (RTs) & on DASS Score.

Methods: Thirty-three student volunteers were given progressive muscle relaxation training daily for 6 weeks. DASS score was done, visual & auditory reaction time was recorded before & after the training period. The readings were compared within the group & also with the age matched 33 controls.

Results & interpretation: There was decrease in the DASS score after the training. There was a significant ($P < 0.001$) decrease in visual RT (from 255.4 ± 58.0 to 208.6 ± 37.8) as well as auditory RT (from 225.2 ± 061.4 to 187.9 ± 038.5)

Conclusion: Our results show that practicing positive muscle relaxation results in significant reduction in visual and auditory RTs and also the DASS Score. Thus we can conclude that progressive muscle relaxation is a very effective tool in decreasing the stress levels in individuals & help students to concentrate better & excel in their studies.

Key-words: reaction time, progressive muscle relaxation, DASS Score

Evolution of left-right asymmetry from matter to mind: role of gene in living systems

P207

Anuradha J Sreedhar, Ravindran Rajan

Department of Physiology, Dr. ALM PGIBMS, University of Madras.

Background: Life is a function of asymmetry of the universe. The consequences of this fact is that all living species are primordially, in their structure and behaviour, functions of cosmic asymmetry. The most striking feature of asymmetry is that it is present in the simplest atom as well as in the complex brain. 1) Matter Asymmetry: Baryon asymmetry or matter-antimatter asymmetry; Electron-Positron asymmetry; Concept of parity (Neutrino) 2) Molecular Asymmetry: Stereochemistry in crystals (sugar) and chirality of carbon (amino acids) 3) Body Asymmetry: Handedness 4) Brain Asymmetry: Cognitive functions.

Objective: To link the role of gene with asymmetry in brain and its behaviour.

Methods: Literature was collected on left-right asymmetry in matter and mind and an analysis was done linking the two. Further study was done to find the role of gene in brain asymmetry.

Results: PCSK6, Proprotein Convertase Subtilisin/Kexin Type 6, is a Protein Coding gene. PCSK6 protease cleaves NODAL, a secretory protein, into an active form to help trigger the development of left/right (LR) asymmetry. It appears that this gene is important for left-right asymmetry in the brain.

Conclusion: Experimental study using gene silencing technique by RNA interference method can confirm the exact role of the gene in brain asymmetry.

Key-words: matter-antimatter asymmetry, stereochemistry, handedness, brain asymmetry, PCSK6 gene

Prenatal synergistic dietary supplementation of choline and DHA attenuate gestational stress induced deficit in milestones of developmental reflexes in rat pups

P208

Huban Thomas R¹, Kumar M R Bhat², Kiranmai S Rai³

¹Department of Anatomy, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, India, ²Department of Anatomy, Ras Al Khaimah College of Medical Sciences, RAK Medical & Health Sciences University, Ras Al Khaimah, UAE, ³Department of Physiology, Manipal Melaka Medical College, Manipal Academy of Higher Education, Manipal, India

E Mail: huban_anatomy@yahoo.co.in

Background: Maternal stress during pregnancy affects the intrauterine growth, birth weight, head circumference, cognitive ability, motor maturity and motor activity of the offspring. Choline and DHA are essential nutrients for development of brain. Dietary intake of choline or DHA by pregnant mothers directly affects fetal development.

Aim: The present study assessed the physical, sensory and motor developmental reflexes in rat pups born to stressed mothers and compared with those supplemented with choline and or DHA during entire gestational period.

Methods: Pregnant dams were divided into six groups - Normal control [NC], Saline control [SC], Stress [STR], Stress + Choline [STR + C], Stress + DHA [STR + DHA], and Stress + Choline + DHA [STR + C + DHA]. NC dams were undisturbed, during the entire gestation period. Stress groups of dams were exposed to restraint stress from E11 to delivery. Saline, Choline and / DHA were supplemented to respective groups of dams during entire gestation [E0 to delivery]. Following delivery, neonates were tested for physical and developmental reflexes up to weaning.

Results: Prenatally stressed rat pups showed significant decrease ($p < 0.001$) in developmental reflexes compared to the same in age matched NC, SC groups. Rat pups exposed to prenatal stress and supplemented prenatally with both choline and DHA, showed significantly ($p < 0.001$) attenuated gestational stress-induced deficit in milestones of development and reflexes when compared to the same in age matched STR rat pups.

Conclusion: Synergistic supplementation of choline and DHA during prenatal stressed gestation in rats, attenuates stress-induced deficits in fetal development and reflexes of offspring.

Key-words: Choline, DHA, prenatal stress, supplementation, fetal development

Exploratory behaviour and oxidative stress changes in stressed rats treated with virgin coconut oil

P209

Chitra Pai K¹, Anupama N¹, Nayanatara Arunkumar¹, Anupama Hegde², Sowndarya K², Roopesh Poojary¹

¹Department of Physiology, ²Department of Biochemistry, Kasturba Medical College, Manipal Academy of Higher Education (MAHE), Mangalore. Email ID: chitrapaikulyadi@gmail.com

Background: Stress, which is constant and persists over an extended period of time, can be psychologically and physically debilitating. Virgin

coconut oil(VCO) is the finest and purest grade of coconut oil available. VCO is rich in medium chain fatty acids (MCFAs) and polyphenols, known to have a potential antidepressant function. Therefore, it may be used as anti-stress and antidepressant nutritional oil.

Objectives: To evaluate whether VCO influences exploratory behaviour of rats exposed to chronic unpredictable stress (CUS) through changes in oxidative stress.

Methods: Inbred Wistar rats (n = 24) were divided into four groups. Controls, group exposed to CUS, VCO treated group, and CUS+VCO group. The rats were exposed to various acute stressors randomly and fed VCO by oral gavage (2 ml/kg body weight) for 21 days. Following open field test, lipid peroxidation marker (malondialdehyde) and antioxidant (reduced glutathione) levels were estimated in liver and brain tissue by Kei Satoh's method (malondialdehyde) and method of Moron et al. (reduced glutathione). Data were expressed as mean \pm SD (Kruskal-Wallis H test and Mann-Whitney U test). $p < 0.05$ was considered as statistically significant.

Results: Open field test showed improvement in exploratory and anxiety-like behaviour in VCO treated stress rats. There was a significant decrease in lipid peroxidation and re-establishment of anti-oxidant glutathione levels in brain and liver in VCO treated stressed rats in comparison to stressed rats.

Conclusion: This study confirms the modulatory effect of VCO on oxidative stress and cognitive impairment in rats exposed to stress.

Key-words: VCO, stress, malondialdehyde, reduced glutathione, open field test

Blood Pressure variation to a single session of Suryanamaskara practice

P210

Kola Hemalatha¹, Mamatha SD¹, Smitha MC²

¹Department of Physiology, ²Department of Community Medicine, JSS Medical college, JSS Academy of Higher Education and Research, Mysuru, India

Background: Surya Namaskara (SN) is a popular traditional Indian yoga practice called Sun Salutation. It is a series of 12 physical process performed with control Breathing. Previous studies have shown Regular practice produces statistically significant reduction in pulse rate, which is attributed to increased vagal tone and decreased sympathetic activity. The present study was carried out to investigate the blood pressure responses to a single session of

Surya Namaskara

Objective: To know whether there is any variation in the Blood Pressure following a single session practice of SN in healthy subjects

Methods: It was an interventional study design where 50 healthy students of both genders aged between 18-23 years were selected and their Systolic Blood Pressure, Diastolic Blood Pressure was recorded using Mercury Sphygmomanometer. Pulse pressure, Mean Arterial Pressure and Rate Pressure Product were calculated and later the students were asked to perform SN for 30 minutes and immediately their systolic blood pressure, diastolic blood pressure, was measured following which the students were asked to relax and after 5 minutes the Systolic Blood Pressure, Diastolic Blood Pressure, were measured and Mean Arterial Pressure, Pulse Pressure and Rate Pressure Product were calculated and these all were compared and analysed.

Results: There was significant increase seen in SBP, PP, HR, RPP immediately following SN and after 5 minutes relaxation the reading in all above parameter came back to normal.

Conclusion: The findings of our study showed that there is increase sympathetic activity following single session of Surya Namaskara practice.

Key-words: Yoga, Surya Namaskar, blood Pressure changes

Assessment of resting cardiovascular parasympathetic modulations in a normal menstrual cycle by daily recordings

P211

Hemalatha Manjeshwara¹, Milind V. Bhutkar², Amudharaj Dharmalingam³, Palaniswamy Hariharan¹

¹Aarupadai Veedu Medical College, Kirumampakkam, Puducherry, ²Vinayaka Missions Kirupananda Variyar Medical College, Salem, Tamilnadu, ³All India Institute of Medical Sciences, Mangalagiri, Andhra Pradesh
Email: sunrosehema2004@gmail.com

Background: Female sex hormones exert significant influence in the functioning of the cardiovascular system. Gender differences in cardiovascular health and disease which are largely attributed to the sex hormones. Menstrual cycle is associated with changes in female hormonal levels. It is expected that there might be significant changes in the cardiovascular functioning in a normal menstrual cycle. Fewer studies done in the past revealed conflicting findings and none with daily assessment of the cardiovascular autonomic functioning.

Objectives: The study has the goal of finding the changes in the cardiovascular parasympathetic functioning in a normal menstrual cycle. The objectives of the study are,

1. To record resting short term heart rate variability (sHRV) in 60 young healthy adult females everyday of a single menstrual cycle.
2. To analyse the trend in the indices of cardiovascular parasympathetic activity throughout the menstrual cycle through the daily sHRV recordings

Methods: 60 young healthy adult females of age 18-22 years were included in the study after a careful medical history, clinical examination, inclusion and exclusion criteria. Lead II ECG was recorded digitally and sHRV computed using HRV 1.1 software. Task Force recommendations were followed. Parasympathetic indices were analysed using repeated measures ANOVA and trendline analysis.

Results: Alterations were observed in parasympathetic indices along the menstrual cycle. Higher parasympathetic activity was observed during the later part of the cycle. Trendline analysis revealed a non linear equation as a curve of best fit.

Conclusion: Menstrual cycle alters the cardiovascular parasympathetic activity in young healthy adult females.

Key-words: Parasympathetic, menstrual, daily, HRV

Perceived stress level scorings and their correlations with cardiovascular autonomic activity in postovulatory phase of menstrual cycle in healthy young female medical students

P212

Adyasha Senapati¹, Hemalatha Manjeshwara¹, Amudharaj Dharmalingam², Palaniswamy Hariharan¹

¹Aarupadai Veedu Medical College, Kirumampakkam, Puducherry. ²All India Institute of Medical Sciences, Mangalagiri, Andhra Pradesh
Email: adyashas19@gmail.com

Background: Cardiovascular autonomic activity is altered in physical stress. Perceived stress score (PSS) is a questionnaire tool to measure mental stress levels. Medical course is rated as highly stressful among various professional courses. Studies observed correlations between stress and autonomic activity and also differences in autonomic activity between various phases of menstrual cycle. Fewer studies were conducted to correlate the PSS with cardiovascular autonomic activity in postovulatory phases of menstrual cycle in healthy female medical students.

Objectives: The study has the goal of associating the stress levels with cardiovascular autonomic activity in postovulatory phase of menstrual cycle. The objectives of the study are,

1. To score the stress levels through PSS in 30 young healthy female medical students.
2. To analyse the short term heart rate variability (sHRV) in aforementioned study subjects in postovulatory phase.
3. To correlate PSS scores with indices of sHRV in postovulatory phase of menstrual cycle.

Methods: Thirty healthy young medical students were included in the study after analysing for the inclusion and exclusion criteria. PSS and sHRV analysis done as per Task Force recommendations in post ovulatory phase. Indices of sHRV were correlated with PSS scores in postovulatory phases of menstrual cycle by spearman correlation analysis.

Results: Indices of sympathetic and parasympathetic activities correlated significantly and differentially with PSS. Significant negative correlations were observed between overall sHRV with PSS in post ovulatory phase.

Conclusion: Associations between stress levels and cardiovascular autonomic activity were significant in the postovulatory phase of menstrual cycle.

Key-words: PSS, HRV, menstrual, autonomic, postovulatory

Comparison of effect of single bout of exercise and yoga on modulation of Heart Rate Variability

P214

Mamatha S D¹, Rajalakshmi R¹, Smitha M C²

¹Department of Physiology, ²Department of Community medicine, JSS Medical College JSS Academy of Higher Education and Research, Mysuru. drpachumamtha@gmail.com

Background: Heart rate variability (HRV) analysis is a non-invasive assessment of tonic autonomic regulation. Exercise is referred as double-edge sword, even though regular physical exercise improves the autonomic functions, sudden death reported during or immediately after exercise is attributed to changes in autonomic tone. There are studies focused on effects of exercise and yoga training on HRV, but less is known about immediate effects.

Objectives: To assess the modulation of autonomic functions following single bout of exercise & yoga in healthy individuals.

Methods: 60 healthy subjects, aged 18-25 years, of both gender were divided into two groups, group 1 for aerobic exercise and group 2 for suryanamaskar (SN). Basal HRV was recorded in both groups using standard procedure on subjects in relaxed, comfortable supine position, in sound attenuated room by AD powerlab instrument. HRV was recorded, immediately, after 30 minutes of activity in both groups.

Results: At basal level there was no differences in values measured, the significant increase in Heart rate, LF/HF ratio and decrease in High frequency(HF) domain in both groups was observed immediately after the activity. There was reduction in values of LF/HF ratio and increase in HF in SN performers compared to exercise group which was not significant.

Conclusion: This indicates that sympathetic activity is greater immediately after both exercise and SN. Even though the comparison between exercise and SN shows no significant difference in HRV parameters, the values suggests less sympathetic activity in SN compared to exercise.

Key-words: Aerobic exercise, Suryanamaskara, HRV, Autonomic functions

Evaluation of Cardiac Autonomic Neuropathy outcome in type 2 diabetes mellitus patients after maintaining two months of sustained euglycemia

P215

Abhijeet Srivastava¹, Deben Singh Laishram¹, Ksh Achouba Singh², Rolinda Rajkumari¹

¹Department of Physiology, ²Department of Endocrinology, JNIMS, Imphal
(Email id: drabhijeet.srivastava@gmail.com)

Background: Cardiac Autonomic Neuropathy (CAN) is a frequent chronic complication of Diabetes Mellitus (DM) with potentially life-threatening outcomes. By the time symptoms have developed, autonomic damage in majority of organs is irreversible. There is need to treat autonomic neuropathy at an early stage.

Objective: To see the effect of two months of sustained euglycemia on prevalence rate of CAN in recently detected type 2 DM patients.

Methods: Study was carried out on 50 patients of recently detected type 2 DM, who attended diabetic clinic in JNIMS hospital, Imphal. Autonomic function test was performed by determining E:I ratio, 30:15 ratio, valsalva ratio (Vr), sustained hand grip test (SHGT) and blood pressure response to standing (BP).

Results: At baseline, E:I ratio was found to be abnormal

in 48% , 30:15 ratio was abnormal in 46%, BP was abnormal in 8%, Vr was abnormal in 20% and SHGT was abnormal in 30% of patients. After two months of maintaining sustained euglycemia, E:I ratio was abnormal in 38.1%, 30:15 ratio was abnormal in 38.1%, BP was abnormal in 4.8%, Vr was abnormal in 19% and SHGT was abnormal in 28% patients. E:I Ratio and BP response to standing were statistically significant after 2 months of sustained euglycemia.

Conclusion: This study shows that the prevalence of CAN reduced from 70% to 62% after two months of sustained euglycemia. Hence, there is fair chance of improvement in deranged autonomic functions in type 2 DM, if intervened early.

Key-words: Diabetes mellitus, Cardiac Autonomic Neuropathy, Euglycemia

A comparison between traditional and modified case-based method for learning Physiology in first MBBS students

P216

Ajay Kukreja¹, Sudhakar Boinapalli², Sandeep Singh Chouhan³, Sarita Kanojia⁴

¹Department of Physiology, ²Department of Biochemistry, Pacific Institute of Medical Sciences, Udaipur Rajasthan, ³Department of Physiology, Lady Hardinge Medical College, New Delhi, ⁴Department of Physiology, ESIC Dental College, New Delhi

Background: Teaching methodology is largely didactic lecture based. Active forms of learning such as Problem based learning (PBL) and Case based learning (CBL) have been gaining ground to facilitate self-directed learning. Studies have shown that Active learning forms assist the students better to apply concepts of basic medical science such as Physiology & Biochemistry into clinical settings.

Objectives: In this study we inclined to evaluate the impact of Novel method of teaching –Case based learning (CBL) on learning Physiology.

Methods: Present study was carried out on 115 first year MBBS students who attended scheduled physiology theory classes, by traditional method (Pre-Test CBL) and then by novel method (Test CBL). It is Modified CBL since it was conducted in a large study group. Pre-Test CBL and Post-Test CBL evaluation was done at the end of both the methods. Likert scale was used to evaluate students' perception about the teaching methods.

Results: In our study CBL had a positive impact ($p < 0.05$) on marks obtained in Post-Test CBL evaluation. Girls performed better than boys in Post-

Test CBL evaluation ($p < 0.5$). 72% of the students agreed that overall, CBL was a better method of learning for them.

Conclusion: Our study concluded that students were receptive to the introduction of CBL and it had positive impact on the understanding of the topic.

Key-words: Teaching methodology, Modified Case based learning (CBL), Physiology, Medical students

Integrated Case-based teaching on aphasia using videos to first year medical students

P217

Prathap M. Baby¹, Bincy M George², Sanu Susan Jacob³, Kiranmai S Rai¹

¹Department of Physiology, Melaka Manipal Medical College (Manipal Campus), Manipal Academy of Higher Education, Karnataka, India, pratap.baby@manipal.edu, ²Department of Anatomy, Melaka Manipal Medical College (Manipal Campus), Manipal Academy of Higher Education, Karnataka, India, ³Department of Physiology, Kasturba Medical College – Manipal, Manipal Academy of Higher Education, Karnataka, India.

Background: Case-based Learning (CBL) is an active learning tool that enable students to integrate fundamental concepts of pre-clinical subjects into clinical cases. With the increased availability of digital online-resources, it is important to offer innovative strategies to enhance understanding of clinically important scenarios.

Objectives: To understand the effectiveness of video-assisted integrated CBL of clinical cases of aphasia among first year medical students and also to evaluate student perception on video assisted CBL.

Methods: First year medical students ($n = 150$), learning in a horizontal integrated-curriculum, were included. A pre-test consisting of multiple choice questions was conducted after Anatomy and Physiology didactic lectures on the topic 'Neuroanatomy and neurophysiology of language and its impairment in aphasia'. An identical post-test was conducted after a video presentation involving 'introduction to language', 'clinical cases of Broca's aphasia, Wernicke's aphasia and conduction aphasia', coupled with CBL session. Results were analysed using paired t-test. A four point Likert scale was used to evaluate student's perception on the learning strategy.

Results: There was significant improvement in students' performance in the post-test scores as compared with the pre-test scores (p value < 0.001). Student feedback regarding this method was very

positive. Significant percentage of students felt that clinical-video assisted session fostered better understanding of the topic, facilitated critical-thinking and promoted beneficial interaction between peer members that further kindled learning.

Conclusion: CBL accompanied by clinical-videos of aphasia is ascertained to be an effective learning modality and can be incorporated into teaching-learning methodologies that require clinical-based understanding of basic concepts.

Key-words: Case-based integrated teaching, Video-assisted teaching

Effects of premenstrual syndrome (PMS) on academic functioning and its management

P218

Sharmila Torke¹, Sue Sandra Sergius², Lee Zhenyu², Edward Cheng Han Jian², Manjot Kaur²

¹Department of Physiology, ² MBBS Students, Melaka Manipal Medical College (Melaka Campus), Manipal Academy of Higher Education, Manipal 576104, India

Background: Premenstrual syndrome (PMS) is a condition that affects a woman's emotions, physical health, and behaviour during certain days of the menstrual cycle, generally few days before her menses. Female students who suffer from PMS, find it difficult to concentrate on academic activities and seek various methods of managing the symptoms. This study was conducted to explore the effects of PMS on the academic functioning of medical students of Melaka Manipal Medical College (MMMMC) and how it is managed by the students.

Objectives: To study the impact of PMS on academic functioning of MMMC students and management strategies adopted by them.

Methods: The study was conducted by administering a 11-item questionnaire to female medical students of MMMC ($n = 100$). The items in the questionnaire sought details regarding effects of PMS on their academic activities and its management. Data was analysed using Microsoft Office Excel.

Results: Majority of students (60%) experienced PMS occasionally. The most commonly reported symptom was mood swings (15%). Majority of students did not miss classes because of PMS. 59% of students were able to concentrate in class but were easily distracted, while 21% of students were unable to concentrate in class. 52% of students were able to carry on their daily revision during PMS. The most common method of PMS management was found to be use of natural home remedies (38%).

Conclusion: PMS does not hamper the academic life of students of MMMC.

Key-words: Premenstrual syndrome, academic life, management

Readiness for self-directed learning among first year medical students

P219

Asha Vashe¹, Vasudha Devi², Raghavendra Rao³, Reem Rachel Abraham¹

¹Department of Physiology and ²Department of Pharmacology, Melaka Manipal Medical College, Manipal Campus, Manipal Academy of Higher Education, Manipal, India. ³Department of Physiology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, India.

Background: Self-directed learning (SDL) skill is important in the medical field, where the information is continuously updated. Readiness for SDL is present in all individuals to some extent and a good medical curriculum must promote it.

Objective: To explore whether there is any change in students' readiness for SDL as they experienced the curriculum.

Methods: Self-directed learning readiness scale (SDLRS) was used to find the SDL readiness of the students of September 2013 batch (n = 234), admitted to Melaka Manipal Medical College, Manipal. It is a prevalidated questionnaire, having 29 items grouped under 3 scales: self-management (10 items), desire for learning (9 items), and self-control (10 items). It was administered to the students at the commencement and end of first year of the MBBS program. Data generated through SDLRS were summarized using mean and standard deviation (SD). Independent samples t-test was conducted to compare the subscales of pre and post-tests of SDLRS.

Results: There was a significant increase ($p < 0.05$) in students' SDL readiness score at the end of the year when compared to that at the beginning. A significant increase ($p < 0.05$) was found in all three subscales of SDLRS. The mean scores and SD of the pre-test were 32.12 (4.78), 33.59 (3.9), 35.97 (4.24) and 101.67 (9.86), and post-test scores were 36.04 (5.21), 37.24 (4.03), 39.42 (4.41) and 112.70 (11.12) for self-management, desire for learning, self-control and total score respectively.

Conclusion: The study demonstrated that students' readiness for SDL was increased as they experienced the curriculum.

Key-words: self-directed learning readiness, self-directed learning readiness scale, medical students

An easy to use program for teaching genesis of membrane potentials

P220

Vinay Oommen, Anand Bhaskar

Department of Physiology, Christian Medical College, Vellore

Background: Basic concepts in physiology like equilibrium potential and genesis of membrane potential are difficult concepts for students to understand and for the teachers to teach. The calculations involving the teaching of this concept like the Nernst equation and the Goldman-Hodgkin-Katz (GHK) equations are often tough for the students to perform.

Objective: Our objective was to develop an easy to use program which helps in calculating the membrane potential by changing concentrations of various ions and their permeabilities.

Methods: A program was created with Igor Pro version 5.05 (WaveMetrics, USA) which allows the user to change the intracellular and extracellular concentrations of sodium, potassium, calcium and chloride ions and their membrane permeabilities. The Nernst equation and GHK equations were incorporated in the software so that the membrane potentials are calculated by the software and given as readouts along with graphing when the concentrations of ions and their membrane permeabilities were changed.

Results: The program allows the user to appreciate the membrane depolarization caused by increasing the external potassium concentration. The depolarization of the cell by increasing the sodium permeability was also easily demonstrable with the program.

Conclusion: The developed program is useful to teach the concepts of equilibrium potential and action potentials and helps the user to calculate the equilibrium potentials for various ions by changing their concentrations and membrane permeabilities. It can be easily used in a theory class or practical class to teach these difficult concepts.

Key-words: membrane potential, Nernst equation, Goldman-Hodgkin-Katz equation

Student participation in assessment: A method of learning

P221

Surekha R Kamath

Department of Physiology, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, Karnataka, India.
surekharkamath@yahoo.com

Background: It is well known that framing of questions can be valuable learning exercise. The designing of questions requires knowledge and understanding of the subjects being taught. A study was designed to assess the student understanding of the basic human functions, in the physiology class, in which first year medical students were asked to create multiple true false (MTF) statements, based on their learning objectives.

Objectives: The present study was undertaken to ascertain the effectiveness of question construction as a strategy for learning physiology.

Methods: The current study was conducted on first year medical students (n=222) of Melaka Manipal Medical College, Manipal, India. The study was conducted in one of the muscle physiology revision classes, where students were divided into groups of five and asked to prepare a set of MTF questions. Following the activity, the questions prepared by the students were collected and analysed by the subject experts.

Results: The MTFs prepared by students showed that the majority of the MTFs tested knowledge (23.5%) and comprehension (45%). About 11.5% of the questions produced were judged to be capable of testing higher order cognitive skills. However, 20% of the MTFs were in the application level indicating that the students have not only understood the subject but also applied it.

Conclusion: The study results revealed that the interest and active participation of first year medical students in question setting proved to be an activity which encouraged active learning. This student learning activity is adaptable to all organ systems in physiology and to other subject specialities.

Key-words: active learning, framing questions, knowledge

Animal experiments in MBBS curriculum: Need of the hour

P222

Ashish Arvind,

Pt. B D Sharma Post Graduate Institute of Medical Sciences, Rohtak

Background: The practice of animal experimentation is quite old in Medical education. The very purpose of practicing animal experiments in MBBS first year practical classes was to show the actual phenomenon to students. It not only helped the students to understand the complex mechanisms of physiological phenomena but also provided first hand surgical skills. It also helped in understanding the concept of dose titration of drugs and witness the effect of escalating drug response. Altogether removal of animal experimentation from MBBS curriculum has created a void between theoretical knowledge and practical understanding.

Methods: People advocated about animal rights and ethical treatment of animals during animal studies and in this regard suggested alternatives to animal experiments. The alternatives included, video recordings, simulation software, animations, ceramic models and so on. None of them could raise the interest of students towards practical aspects of Physiology. Simulator animations were tried in VMMC and Pt. B D Sharma PGIMS, Rohtak for a sufficient number of students. After each session students wanted to get hands on practice on animals itself.

Results: None of the alternate methods were sufficient enough to raise the curiosity or fill the void between theory and practical.

Conclusion: Animal experiments should be restarted with proper adherence to animal ethical guidelines and students must be trained to give due respect during animal handling. Since MBBS curriculum teaches to treat living human beings, they must start their study from living animals to be able to deliver their best after attaining due qualification.

Key-words: Animal experiments, MBBS curriculum, animal ethical guidelines

Computer Assisted Learning: A students' perception

P223

Manish Kumar¹, Manish Kumar², Akash Chandra¹, Lalit Kumar¹, Purnendu Arya¹, Raushan Kumar Ranjan¹

¹Department of Pharmacology, ²Department of Physiology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India
Email : manu072@gmail.com

Background: This study was designed to obtain data about students' perception and feedback in terms of acceptability, advantages and disadvantages of Animal Simulator software in Computer Assisted Learning (CAL) in Pharmacology experiments.

Methods: Questionnaire study, done on randomly and voluntarily selected ninety-six fourth and fifth semester MBBS Students. Divided into four groups containing 24 in each. Students were taught experimental pharmacology practical online/offline using Animal simulator (CAL- Computer Assisted Learning) for 2 hours on different days in three sessions. Questions and their feedback were taken during these sessions and presented in tables. Statistical analysis of data was done using Graph Pad software.

Results: 2/3rd students were in favour of in vitro and in vivo live animal experimentation for better understanding and learning. Students agreed that CAL was enjoyable and time saving, easy to perform, contributes more to understanding theoretical concepts, no experimental error, welcome change and best alternative and less time consuming. Students disagreed that CAL was an effective method of teaching practical aspects and preferred experimentation than laboratory practical. Positive response obtained about advantages of CAL. Also, positive feedback was obtained regarding disadvantages of CAL.

Conclusions: Students' perception was good and in opinion that the exercises were interesting and educationally beneficial. Computer assisted learning is a feasible and very effective teaching and learning method in pharmacology with huge potential to change the way of learning.

Key-words: Animal simulator, Computer assisted learning, Experimental pharmacology practical

Fantasy bullets: A heutagogical approach in pharmacology

P224

Vasudha Devi, Tatiyana Mandal, Rajasekhar Chinta, Amruth Kiran Bhat, Vishaal Bhat, Devasrita Dash
Department of Pharmacology, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, Karnataka, India- 576104

Background: During pharmacotherapy, a doctor is expected to use competencies learned during medical education in new and often uncertain settings. With a goal to promote application of basic concepts of pharmacology in undergraduate medical students, an activity called as fantasy bullets was designed incorporating principles of heutagogy.

Objectives: 1. To explore the impact of fantasy bullets activity on students' understanding of basic concepts of Pharmacology; 2. To explore feasibility of implementing this activity.

Methods: During the group activity (n = 10), 2nd year MBBS students (n = 141) analysed all pharmacokinetic (PK) and pharmacodynamics (PD) concepts learnt in lecture classes and applied them carefully to design drug (fantasy bullet) profile relevant to the given hypothetical condition. Students' presented the drug profile using audio-visual aids and role play.

Results: Compared to pre-test, there was a significant decrease in the number of conceptual mistakes committed by each group in PK and PD concepts in the post test ($p = < 0.001$). The median grades for all the items in the questionnaire regarding students' perceptions on the activity was ≥ 3 in 5-point Likert scale. Students' opined that the activity was interesting and had scope for creativity, autonomy and team work. We could conduct this activity involving whole batch of students with the existing infrastructure and resources of our institute.

Conclusion: The activity improved students' understanding of basic concepts of pharmacology. This can be easily implemented in any medical curriculum with very few resources. More of such activities in a medical curriculum might promote development of knowledge and soft skills required for pharmacotherapy and rational prescribing.

Key-words: medical, undergraduate, pharmacology, heutagogy

Student's perception on handouts as an educational tool in clinical physiology laboratory sessions

P225

Shashikala G.V, Anita Herur, Shailaja Patil, Roopa B Ankad, Shweta Patil

Dept of Physiology, S. N. Medical College, Bagalkot, Karnataka, India.

e-mail:dr.gvs@rediffmail.com

Background: In a traditional set up, students arrive at practicals with no clear idea of technique employed, skills required to conduct experiment or understand underlying scientific principles and at the same time they rarely take notes, appear disengaged from demonstration and struggle with the procedure both during and after laboratory sessions.

Objectives: 1. To construct specific learning objectives for each of the clinical physiology laboratory (CPL) sessions. 2. To prepare complete outline handout with graphic illustration for each of the CPL session. 3. To evaluate the handout using checklist provided by British Columbia Institute of technology 4. To provide concerned handouts to students one day prior to the CPL session 5. To obtain

students feedback on handouts using questionnaire 6. To evaluate the students' feedback.

Methods: Complete outlined handouts were prepared for each of the CPL sessions. Corresponding handouts were distributed to all the 100 students one day prior to the practical. After the CPL session's student's perception regarding handout was collected in the form of questionnaire and the content was assessed by grading system. The data was analyzed as percentage.

Results: Out of 100 students enrolled, 100% students preferred handouts. The handouts scored 3.66 in organization, 3.63 in presentation and relevance, 3.92 in understanding the content and 4.11 in its role in preparing for the practical sessions.

Conclusion: Complete outlined handout with graphical illustrations in clinical physiology laboratory sessions, used in our study as an educational tool, has shown to, help students to perform the skills individually.

Key Words: CPL; handouts; educational tool; students' feedback

Changes in stroke volume variation and cardiac index during open major bowel surgery – Are they related?

P226

Sujatha Prabhu P¹, Anitha Nileshwar², Krishna H M³, Manjunath Prabhu⁴

¹Department of Physiology, Melaka Manipal Medical College (Manipal campus), ^{2,3,4} Department of Anaesthesiology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, Karnataka, India.

Background: Stroke volume variation (SVV) is a dynamic indicator of preload, which is a determinant of cardiac output.

Objective: To evaluate the relationship between changes in SVV and cardiac index in patients with normal left ventricular function undergoing major open abdominal surgery.

Methods: Ethical clearance was obtained. Patients undergoing major open abdominal surgery were monitored continuously with FloTrac® to measure SVV and CI along with standard monitoring. Both SVV and CI were noted at baseline and every 10 minutes thereafter till end of surgery and were observed for concurrence between the measurements.

Results: 1800 pairs of measurement of SVV and CI were obtained from 60 patients. Mean SVV and CI (of all patients) measured at different time points of

measurement showed that as SVV increased with time, cardiac index dropped correspondingly. When individual readings of CI and SVV were plotted against each other, the scatter was found to be wide, reiterating lack of agreement between the two parameters ($R^2 = 0.035$). $SVV > 13\%$ suggesting hypovolaemia was found at 207 time points. Of these, 175 had a $CI > 2.5$ L/min/m² and only 32 patients had a $CI < 2.5$ L/min/m².

Conclusion: SVV, a dynamic index of fluid responsiveness can be used to monitor patients expected to have large fluid shifts during major abdominal surgery. It is very specific and has a high negative predictive value. When SVV increases, cardiac index is usually maintained. Since many factors affect SVV and CI, any increase in $SVV > 13\%$, must be correlated with other parameters before administration of fluid challenge.

Key-words: Stroke volume variation, cardiac index, fluid requirement, major bowel surgery

Reduction of stress to improve the performance of slow learners in medical students: An interprofessional approach

P227

Sneha Shetty¹, Sharada Rai², Rekha D Kini¹, Kunal¹, Krishna Sharma³, Bhagyalakshmi K¹, Pratik Kumar Chatterjee¹

¹Department of Physiology, KMC, MAHE, Mangalore,

²Department of Pathology, KMC, MAHE, Mangalore,

³Department of Yogic Sciences, Mangalore University.

Background: Medical education is perceived as being stressful, and a high level of stress may have a negative effect on cognitive functioning and learning of students in a medical school.

Objectives: 1. To assess the stress levels in first year MBBS students. 2. Evaluate the effects of yogic techniques on their stress levels.

Materials and Methods: This is a cross-sectional study was conducted among medical undergraduate. Institutional ethics committee clearance was obtained before beginning the experiments. A total of 100 1st year medical students from Kasturba Medical College, Mangalore were the participant in this study. Stress levels were assessed using perceived stress scale and sessional marks were used to assess academic performance. Yogic techniques were given for a period of 6 weeks and post intervention stress levels were assessed using student t. Statistical package SPSS version 17.0 was used for analysis. Significance of the test was set at $P < 0.05$.

Results: The overall response rate was 95%. The mean

perceived stress score was 20.5 ± 3.36 . In the high stress group average score was 22.84 ± 2.39 , whereas in the low stress group, they had an average score of 15.8 ± 2.56 . The stress levels were significantly higher in the high stress group. Yoga intervention significantly ($p < 0.0001$) decreased the stress levels in the high stress groups from mean perceived stress scale score of 23.69 (pre-intervention) to 19.72 (post-intervention) when compared to the low stress groups.

Conclusion: From the present study it is concluded that yogic intervention helps in reducing stress in medical students.

Key-words: Yoga intervention, Medical students, Academic performance

Association between reaction time and heart rate variability in high risk cardiovascular adolescents

P228

Shailaja S. Patil,

S. Nijalingappa Medical College, Bagalkot, Karnataka.
E-mail: drshailajapatil@gmail.com

Background: In obesity, family history of hypertension and diabetes, there is a higher prevalence of cardiovascular disease, which is supposed to be due to autonomic imbalance. The alterations in cardiac autonomic functions can be assessed by heart rate variability (HRV) indicators and there is a relationship between HRV and reaction time (RT).

Objectives: To assess the heart rate variability and reaction time in high risk cardiovascular disease adolescents and also to find the association between these two parameters.

Methods: Thirty-nine high risk adolescents (15 girls and 29 boys) in the age group of 14 to 15 years who were obese, and had family history of hypertension (HT), diabetes mellitus (DM) in parents were selected. Anthropometric and HRV parameters and reaction time (RT) were assessed.

Results: HRV is reduced in the high risk groups both in females and males as compared to normal subjects and lower values were recorded in females as compared to males. There was also a negative correlation of HRV with RT both in males and females.

Conclusion: Lesser HRV values in females indicate reduced heart rate variability and such individuals are more prone for cardiovascular diseases. Reaction time, which is a marker of cognitive ability, is increased in persons with decreased HRV; and hence, such high risk adolescents should be followed-up and given timely intervention.

Key-words: Heart rate variability; reaction time; high-risk adolescents

Correlation of heart rate variability indices with renal functions in pre-eclampsia

P229

Anita Herur¹, Manjunath Aithala², Kusal Das², Ashalata Mallapur¹

¹S. Nijalingappa Medical College, Bagalkot, Karnataka, ²Shri. B. M. Patil Medical College, BDLE (deemed to be university), Vijayapura, Karnataka

Background: Pre-eclampsia (PE) is a major complication of pregnancy that could lead to impairment of renal functions, which in turn, may result in maternal and fetal morbidity and mortality. The analysis of heart rate variability (HRV) is a noninvasive diagnostic tool that provides important prognostic information of individual's risk of developing cardiovascular disease and also may predict the damage to the kidneys in cases of PE.

Objectives: To correlate the HRV parameters with that of renal function tests in cases of PE with that of healthy pregnant controls.

Methods: This was a case-control study. Pregnant women diagnosed to have PE according to ACOG guidelines and aged 18-35 years, were included as cases. Healthy pregnant women, matched for age, gravida and gestational weeks were included as controls. Gestational age was calculated from first trimester USG. HRV was recorded by Powerlab (AD instruments). Blood samples were analyzed for blood urea, serum creatinine, serum uric acid, and total proteins. Statistical analysis was done using Student's t test.

Results: There was a correlation found between the low frequency domains and serum uric acid levels in pre-eclampsia.

Conclusion: Pre-eclampsia shifts the sympathovagal balance to the sympathetic side which may increase the cardiovascular risk and thereby the chances of renal damage.

Key-words: Heart rate variability; pre-eclampsia; creatinine; uric acid

Serum electrolyte changes and Electrocardiographic changes in different phases of menstrual cycle

P230

Shilpa Patil¹, R B Patil

¹KIMS Koppal, ²GIMS Kalaburagi

Background: Menstrual cycle is a physiological phenomenon characterised by cyclical fluctuation of hormones which may have influence on various parameters so the present study was conducted.

Objectives: To compare serum electrolyte changes and electrocardiographic changes in different phases of menstrual cycle

Methods: The present study was conducted on 30 healthy female medical students in the age group of 18-23 years with normal menstrual cycle of 27-33 days. Electrocardiographic changes were recorded using AD INSTRUMENT POWERLAB /30 SERIES and serum electrolytes were estimated using Erba chem.-7 during Menstrual phase, Proliferative phase and Secretory phase.

Results: Serum electrolytes like serum calcium, serum sodium, serum magnesium, serum potassium showed no significant changes. Heart rate was significantly increased in proliferative phase compared to menstrual phase but PR interval and QT interval showed no significant changes.

Conclusion: Heart rate changes may be due to hormonal fluctuations and due to autonomic activity. Further study has to be conducted using large sample and by doing hormonal assay.

Key-words: Serum electrolytes, Electrocardiography

Effect of Sudarshan Kriya on pulmonary function of students in stress

P231

Pranati Nanda¹, Dharitri Swain², Madhuri Panigrahi¹, Priyadarsini Mishra¹, R. Nandini¹

¹Dept of Physiology, ²College of Nursing, AIIMS BBSR

Background: Sudarshan Kriya Yoga (SKY) is one form of yogic breathing exercise. SKY is a type of cyclical controlled breathing practice which has four distinct components. A short duration (7days) SKY practice is quite beneficial in improving one's ventilatory function.

Objective: To determine the effect of SKY on Pulmonary Function Test (PFT) in students having higher stress level.

Material and Methods: The study was conducted in the department of physiology AIIMS, Bhubaneswar. 30 female students were recruited from medical college, Bhubaneswar over a period of three months. Stress level were measured by "perceived stress scale". Pulmonary functions parameters were measured with spirometer at the beginning and after 90 days of sky

practice. Analysis of results were done with excel sheet

Results: In our study of 90 days SKY practice, all the PFTs improved significantly, there is also significant increase in pulmonary parameters viz. FVC, FEV1, SVC and MVV by 4%, 2%, 2% & 3% respectively.

Conclusion: Regular practice of Yoga (SKY) for 90days is beneficial in improving the respiratory functions in individuals having higher stress level. Further research with large sample size and for varied age groups is needed for applying these results to population in general.

Key-words: Sudarshan Kriya, Pulmonary function, student stress

Evaluation of analgesic activity of aqueous extract of Terminalia paniculata (TP) bark

P232

Meena Kumari K, BhanuPratap Singh, Balaji O, Amberkar Mohanbabu V

Dept of Pharmacology, Kasturba Medical College, Manipal Academy of Higher Education, Manipal
Email:meena.kumari@manipal.edu

Background: This study was taken to evaluate the analgesic activity of aqueous extract of Terminalia paniculata (TP) bark.

Methods: Analgesic activity was determined using hot plate and tail flick method. Thirty adult wistar rats were divided into 5 groups of 6 rats each. Group I (control) received 2 mL water, Group II-codeine 5mg/kg, Group III, IV and V -(100, 200 and 400 mg/kg) of TP, orally respectively. Latency time to pain sensation was noted at 30, 60, 90, 120 and 180 min in all rats.

Result: At 0 min, there was no significant difference in reaction time to pain sensation between the groups. At all-time points (30, 60, 90, 120 and 180 min), Terminalia paniculata treated animals showed significant increase in reaction time when compared with control group in both models.

In hot plate model, group V showed significant increase in reaction time as compared to group III and IV at all time points and was comparable to standard codeine at 120th and 180th min. Standard codeine showed significantly better analgesic activity than group III and group IV at all-time points.

In tail flick method, standard codeine showed significant increased latency time compared to all three doses of TP at 90, 120 and 180th min. Group 5 showed significant increased reaction time compared to group 3 and 4 from 60th min to 180th min. Group 4

showed increased analgesic activity compared to group 3 at 90, 120 and 180th min but group 3 was significantly better at 30th min.

Conclusion: Thus, bark of Terminalia paniculata possesses analgesic potential.

Key-words: codeine, hot plate, tail flick, reaction time

Knowledge and Awareness of Bisphosphonates induced Osteonecrosis amongst Medical and Dental Professionals

P233

Vathsala Patil, Shruthi Acharya

Department of Oral Medicine and Radiology, Manipal College of Dental Sciences, Manipal, MAHE, Manipal Karnataka

Email : vathsala.mcods@manipal.edu

Background: Bisphosphonates, Antiresorptive and Antiangiogenic agents are associated with serious complication of osteonecrosis of jaw. Management of osteonecrosis secondary to these medications have a poor prognosis and demands long-term treatment, thus mutual efforts between the medical doctor and dentist through a multi-disciplinary approach are essential. But with accurate knowledge of side effects of these drugs, importance of dental referral prior to commencement of these medication and awareness of drug holiday period, it is possible to avoid this complication.

Objectives: To evaluate the level of knowledge and awareness about medication induced osteonecrosis of jaw and also in turn intends to increase the same amongst them

Methods: This was a questionnaire based study where knowledge and attitude of Medical specialists (i.e. Orthopaedic, General Medicine, Surgical Oncology, Radiation Oncology specialists) and dental professionals like dental faculty and post graduate students were evaluated through multiple choice questions sent through google forms.

Results: Although awareness of osteonecrosis as side effect of bisphosphonates was seen amongst all practitioners. Results reflected a lack of knowledge regarding various side effects of antiresorptive drugs.

Conclusion: In the recent years there has been an increasing trend of usage of bisphosphonates, and other antiresorptive agents. A good knowledge about various complications and drug holiday amongst who prescribe them and amongst who treat them is essential to avoid the complications.

Key-words: osteonecrosis of Jaw, Bisphosphonates

Price comparison of commonly available brands of cephalosporins with DPCO price list in India

P234

Sarvesh Singh, Rajendra Kumar, Narendra Kumar, Rahul Kumar, Divya Yadav, Preeti Mishra
King George's Medical University, Lucknow, India
Email id: drsarveshsingh@gmail.com

Background: About 25% of patients die at home following discharge against medical advice from the Indian Intensive care units due to non-affordability of intensive care treatment & 39 million Indians are becoming poorer every year due to rising healthcare costs. Drug Price Control Order (DPCO) was implemented by the government of India with the aim of bringing down the cost of essential medicines.

Objectives: The present study was conducted to analyse the cost of commonly used cephalosporins drugs present in Indian market in respect of DPCO ceiling price.

Methods: Price list of year 2017 of available brands for cephalosporins drugs covered under the DPCO was downloaded from the government website <http://nppaindia.nic.in>. Unit prices of drug formulations available in Indian market was compared with DPCO price list. Percentage of total brands was calculated who were selling their drug above the DPCO ceiling price list.

Results: Out of 3784 brands of different cephalosporins observed, 3385 (89.46 %) brands are selling their drug above the ceiling price of DPCO. It is surprising that none of the pharmaceutical company is selling the drug Cefadroxil Tablet 1 GM, Cefazolin Powder for Injection 500 MG & 1 GM, Cefixime Oral liquid 50 mg/5 ML below the recommended price by DPCO. Total 397 companies were manufacturing the Cefixime Oral liquid 50 mg/5 ML and all are selling the preparation above the ceiling cost decided by DPCO.

Conclusion: Despite the implementation of price control, most of the pharmaceutical companies are selling cephalosporins above the price fixed by DPCO. Re-assessment for implementation of price control for essential medicine is the need of the hour.

Key-words: cephalosporin, essential medicine, price variation, DPCO

Tamoxifen Induced Vasculitis

P235

Utkarsha Kulkarni¹, Veena Nayak¹, Mukhayprana Prabhu², Raghavendra Rao³

¹Dept. of Pharmacology, Kasturba Medical College, Manipal University, Manipal, India, ²Dept. of

Medicine, Kasturba Medical College, Manipal University, Manipal, India, ³Dept. of Dermatology, Venereology and Leprosy, Kasturba Medical College, Manipal University, Manipal, India
Email id: udkulkarni92@gmail.com

Background: Tamoxifen is Selective Estrogen Receptor Modulator (SERM) that is used for treatment of women with ER+ metastatic breast cancer or following primary excision of ER+ tumor as an adjuvant treatment to prevent recurrence and extend overall survival. Following is the case report of vasculitis caused by tamoxifen.

Objective: To report a case of tamoxifen induced vasculitis.

Case Presentation: A 45 year old female patient underwent modified radical mastectomy in 2013 for left infiltrating lobular carcinoma of breast which was ER/PR +ve and Her 2 Neu -ve. Following the surgery, she was started on tab. tamoxifen 20mg OD in 2014. Six months after taking tamoxifen, she developed asymptomatic reddish lesions over both legs. On examination there were erythematous non blanchable papules on both legs. Immunofluorescence assay and skin biopsy of the lesions confirmed the diagnosis of cutaneous vasculitis. Patient was started on dapsons 100mg OD for 2 weeks. The symptoms subsided, but lesions recurred after 2 weeks. Patient was continued on tab. tamoxifen 20mg OD. Patient continued to have vasculitis for over past three years. She had relief of symptoms when on dapsons therapy, but the lesions recurred when dapsons was stopped.

Result: According to Naranjo's algorithm scale, this case is suggestive of "Probable" adverse drug reaction.

Discussion: Although the development of cutaneous purpuric vasculitis due to tamoxifen is extremely unusual, considering its severity and widespread use of tamoxifen in treatment of breast cancer, there is need for better vigilance.

Key-words: Breast cancer, tamoxifen, vasculitis

Effect of aqueous seed extract of *Mucuna pruriens* against sodium arsenite induced oxidative stress in male rats

P236

Preethi Concessao¹, Laxminarayana Kurady Bairy², Archana P.R¹,

¹Department of Physiology, Melaka Manipal Medical College, Manipal academy of higher education, Manipal. ²Department of Pharmacology, RAK Medical and Health, UAE.

Email: preethi.concessao@manipal.edu

Background: Arsenic is a heavy metal posing threat to public health. Liver and kidneys are considered as the primary targets for its toxico-pathological manifestations. *Mucuna pruriens* contains alkaloids, saponins and flavonoids which increase the antioxidant capacity.

Objective: To investigate the protective effect of *Mucuna pruriens* on liver and kidney functions of sodium arsenite treated animals.

Methods: The study was divided into short term (45 days) and long term (90 days) with each group divided into seven sub groups.

Group 1: Normal control; Group 2: N-Acetylcysteine (NAC) control; Groups 3: Sodium arsenite in drinking water (50 mg/ litre); Group 4: Sodium arsenite + NAC (210 mg/kg body weight/day) orally; Groups 5 – 7: Sodium arsenite + aqueous seed extract of *Mucuna pruriens* (350, 530 and 700 mg/kg body weight/ day) orally.

Following the treatment blood was withdrawn retroorbitally to assess the liver and kidney functions. Data was analysed by one way ANOVA followed by post hoc Tukey test. $p < 0.05$ was considered statistically significant.

Results: The short term treatment groups did not show any improvement in the kidney and liver enzymes. In the long term treatment groups, the animals that received seed extract [350- 700mg/kg body weight ($p < 0.05$ to $p < 0.001$)] showed significant decrease in serum creatinine and serum ALT levels and animals that received seed extract 700mg/kg body weight ($p < 0.05$) showed significant decrease in serum AST levels when compared to sodium arsenite group.

Conclusion: *Mucuna pruriens* treatment showed improvement in liver and kidney functions in long term treatment groups.

Key-words: *Mucuna pruriens*, sodium arsenite, oxidative stress

Sorafenib Induced Changes in Superoxide Dismutase Activity of testicular tissue in Male Swiss Albino Mice

P237

Surekha D Shetty¹, K.Laxminarayana Bairy²

¹Department of Anatomy, Melaka Manipal Medical College (Manipal Campus), Manipal Academy of Higher Education (MAHE) Manipal, Karnataka, India,

²Ras al-Khaimah Medical and Health Sciences, UAE.

Email: surekha.shetty@manipal.edu

Background: Male gonadal toxicity is a common

complication of modern anti-cancer treatments. Generation of reactive oxygen species and mitochondrial dysfunction has limited its usefulness due to its toxicity to normal cells including testicular cells. Antioxidants are compounds that protect cells against the damaging effects of reactive oxygen species.

Objective: To investigate the effect of sorafenib on antioxidant enzyme; superoxide dismutase (SOD) of testicular tissue in male Swiss albino mice.

Methods: Male Swiss albino mice (9-12 weeks old) were used for the study. The animals were segregated into treatment and control groups (n = 6 in each group). Treatment group received 25, 50 and 100 mg/kg body weight of sorafenib orally for seven consecutive days at intervals of 24 hours between two administrations. Control group remained in home cage for the same duration to match their corresponding treatment groups. The animals were sacrificed at the end of 1st, 2nd, 4th, 5th, 7th and 10th weeks after the last exposure to the drug. Testes were removed, weighed and homogenized. The tissue homogenate obtained was cold centrifuged. The supernatant was taken for estimation of SOD activities.

Results: The SOD activity was reduced significantly ($P < 0.05$ to 0.001) during the 1st, 2nd, 4th, 5th and 7th week sampling time in mice treated with all the doses of sorafenib indicates decrease in its activity. The maximum decrease of SOD activity was observed during the 5th week sampling time in mice treated with all the doses of sorafenib.

Conclusion: Data generated from the present study proved that administration of sorafenib decreases the SOD activity in testicular tissue. It leads to imbalance between antioxidant system and reactive oxygen species generation, which produces the oxidative stress.

Key-words: Toxicity, antioxidant enzyme, oxidative stress, testicular tissue

Effect of Diabetes on the Male Reproductive System– A Histomorphological Study

P238

Arvind Kumar Pandey¹, Sushma R Kotian¹, Ashok Kumar¹, Sanchari Basu Mallik², Nandini P Bhat¹, Anne D Souza¹

¹Department of Anatomy, Kasturba Medical College Manipal, ²Department of Pharmacology Manipal College of Pharmaceutical Sciences, Manipal University, Karnataka, India

E-mail: arvind.pandey@manipal.edu

Background: Type 1 diabetes is an autoimmune disorder characterized by lack of insulin production by the beta cells of the pancreas. This lack of insulin causes a variety of systemic effects on the body metabolism. Reproductive dysfunction is one among them.

Objectives: The present study investigates the effects of diabetes on the male reproductive system of streptozotocin-induced diabetic rats.

Methods: 18 adult male Wistar rats weighing about 250-300g were included in the study. The animals were divided into normal and diabetic groups. The diabetic group was further subdivided into two subgroups of 24 and 48 days' duration. A single dose of streptozotocin (40mg/ kg body weight) was administered intraperitoneal to the animals of the diabetic group. After planned duration; the testes and epididymis were dissected, and their gross weight was measured. The tissues were then processed for histological study.

Results: The gross weight of testis and epididymis in diabetic rats on 24 and 48 days showed a decrease in comparison to the control. ($p < 0.01$ for testis, $p < 0.001$ for epididymis respectively). Diabetic animals presented significantly decrease in the diameter of seminiferous tubules compared to the control group ($p < 0.01$). Epididymis in diabetic groups shows a considerable reduction in tubular surface area compared to control ($p < 0.01$). There was a reduction in the mean diameter too which was measured using the maximum and minimum diameter of the tubules ($p < 0.01$).

Conclusion: The present study is an insight to the histological changes observed in the gonads affected by diabetes.

Key-words: Diabetes mellitus, Testis, Epididymis, Streptozotocin (STZ), Male infertility

Morphometry of the ulnar nerve and its digital branches in the hand

P239

Mamatha H, Rohini Punja Sneha Guruprasad Kalthur
Department of Anatomy, Kasturba Medical College, Manipal University, Madhav Nagar, Manipal, Karnataka, India – 576104

Background: The ulnar nerve is a continuation of medial cord of brachial plexus. Knowledge of variations in the branching pattern are useful during surgical procedures.

Objective: Our study aims to measure the length of branches of ulnar nerve in the volar aspect of the hand using specific bony landmarks of the palm.

Material and Methods: The study was conducted on 30 formalin preserved adult hand specimens. The distance between pisiform bone and the division of ulnar nerve into its two terminal branches was measured using a digital Vernier calipers. Distance between the proper digital branches to the head of fifth metacarpal was also observed.

Results: The average distance from pisiform to the division of ulnar nerve was 3.9 ± 2 cms. The average of distance between proper digital branches to the head of fifth metacarpal was 5 ± 1 cms. These results were compared with other studies.

Conclusion: The study shows that the branching pattern of ulnar nerve is highly variable and a knowledge of such variations and measurements should be kept in mind during surgical procedures to minimize the incidence of injury to its branches.

Key-words: Ulnar nerve, Digital branches, Pisiform bone

Effects of virgin coconut oil on renal dysfunction in alloxan induced diabetic rats

P240

Rekha D Kini¹, Aishani K²

¹Department of Physiology, ²II MBBS Student, Kasturba Medical Collage, Mangalore, Manipal Academy of Higher Education(MAHE), Karnataka, India. e-mail: rekha.kini@manipal.edu

Background: Diabetic nephropathy is the leading cause of kidney disease and is one of the leading cause for death. Proper treatment for uncontrolled diabetes is known to be helpful in managing adverse effects of diabetes. Virgin coconut oil (VCO) is increasingly getting the reputation because of its antioxidant properties.

Objective: The present study was undertaken to see the effect of VCO on kidney damage in alloxan-induced diabetic rats

Methods: Institutional ethics committee clearance was obtained. Healthy adult albino rats of Wistar strain, approximately 150-200gram body weight, were divided into 4 groups (n=6). Group I (Control Group), Group 2: (VCO treated), Group 3: (Diabetic Group) and Group 4 (Diabetic rats + VCO). This treatment was given for three weeks. After the experiment protocol, blood sample was collected and analyzed for

glucose serum creatinine and urea. Unpaired student's t-test was done. Significance of the test was set at $P < 0.05$

Results: A significant increase (< 0.001) in the blood glucose level was observed in Gr.III, when compared to Gr.I and Gr.II. Treatment with VCO in alloxan-fed rats reduced the blood glucose level significantly ($p < 0.0001$). The level of urea in Gr.III significantly increased (< 0.001), when compared Gr.I and Gr.II. and decreased in Gr.IV, when compared to GR.III.

Conclusion: The present study showed that diabetes mellitus induced by alloxan led to renal dysfunction and can be significantly reversed by dietary consumption of VCO.

Key-words: Diabetes, alloxan, urea, creatinine

Contribution of upper and lower body lengths to the overall height of individuals: An anthropometric study among MMMC students

P241

Aparna Tripathy¹, Siti NurDeana Bt Moktar Daidi², Syarifah Nur Aiman Arina Bt Syed Ahmad Bokharey², Yong Chun Fatt², Suria Samsuri².

¹Department of Physiology, ²MBBS of batch 37 Students; Melaka Manipal Medical College, MAHE, Manipal.

Background: Body height is an indicator of development determined by nutrition, genetic, hormonal and environmental factors. Contribution of the lower body length (LBL) to total height (TH) has been reported earlier. However, there are no articles available on the contribution of upper body length (UBL) to TH.

Objectives: Evaluation of contribution of UBL and LBL to TH. To compare TH across different ethnic groups and between males and females of different ethnicities.

Methods: 50 male and 50 female MMMC students from different ethnicities (Malay, Indian, Chinese, and Srilankan) voluntarily participated, after informed consent. Participants with history of fractures, musculoskeletal surgery or limited movements were excluded. Participants were asked to stand erect, barefoot with heels, toes placed on level surface. TH, LBL (distance between anterior superior iliac spine and level surface) was measured and UBL was calculated (TH-LBL). Data was analyzed using SPSS version 16. Results were expressed in mean \pm SD and $p < 0.05$ was considered statistically significant.

Results: Males ($174.18 \pm 6.67\text{cm}$) were taller than females ($159.68 \pm 6.69\text{cm}$), which is statistically significant ($p = 0.001$). LBL is greater in females ($93.88 \pm 6.14\text{cm}$) than males ($83.79 \pm 6.82\text{cm}$), whereas males ($90.65 \pm 5.37\text{cm}$) have greater UBL than females ($65.80 \pm 5.19\text{cm}$), which is statistically significant ($p = 0.001$). There is no significant difference in TH of participants among ethnicities; Malay ($163.72 \pm 10.71\text{cm}$), Indian ($166.66 \pm 10.06\text{cm}$), Chinese ($168.44 \pm 9.31\text{cm}$), Srilankan ($168.90 \pm 9.02\text{cm}$). TH of males differ among ethnic group, but it is not statistically significant. Malay females ($155.69 \pm 6.06\text{cm}$) were significantly shorter than Srilankan females ($162.50 \pm 5.25\text{cm}$) ($p = 0.044$).

Conclusion: TH in males is contributed by UBL whereas in females it is contributed by LBL. Females of the Malay ethnic origin were significantly shorter, whereas all other groups showed no difference

Key-words: Anthropometry, Height, Ethnicity

Polycystic Ovarian Syndrome (PCOS) induced alterations in Hypothalamic-Pituitary-Adrenal (HPA) axis in Wistar Albino Rats

P242

Dheepthi J¹, Sathya Narayanan G²

¹Research Scholar, ²Assistant Professor Department of Physiology, Dr. ALM PG IBMS, University of Madras, Taramani, Chennai

Background: PCOS is a polygenic, polyfactorial, systemic, inflammatory, autoimmune disease. It has been reported that PCOS affects 5%-10% women of reproductive age worldwide and about 40% of women with PCOS experience depression. Though PCOS is an alarming infertility issue in the present scenario, its secondary consequence like depression has not been studied widely.

Objectives: To study the effect of estradiol valerate (EV) induced PCOS on Gonadotropin releasing hormone (GnRH), Follicle stimulating hormone (FSH), Luteinizing hormone (LH), and adrenal hormone Corticosterone (CORT) and on anxiety behavior.

Methods: 24 female Wistar albino rats weighing 160-180 gms were divided into three groups – Group 1: Control, Group 2: EV induced PCOS(4 mg / kg b.w. EV in 0.2 ml Sesame oil i.m.), Group 3: Sesame oil (0.2 ml Sesame oil i.m.). The anxiety behavior and HPA hormones were examined. The data were analyzed by One Way ANOVA.

Results: The PCOS induced rats exhibited anxiety like behavior when compared to the control and vehicle

group. A significant increase in the GnRH and CORT, and a significant decrease in the FSH and LH were observed in the PCOS induced group when compared with the control group.

Conclusion: Social anxiety is an extreme worry and fear of being looked upon negatively or judged by others in the present scenario. In this study, Anxiety is the effect of PCOS and women with PCOS are more likely to suffer from anxiety than women without PCOS which should be treated upon.

Key-words: PCOS, Anxiety, HPA axis

Immediate Effect of Sudarshan Kriya Basic Program on Blood Pressure and Glucose Level in Young Collegiate students

P243

Kulandaivelan S, Seeta Rani, Ravina Rathi, Maghna Kundu, Mamta Yadav

Dept. of Physiotherapy, GJUST, Hisar-125001.

E-mail: tryhard2024@yahoo.co.in

Objectives: Effect of 4 days basic SK program on blood pressure (BP), pulse rate (PR), rate-pressure product (RPP) and fasting blood glucose level (FBG) in young collegiate students.

Methods: Experimental study, different subject design. 40 sex-stratified (20 males, 20 females) convenient sample was randomly divided into SK group (10 males, 10 females) and active control group. SK program for experimental group was delivered by experienced teacher in the evening. Outcome measures were SBP, DBP, PR, RPP, FBG which were measured using standard procedures. They were measured early morning, on each day during the basic program and on the subsequent morning after training. Hence 5 readings were taken. Related 't' test and unrelated 't' test was used to compare within-group, between-group values respectively. Significant level was set at $p < 0.05$. Analysis were done using IBM-SPSS (21.0 version) software.

Results: 15 and 16 subjects from control and SK group respectively completed all 5 readings (75-80% compliance rate). 4 days of SK significantly reduced SBP (mean difference [MD] $3.5 \pm 1.65\text{ mmHg}$; $p = 0.05$); PR (MD $12.31 \pm 4.2\text{ beats.min-1}$; $p = 0.01$); RPP (MD 17.73 ± 0.06 ; $p = 0.007$) with insignificant reduction in DBP (MD $3.44 \pm 2.42\text{ mmHg}$; $p = 0.18$) and FBG ($2.38 \pm 3.08\text{ mg.dL-1}$; $p = 0.45$). However, when the results were compared with control, there was no significant difference except for PR (MD $8.55 \pm 3.31\text{ beats.min-1}$; $p = 0.014$).

Conclusion: 4 days Sudarshan kriya significantly reduced the pulse rate in young collegiate students.

Key-words: Blood Glucose; Fasting; Heart Rate; Blood Pressure; Students

Evaluation of anti-diarrhoeal effect of curcumin

P244

Anil Kumar¹, Vijay Kumar Roy², Neetu Arora³

¹Dept. of Physiology, SHKM Govt. Medical College, Nalhar, Nuh, Haryana, ²Dept. of Physiology, SGT Medical College, Hospital & Research Institute, Gurgaon Haryana, ³Dept. of Anatomy, SHKM Govt. Medical College, Nalhar, Nuh, Haryana.
Email id- dranilshkm@gmail.com

Background: Turmeric has been used in traditional medicine as household remedy for various diseases including biliary diseases, cough, hepatic diseases, wound healing and diarrhea etc. Curcumin is the active salt present in turmeric. This study was carried out to provide scientific basis for the use of curcumin in diarrhea.

Objective: The objective of this study was to evaluate the anti-diarrheal effect of curcumin and to compare it with standard medicine i.e. Loperamide.

Materials and Methods: The albino rats were divided into five groups of six animals in each group. Group I (control) received vehicular fluid. Group II (positive control) received standard drug for diarrhea i.e. loperamide at the dose of 2mg/kg body weight. Group III, IV and V were administered curcumin intragastrically by the naso-gastric tube, in the dose of 500mg/kg, 750mg/kg and 1 gm/kg body weight respectively, suspended in normal saline. After one hour of above treatment, 1 ml of castor oil was given intragastrically to all the overnight-fasted animals to induce diarrhea. Each animal was housed separately and observed for time of onset and number of diarrheal episode for 4 hours. The data was analyzed by using SPSS 11.

Result: Remarkable anti-diarrheal effect of curcumin against castor oil induced diarrhea was observed in dose dependent manner.

Conclusion: From the present study, we can draw a conclusion that, Curcumin have significant anti-diarrheal effect. It may be used as an adjuvant for the treatment of diarrhea, and irritable bowel syndrome.

Key-words: Curcumin, Anti-diarrheal, Diarrhea

Correlation of glycosylated hemoglobin (HbA1c) levels with auditory and visual reaction time in diabetics

P245

Shweta patil¹, Sangita phatale²

¹SN medical college Bagalkot, ²MGM medical college Aurangabad. E-mail: patilshwe@gmail.com

Background: Diabetes mellitus designates a group of metabolic diseases characterized by hyperglycemia due to insufficient insulin secretion and/or reduced insulin sensitivity. Chronic hyperglycemia in diabetes affects peripheral nerves in the somato-sensory system, slowing psychomotor responses, which may affect reaction time.

Objectives: To assess and compare auditory and visual reaction time in group-1 and group-2 diabetics and to correlate it with HbA1c levels in both the groups.

Material and methods: The study was conducted on 60 subjects aged between 40-50 years after obtaining the permission of the ethical committee of our institution. The group consisted of 60 well-controlled diabetic patients (HbA1c < 7%) with history of diabetes for 1-10 years attending the medical OPD of Basaveshwar teaching and general hospital, Gulbarga. Diabetics with HbA1c 5-6% were grouped as group-1 and those with HbA1c 6-7% as group 2. The visual reaction time for green and red light and auditory reaction time for tone and click sound was measured by using reaction time apparatus 2x4, Anand agencies Pune. HbA1c was estimated by micro-column method.

Results: The visual and auditory reaction time of diabetics with HbA1c 5-6% was faster as compared to the diabetics with HbA1c 6-7% with $P < 0.001$ and a statistically significant positive correlation was found between HbA1c levels and the visual and auditory reaction time.

Conclusion: We found a positive correlation between HbA1c levels and visual and auditory reaction times, showing that poor metabolic control slows psychomotor responses.

Key-words: Diabetes, Hyperglycemia, Reaction time, HbA1c, Neuropathy

Effect of Sub-maximal Exercise Stress on Cold Pressor Pain: A Gender Based Study on Engineering students of National College of Engineering, Nepal

P246

Ehsan Ansari, Mahamad Badrudoza

Department of Electrical Engineering, National College of Engineering, Satdobato, Lalitpur, Nepal, ehsanans45@gmail.com

Background: Analgesic effect of exercise has long been debated and controversial topic as it may result in hyperalgesia or hypoalgesia.

Objectives: The aim of the study was to compare the effect of exercise on cold induced acute pain in male and female.

Methods: The subjects were asked to immerse his/her dominant hand in ice cold water (20 to 40C) and pain threshold (start of feeling pain) and pain tolerance time (total time up to which pain can be tolerated) were recorded. Blood pressure, heart rate and respiratory rate were recorded during and after cold pressor pain test and exercise to study cardiovascular effects. To minimize the analgesic effects of female sex hormones, experiments on females were done in mid-luteal phase (21 to 24 days of menstrual cycle). For exercise, bicycle ergometer was used. Initial load for exercise was 25 watts, which increases with 25 watts at the interval of every 2 minutes and exercise was continued until the heart rate reached the 60 to 75 % of the maximal heart rate for that subject.

Results: There was significant increase in all pain parameters just after exercise (Pain threshold from 14.25 ± 10.2 sec to 20.83 ± 13 sec after exercise, $p < 0.001$; pain tolerance from 39.5 ± 25 sec to 54.67 ± 31 sec, $p < 0.001$). Exercise had much effect on pain tolerance than pain threshold (from 26.2 ± 20 sec to 36.2 ± 23.5 sec, $p < 0.01$).

Conclusion: The effect of exercise on pain perception was significant in both male and female, the analgesic effect being more enhanced in female than male.

Key-words: analgesia, exercise

Assessing Sleep Stability in Long-term Vipassana Practitioners and Controls using Event-Related Potentials and transcranial Alternating Current Stimulation

P247

Pranay S. Yadav, Rahul Venugopal, Gulshan Kumar, Ajay Kumar Nair, Arun Sasidharan, Bindu M. Kutty
NIMHANS, Bangalore

Background: Long-term meditation is believed to improve many parameters of sleep. To causally evaluate sleep architecture and stability among meditators, we are examining the changes in brain oscillatory patterns during sleep, following auditory stimulation as well as following tACS.

Methods: The participants included Vipassana meditators with different meditation proficiencies and matched controls, both part of a larger study involving 4-night polysomnography evaluation. First night evaluates baseline sleep, second involves presentation of auditory stimuli, while third and fourth nights involve tACS intervention. 1000Hz pure tones, presented every 10s throughout the sleep, were used for eliciting auditory ERPs. Four 30s-long bursts of tACS stimulation were administered at delta frequency during stable NREM sleep and at gamma frequency during stable REM sleep, through bilateral fronto-temporal electrodes on separate nights.

Results: Auditory ERPs were associated with event related synchronization in theta frequency, which decreased with sleep depth. N550-P900 complex amplitude correlated with lower NREM disruptions. Spectral changes post tACS stimulation were able to index sleep stability. In tACS REM stimulations, theta power suppression positively correlated with REM disruptions.

Conclusion: Macro and micro sleep architecture parameters provide a narrative of sleep efficiency and dynamics (spindle-delta) involved within stages and across cycles. Sleep depth is revealed by sleep ERP changes in each sleep stage. Conventional polysomnography with microsleep analysis combined with auditory and tACS stimulations would help generate a comprehensive profile of brain activities during sleep and facilitate evaluation of differences between Vipassana practitioners and controls.

Key-words: tACS, Polysomnography, ERPs, Vipassana, Sleep, Meditation

Altered functional connectivity between insular cortex and default mode network among migraine patients

P248

Ramesh Babu, M.G¹, Rajagopal, K.V², Kiranmai S Rai¹
¹Department of Physiology, Melaka Manipal Medical College, Manipal Campus, Manipal Academy of Higher Education, Manipal, India, ²Department of Radiodiagnosis and Imaging, Kasturba Medical College, Manipal University, Manipal.

Background: Insular cortex (IC) plays a complex multi-faceted role in pain processing and activated in various types of pain stimulation. It participates in both sensory-discriminative and affective-motivational aspects of pain. It has extensive reciprocal connections with parts of the default mode network (DMN).

Objective: The aim of this study is to analyze functional connectivity (FC) between (DMN) and bilateral IC among migraine patients (MP) compared with that of normal participants (NP).

Material and Methods: Twenty-four [NP (n=12) and MP (n=12)] age, gender and handedness matched participants were undergone MRI brain imaging, after obtaining ethical committee clearance and informed consent. During resting-state fMRI (rsfMRI) scanning, participants were instructed to close their eyes, and not to sleep or move. All MRI data were preprocessed using SPM12 toolbox in MATLAB version-2017a. FC analysis was performed using CONN toolbox.

Results: Both the groups did not differ in age, male/female ratio and handedness. FC analysis showed a significant decrease ($p < 0.05$) in the FC between left IC and posterior cingulate cortex (DMN), whereas a significant increase ($p < 0.05$) in FC was found between bilateral anterior IC and bilateral lateral parietal (DMN) cortices in MP compared with that of NP.

Conclusion: This study provides the first rsfMRI evidence of altered brain function among MP of the Indian population. The present study shows altered FC between IC and DMN which indicates information transfer and multi-modal integration dysfunction that affects pain sensitivity and processing in MP. Studies with larger sample size and correlation with clinical findings need to authentic evidence of altered FC among MP.

Key-words: Migraine, MRI, DMN

Cognitive stressor during isometric contraction in offsprings of hypertensive parents

P249

Roopa B. Ankad, Anita Herur, Shasikala GV, Shailaja Patil, Shweta Patil.

Department of Physiology, S. Nijalingappa Medical College, Bagalkot, Karnataka.

Email: roopabalu07@gmail.com

Background: About 40% of patients with primary hypertension have genetic predisposition. Sympathetic dominance is observed in young normotensive offsprings of hypertensive parents.

Objectives: 1] To compare time to task failure (TTF) during submaximal isometric contraction (IMC) in young adult offsprings of hypertensive parents (study group) with young adult offsprings of normotensive parents (control group). 2] To assess the effect of cognitive stressor on TTF during IMC in both the above mentioned groups.

Methods: 25 young adults (17-20years), 12 of whom had a positive family history and 13 had no family history of hypertension. Each subject was instructed to perform maximum voluntary isometric contraction (MVC) with the elbow flexor muscles of the nondominant arm using hand grip dynamometer. Then the subject was asked to perform a fatiguing contraction at 20 percent of MVC force and TTF or fatigue time was recorded in seconds. After 15 minutes of rest, the same subject performed fatiguing IMC and a difficult mental math as a cognitive stressor was given simultaneously to know the effect of cognitive stressor on IMC task failure (fatigue time). Results were tabulated and analyzed by Student t test. $p < 0.05$ was considered statistically significant.

Results: TTF reduced significantly when exposed to cognitive stressor during IMC in both the groups. TTF, both during IMC and also when exposed to cognitive stressor during IMC was reduced in study group.

Conclusion: Offsprings of hypertensive parents fatigue early and fatigability increases to cognitive stressor during IMC due to sympathetic dominance compared to offsprings of normotensive parents.

Key-words: isometric contraction; cognitive stress; offsprings; hypertension; TTF

A perspective on Autonomic Function Testing and Research in India

P250

Tania Kamra, Aditya.D, Deepak KK

All India Institute of Medical Sciences, New Delhi, India-110029

Background: The purpose of research in Physiology, at the most basic level, can loosely be split into two types, 'pure research' and 'applied research', where both follow the same structures and protocols for propagating and testing hypotheses and predictions, but vary slightly in their ultimate purpose.

Objectives: The present study focuses on finding out the purpose and perspective of conducting Autonomic Function studies in India.

Methods: The study was done on published indexed articles on Indian studies from 1961-2018 on PubMed.

Results: A large number of Autonomic Function studies are only being done as an adjunct in diagnostic and prognostic application of clinical studies and case reports, implying that the existing ideas and thoughts on Autonomic Physiology are being applied, but fundamental research in the field is only a small percentage. Out of a total of 708 indexed articles, 15.39% were animal studies compared to 75.14% human studies; 10.87% case reports and 75.85% research studies. Based on the data obtained, we found declining trends, both in quantity and quality of Autonomic research with each decade.

Conclusion: Declining research trends in basic physiological sciences, calls for more animal research and equating the balance of pure research with applied clinical usage. The study also calls for the need to establish a committee/board to set up research guidelines.

Key-words: Autonomic Research; AFT; Physiology Research; Animal study; Human study; India

ERP based Differences in Facial Emotion Recognition

P251

Priyesh C.¹, Kirtana R Nayak¹, Chinmay Suryavanshi¹, Rajeshkrishna Bhandary², Rishikesh Behere³, Arun Sasidharan⁴, Asha Kamath⁵

¹Department of Physiology, Kastirba Medical College, Manipal Academy of Higher Education, Manipal.

²Department of Psychiatry, Kastirba Medical College, Manipal Academy of Higher Education, Manipal.

³Department of Psychiatry, KEM Hospital Research Center, Pune. ⁴Axxonet Brain Research Laboratory (ABRL), Axxonet System Technologies Pvt. Ltd., Bangalore. ⁵Department of Biostatistics, Manipal Academy of Higher Education, Manipal.

Email id: prichichu@gmail.com

Background: Schizophrenia and Bipolar Disorder are two major psychiatric disorders which have overlapping features in aspects of cognitive deficits including social deficits and brain abnormalities. Their deficits worsen as they become more symptomatic. Facial emotion recognition deficits play a major role in the social deficits manifested by these patients. Further exploration of the facial emotion recognition in these disorders is done through event related potentials (ERPs), to delineate the differences and deficits in different aspects of the disorder.

Objectives: The present study investigates the ERP components corresponding to image recognition (such as N170 and N250) in Schizophrenia and Bipolar Disorder patients in comparison with Normal Healthy Controls.

Methods: 15 subjects (Mean age = 38; Males = 10, Females 5), 5 in each category, were recruited for the study. EEG was recorded in a 32 channel EEG/ERP system using saline-based electrode cap. The stimulus paradigm included identifying images of three categories such as buildings, gender and facial-emotion.

Results: The amplitude and latency of the ERP components were extracted from relevant electrodes and subjected to statistical analysis using the SPSS Software. ANOVA revealed significant differences between the groups in N170 Latency, N170 Amplitude and N250 Latency.

Conclusion: Further studies with standardized paradigms can improve ERP usage in the diagnosis and treatment of these disorders.

Key-words: Schizophrenia, Bipolar Disorder, Emotion Recognition, ERP

A Comparative study of Simple Visual Reaction time and Choice Visual Reaction time in normal conditions and on exposure to cell phones

P252

Betsy Johnson

Department of Physiology, M.P. Shah Government Medical College, Jamnagar, Gujarat, India

Email id: betz90johnson@gmail.com

Background: Reaction Time is a measure of time take to respond to stimuli. It includes the time required for conduction of sensory impulses, processing of stimulus and to execute motor response. Thus the measure of reaction time in turn indicates the integrity of the Central Nervous System.

Objectives: To find out Simple Visual Reaction time and Choice Visual Reaction time in normal conditions, and on exposure to cell phones.

Methods: Study was conducted on 82 healthy medical students, after inclusion and exclusion criteria. Simple and Choice Visual Reaction times were measured using Direct RT software in millisec, in normal conditions, and on exposure to cell phones.

Result: The Choice Visual Reaction time(688.83 ± 126.24 ms) is statistically significantly higher than Simple Visual Reaction time(480.19 ± 199.45 ms). Both Reaction times are higher with cell phone usage(p < 0.005).

Conclusion: It is seen that Choice Visual Reaction time is more than Simple Visual Reaction time. Both the Reaction times increased statistically significantly on

exposure to cell phones. Therefore, social implications of study is significant and strongly corroborates the idea that cell phone usage has a strong distracting impact if used while engaging in activities like driving etc.

Key-words: Simple Visual Reaction time, Choice Visual Reaction time, cell phones, driving

Blood ammonia level in children with Autism Spectrum Disorder

P253

Nissy Susan Varughese, V. S. Suma Devi

Department of Physiology, Pushpagiri Medical College, Thiruvalla,

Background: Autism spectrum disorder (ASD) is a neurodevelopmental condition. Reliable biomarker that detects ASD might be useful for early interventions. Though studies show elevated serum ammonia level in ASD, studies on correlation between blood ammonia levels with clinical severity of autism are limited.

Objective: To assess the blood ammonia level in children with ASD; To test the association between blood ammonia level and clinical severity of ASD.

Methodology: In this cross sectional study 53 children visiting the Child Development Centre in a tertiary care centre in South Kerala, diagnosed as ASD were included. Details were collected when they came for therapy. Details were filled in the proforma, entered in Microsoft excel sheet and analyzed using SPSS.

Results: The mean blood ammonia level was $1.35\mu\text{g/ml}$, (minimum = $0.6\mu\text{g/ml}$, maximum = $2.3\mu\text{g/ml}$). 89% had hyperammonemia. Blood ammonia had a significant correlation with clinical severity of autism ($p = 0.024$).

Conclusion: In the study population, 89% had hyperammonemia with a mean of $1.35\mu\text{g/ml}$. Blood ammonia had a statistically significant correlation with clinical severity of autism.

Key-words: Autism Spectrum Disorder; Blood ammonia; Brain

Evaluation of visual evoked potential in gestational diabetes mellitus and its association with serum advanced glycated end products levels.

P254

Akriti K¹, Dhanalaxmi Y², G.S. Gaur², S. Haritha³, Jayaprakash S⁴.

¹PhD Scholar AIIMS Rishikesh, ²Department of Physiology, ³Department of Obstetrics & Gynaecology, ⁴Department of Endocrinology, JIPMER, Puducherry

Background: Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance resulting in hyperglycemia with first recognition during pregnancy. Accumulation of Advanced Glycated End Products (AGE) in the brain has been linked to inflammation, oxidative stress, and resultant neuronal dysfunction. Recording of visual evoked potential (VEP) is a sensitive test for detecting these abnormalities by increased latency and decreased amplitude. This study tries to evaluate if any aberrations in VEP is present in GDM and its association with serum AGE levels.

Objective: Assessment of visual evoked potential in healthy pregnant women and pregnant women with GDM aged 19-40 years and its association with serum AGE levels in 32-36th week of gestation.

Methods: This was a cross sectional study conducted in JIPMER, Puducherry. The approval Institute Ethics Committee, JIPMER was obtained. The subjects were recruited from Department of Obstetrics and Gynaecology, JIPMER. Anthropometric parameters, biochemical parameters and visual evoked potential were measured in Department of Physiology, JIPMER.

Result: A total of 60 participants were recruited in the study (30 in each group). There was significant increased latency and decreased amplitude of P100 wave of both the eyes in GDM group as compared to controls. There was significant positive correlation of P100 Latencies of both the eyes with serum AGE levels in GDM group.

Conclusion: Our study findings indicate that pregnant women with GDM are more prone to demyelination of visual tracts as compared to pregnant women with normal blood glucose levels in same phase of gestation. Our study concludes that Increased AGE accumulation in GDM is significantly related to demyelination of optic tract enhancing the risk for diabetes induced retinopathy.

Key-words: GDM, Serum AGE levels, VEP, Pregnancy

Effect of Hypoxic ischemic encephalopathy during early childhood on the electrical activity of the brain: A pilot exploratory study

P255

Megha Agrawal, Latika Mohan

Department of Physiology, All India Institute of Medical Sciences, Rishikesh.

Background: Hypoxic ischemic encephalopathy (HIE) as a result of delayed crying during birth is a very common cause of delayed milestones and global developmental delay in children. This affects their whole life with serious implications such as poor mentation, mental retardation, seizures, cerebral palsy etc. As many deliveries in India are conducted unsupervised in home, it is crucial to explore how hypoxia during delivery can affect the electrical activity of the brain. Hence, this study has been undertaken.

Objectives: To explore the effect of HIE on electrical activity of brain.

Methods: In this study, referred cases with history of delayed crying or hypoxia due to other causes at birth /delayed milestones/global developmental delay underwent video-EEG (Nicolet) for 30-45 minutes to assess the electrical activity of the brain and presence of any interictal abnormal EEG discharge. A brief history including symptoms was also taken along with.

Results: The mean age of the study population was 6.95 years; 48 belonged to Uttarakhand and 32 belonged to Uttar Pradesh. Out of 70 cases, 34 had generalized onset seizures (none had absence seizures), 20 had focal onset seizures (3 focal, 17 focal with secondary generalization), 14 had abnormal pattern with 8 showing hypsarrhythmia and only 2 had normal pattern on EEG. Attenuation of waves in peripheral temporal electrodes bilaterally was seen in 44% of patients.

Conclusion: Hypoxia can cause seizures and abnormal EEG patterns that needs to be further investigated upon as it may affect certain areas of the brain more than the others.

Key-words: hypoxic ischemic encephalopathy, seizures, EEG

