

Medical Education

Effect of stress on academic performance in medical students – a cross sectional study

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Abstract

Introduction- Stress, a universal phenomenon, affects an individual's productivity either by increasing it ('eustress') or decreasing it ('distress'). It is widely acknowledged that the medical fraternity is predisposed to enormous stress. The same may be true for the budding medicos- the undergraduate medical students. In our study we attempted to identify situations that predisposed the medical students to stress and their effects on academic performance and to suggest certain coping mechanisms. **Objectives-** *firstly* to explore common sources of stress in medical students, *secondly* to establish correlation of stress, gender, attendance, and academic performance if any. **Method-** 114 medical undergraduates were assessed for the common sources of stress and the level of stress using semi structured Performa and stress scale. The results were compared and correlated with various variables like attendance, demographic factors, average marks etc. Pearson correlation coefficient was used for statistical correlation amongst different variables. **Results & Conclusions-** Stress shows beneficial effects in females when compared to males. High attendance and better day to day performance in female medical students was associated with more amount of stress when compared to male students. Thus, stress among medical students should be acknowledged and attempts should be made to alleviate it.

Introduction

'Stress' a universal phenomenon, affects an individual's productivity either by increasing ('eustress') or decreasing it ('distress'), as 'stress' is handled differently by different people (1, 2). Every year a large number of under-graduate medical

students enrol for the different medical courses across the country. However, weak academic performance and high failure rate remains a persistent problem (3). For students detention based on attendance and failing before attaining final medical degree provide extra burden on the students as well as on the parents (4, 5, 6). Poor academic performance and poor attendance is often indicative of difficulties in adjusting to new environment. On one hand, studies have reported that stress can be inversely related to academic performance, on the other hand, studies failed to detect an association between stress and academic performance (7, 8). Interestingly, perceived stress and coping may be influenced by stress as well (9).

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Our study is an attempt to identify stress causing situations in the life of a medical student and to examine the effect of those situations on academic performance. We also explore the correlation of stress with gender, age, attendance and propose ways of coping with stress, which in turn will help students in improving their academic performance.

Materials and methods

After obtaining ethical clearance from the Institutional Ethics Committee at the commencement of the study, all first year medical students who had enrolled in 2010-2011 at Subharti Medical college, Meerut (N=114, males=52, females=62) were taken up for the study. Following a written consent from students, they were given a self designed semi structured performa which included socio-demographic details including age, sex, domicile, current residence, stress score & Cumulative grade points, during their practical hours in the department of pharmacology (i.e. after passing their 1st professional exams) after obtaining permission from the lab coordinator. A list of stressors as well as the amount of stress amongst the medical students was calculated using the standardized stress scale by Girdano et al (10).

Cumulative grade points and attendance were calculated based on the record available in the department. A total of 10 CGP (cumulative grade points) are calculated based on the performance (%) in group discussion (10%), day to day assessment (15%), seminars (12.5%), 1st terminal exams (25%) and 2nd terminal exams (37.5%), during their stay in the department i.e. before appearing in 1st professional exams (annexure-I). Stress scale consisted of a list of 25 questions based on the events that occurred in the life of the students. Students were asked to tick in the right hand column for each of those events that happened to them during the last 12 months (annexure-II). In each class students took approximately 10 minutes to complete the questionnaire. Each question carried certain marks according to its importance in causing stress in the life of a college student. A total score (annexure-III) was calculated for each student separately and they were classified in to three groups on the basis of the scores obtained- low stress level group (less than 150 points), border line range group (150-300), and high stress level group (more than 300 points). The level of stress was then correlated with the variables like age, sex, academic performance and attendance using Pearson correlation coefficient as our statistical tool.

Appendix – I

How to calculate your cumulative grade points

Your grade point average (CGP) is calculated by dividing the total amount of grade points earned by the total amount of credit hours attempted. Your grade point average may range from 0.0 to 10.0 as follows: (91-100%) = 10 points, (81-90%) = 9, (71-80%) = 8, (61-70%) = 7, (51-60%) = 6, (41-50%) = 5, (31-40%) = 4, (21-30%) = 3, (11-20%) = 2, (0-10%) = 0.

<i>Activity</i>	<i>Details of activity / Grade points</i>	<i>Activity credit hours / Weightage (%)</i>	<i>CGP</i>
Group discussion attendance	Grade points are given based on their attendance in group discussion.	4 (10)	
Seminars	A topic is allotted to the student which he/she has to present in front of all the faculty members. Each faculty member evaluates the student separately. Mean of marks and then grade points are calculated.	5 (12.5)	<i>Total grade points Divided by</i>
Day to day assessment	Regular tests are conducted throughout the year on completion of a particular topic. Mean of marks obtained and grade points are calculated.	6 (15)	<i>Total activity hours</i>
1 st terminal examination	This is 1 st major examination of three hour duration. Marks obtained are used directly for the calculation of grade points.	10 (25)	
2 nd terminal examination	2 nd major examination before appearing in final professional examination. Marks obtained are used directly for the calculation grade points.	15 (37.5)	

This method is designed to meet the requirement of medical students and is based on the method to calculate CGP used by various universities.

Appendix – II

Performa to record Student Stress

Serial No.....

The following are events that occur in the life of a college student. Place a tick mark in the right hand column for each of those events that have happened to you during the last 12 month.

S. Events No.	Indicate response
1	Death of a close family member
2	Final year or first year in the college
3	Inconvenience due to language in the class room
4	Severe personal illness or injury
5	Any interpersonal problems
6	Financial difficulties
7	Death of a close friend
8	Argument with your room mate (more than every other day)
9	Major disagreements with your family
10	Change in you choice of career
11	Major change in personal habits
12	Change in living environment
13	Living away from the home (home sickness)
14	Problems with your boss or professor
15	Pressure of outstanding personal achievement
16	Failure in some course/subject
17	Inconvenience of living in hostel
18	Final exams
19	Difficulty in interacting with opposite sex
20	Change in your sleeping habits
21	Excessive work load
22	Change in eating habits
23	Change in recreational habits/activities
24	Minor illness or injury
25	Minor violation of the law

Results

114 students (males-52 females-62) who gave the informed consent and fully completed the performa were taken up for the study. The mean age of male students was 19.97±1.337 and 19.839±1.081 years in case of female students. The Stress scale scores were found to be 231.673±93.063 in males and 249.951±113.034 in females. Cumulative grade points were 4.374±1.319 in males and 4.965±1.294 in females, attendance 73.577±14.308 in males and 77.919±11.659 in females. Thus, all in three parameters- stress scale scores, cumulative grade points and attendance, female students scored higher points (Table I).

On the basis of gender distribution and stress levels, maximum number of students 53% (61) students showed medium level of stress (males 30, females

Appendix – III

Student Stress Rating Scale

The following are events that occur in the life of a college student. Each event is given some points (mentioned in front of the event) that have happened during the last 12 month.

S. Events No.	Points given
1	Death of a close family member 100
2	Final year or first year in the college 63
3	Inconvenience due to language in the class room 30
4	Severe personal illness or injury 53
5	Any interpersonal problems 45
6	Financial difficulties 40
7	Death of a close friend 40
8	Argument with your room mate (more than every other day) 40
9	Major disagreements with your family 40
10	Change in your choice of career 20
11	Major change in personal habits 30
12	Change in living environment 30
13	Living away from the home (home sickness) 30
14	Problems with your boss or professor 25
15	Pressure of outstanding personal achievement 25
16	Failure in some course/subject 25
17	Inconvenience of living in hostel 30
18	Final exams 20
19	Difficulty in interacting with opposite sex 20
20	Change in your sleeping habits 80
21	Excessive work load 20
22	Change in eating habits 15
23	Change in recreational habits/activities 15
24	Minor illness or injury 15
25	Minor violation of the law 11

Interpretation of Score

- Less than 150 points : low stress level in relation to life events
- 150-300 points : borderline range
- Greater than 300 points : high stress in relation to life events

Note : From Girdano, D.A., Everly, G.S., Jr., & Dusek, D.E. (1990). Controlling stress and tension (3rd edition), ENglewood Cliffs, NJ: Prentice Hall.

TABLE I: Sample Characteristics.

Sample characteristics	Males (Mean±SD) (n=52)	Females (Mean±SD) (n=62)
Stress scale score	231.673±93.063	249.951±113.034
Cumulative grade points	4.374±1.319	4.965±1.294
Attendance (%)	73.577±14.308	77.919±11.659
Age (years)	19.971±1.337	19.839±1.081

31), followed by 29% (33) students who showed high level of stress (males 13, females 20). More number of female students showed higher level of stress as compared to male students (Fig. 1).

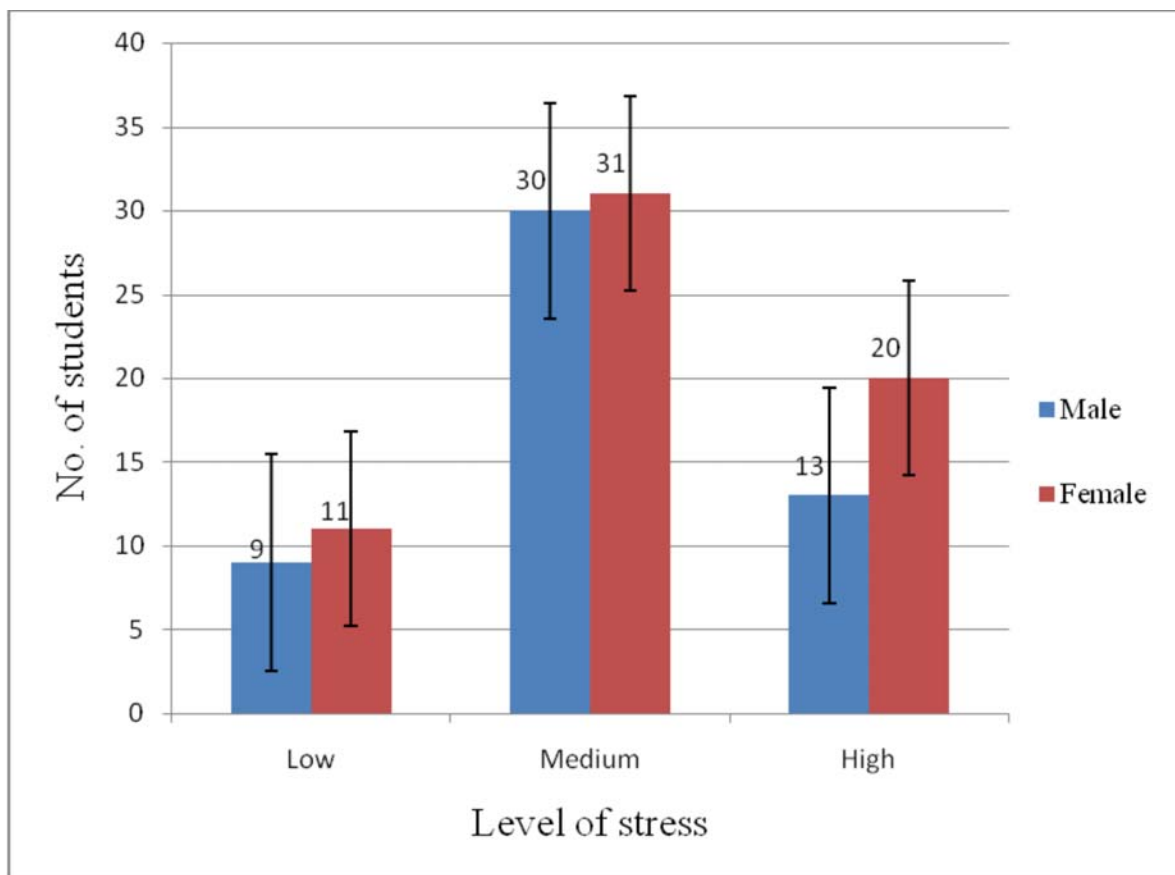


Fig. 1 : Distribution of subjects according to gender and their Stress level.

A total of 47% (54) students earned more than 50% of cumulative grade points in 1st professionals, with female students (34) outnumbering the male students (20). Similarly, female students (41) show better attendance as compared to male students (27). 60% students showed more than 75% attendance (Table II). The correlation between cumulative grade points, attendance and stress in male students and female students is shown in Table III & IV.

TABLE II : Distribution of CGP and attendance according to gender.

Variables	Attendance		Cumulative grade points	
	< 75%	≤ 75%	< 50%	≤ 50%
Male students	25	27	32	20
Female students	21	41	28	34

(CGP - Cumulative Grade Points).

Discussion

The main research question in this paper was to

explore the relationship between perceived stress levels and academic performance (i.e. cumulative grade points and attendance), and to show its relation to other demographic factors such as age and sex.

TABLE III : Correlation between various factors in male students.

	CGP			Attendance			Stress		
	Mild stress	Moderate stress	Severe stress	Mild stress	Moderate stress	Severe stress	Mild stress	Moderate stress	Severe stress
CGP	1	1	1						
Attendance	.84	.76	.91	1	1	1			
Stress score	.26	.13	.002	.08	.12	-.07	1	1	1

TABLE IV: Correlation between various factors in female students.

	CGP			Attendance			Stress		
	Mild stress	Moderate stress	Severe stress	Mild stress	Moderate stress	Severe stress	Mild stress	Moderate stress	Severe stress
CGP	1	1	1						
Attendance	-.002	.54	.79	1	1	1			
Stress score	-.313	.17	.20	.11	-.11	.19	1	1	1

Keeping in view the prior knowledge of higher levels of stress in professional courses including medical, we conducted a survey of undergraduate medical students (11-16). In our study, male students' cumulative grades and stress were found to be inversely correlated i.e. as the level of stress increased from mild to severe the cumulative grades also decreased. This finding suggests that stress has a negative impact on the academic performance of the medical students which can be explained on the basis of the fact that higher stress impairs the performance which is due to the deterioration of the cognitive skills or higher cognitive functions for e.g. impaired concentration, poor retention and poor recall, startle response, mental fatigue (17-24). It can further be stressed upon that the varying effects of stress on performance is often compared to or known as "inverted-u" which has an impact on the cognitive areas of learning as well neuroplasticity (25). In contrast to this finding, interestingly, in our study it was observed that in female students increasing amount of stress was having a beneficial effect on cumulative grade points i.e. the stress was related to the improved academic performance. This contrasting finding in case of female students may be explained on the basis the phenomenon of 'eustress' where an individual is motivated high enough because of stress to move to action to get things accomplished (26-27). Takemuray Y, Kikuchi S and Inaba y have reported the similar results where the stress has been associated with improvement in performance (28-29). In our study we also found that both measures of academic success i.e. cumulative grade points and attendance were positively correlated to one another. The students who showed better attendance (irrespective of gender) earned higher cumulative grade points. This finding is consistent with prior research work (30).

Our study found high levels of stress and its significant role on the academic performance of the medical students. Knowing about the stressors and its impact on students is the first step in highlighting the need for acknowledging, identifying, and attempting to reduce the levels of stress in them.

Conclusions

Keeping in view the fact that the undergraduate medical students are the future medical professionals on whose shoulders the physical as well as mental health of the public lies, it is of utmost importance that the stress and the mental health of these young budding professionals is taken care of. Authors have generated a list of stressors that were reported to be of important value regarding the stress by the students themselves who were under the study. It is thus planned that these stressors will also be included in the further study that is underway. It is also proposed that keeping in view the increased propensity of medical students to be under stress, stress management in form of incorporating and inculcating coping mechanisms should be included in medical curriculum. Some de-stressing techniques including relaxation exercises, yogic exercises, time management, and participation in extra-curricular activities to should be taught to the medical students from the first year in the college, which would indirectly improve the functioning and academic performance of the students.

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