

A STUDY OF BASAL METABOLIC RATE IN ADULT KASHMIRIS

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Summary: Sixty two adults, including forty one males (16-36 yrs.) and twenty one females (16-25 yrs.), were studied by closed circuit method as regards their B.M.R. Males showed a greater lowering of metabolism than the females when compared to MF and AD standards. The females actually showed a higher B.M.R. than the RR standards. Both the sexes had a higher basal metabolism than the values reported from other parts of the country. The difference, however, was significant only in the case of females. Winter metabolism was not significantly higher than the summer value in either sex, though females showed somewhat greater variation.

Key words: Basal Metabolic Rate (B.M.R.) Mayo Foundation (MF) Aub DuBois(AD)
and Robertson Reid (RR) standards Age groups male and female sex
cold climate altitude seasonal variation

INTRODUCTION

Bengali adult have been reported to have basal metabolic rates higher than adult populations in other parts of India, who in turn have rates (B.M.R.) lower than the European and American standards (2). We thought it worthwhile to conduct a study of the B.M.R. of the adult citizens of Kashmir, where altitude is higher and the climate is colder, with the idea that the results will provide data that can be used for comparison with the already available studies.

MATERIALS AND METHODS

The subjects were chosen by random selection from amongst the medical students, teachers and laboratory staff of the Government Medical College, Srinagar. Sixty two subjects, including 41 males and 21 females, belonging to age groups 16-36 and 16-25 yrs. respectively, were studied.

The B.M.R. was measured with Collin's "Metabolex", the acceptability of which has been reported (3). The apparatus works on closed circuit principle. All determinations were made in the morning under basal conditions and after observing all the precautions as given by Peters and VanSlyke (10).

In addition 12 subjects (6 male and 6 female) were studied both in summer and winter to find any seasonal variation in B.M.R.

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RESULTS

The observations are summarised in Tables No. 1 to IV.

TABLE I: Mean B.M.R. of males and females belonging to different age groups along with range, standard deviation (SD), coefficient of variation and standard error of mean (SE).

Age group in years	No. of observations	Mean B.M.R. Cal/Sqm/gr.	Range Cal/Sqm/hr.	S.D.	Coeffi. of variation	S.E.
MALES						
16-19	18	38.99	32.34-42.43	2.8	7.18	0.66
20-29	16	36.85	31.88-42.75	3.45	9.35	0.86
30-36	7	34.88	29.98-37.47	2.8	8.08	1.06
FEMALES						
16-19	14	37.10	31.08-42.40	3.42	9.22	0.91
20-25	7	35.17	32.75-37.17	1.99	5.60	0.74

TABLE II: Variation of B.M.R. with sex in different age groups.

Age group years	Males			Females			Percent difference	T. Remarks
	No. of obs.	B.M.R. Cal/Sq.m./hr.	S.D.	No. of Obs.	B.M.R. Cal/Sq.m./hr.	S.D.		
1	2	3	4	5	6	7	8	9
16-25	27	38.52	3.11	21	36.45	2.91	5.4	2.23 significant (T more than 2.014)

TABLE III: Deviation of the present values from those of Mayo Foundation, (MF), AUB Dubos (AD) and Robertson Reid (RR) standards.

Age group in years	Percent			Deviation from		
	MF	AD	RR	MF	AD	RR
MALES						
16-36	-10.14	-8.46	-1.67			
FEMALES						
16-25	-2.68	-5	+4.38			

TABLE IV: Seasonal variation in B.M.R. of males and females.

No. of obs.	Summer		Winter		Percent difference	T.	Remarks
	Mean B.M.R. Cal./Sq.m./hr.	S.D.	Mean B.M.R. Cal./Sq.m./hr.	S.D.			
MALES							
6	36.43	2.12	36.94	2.94	1.38% higher in winter	0.15	Insignificant. (T less than 2.204).
FEMALES							
6	35.47	3.7	37.27	4.68	5% higher in winter.	1.24	Insignificant. (T less than 2.204).

DISCUSSION

The average B.M.R., as expected, shows a decline in higher age groups in both males and females studied. The B.M.R. is quite low as compared to Mayo Foundation (MF) and Aub DuBois (AD) standards in both sexes. But the difference is not much when compared to Robertson Reid (RR) standards (14). In fact the females show a higher metabolism than the RR standards.

Many of the authors from India have reported an approximately equal lowering of B.M.R. in both the sexes as compared to various standards (7,8,9,13 and 16), while in the present series the females show a lesser deviation than the males, indicating that the women of Kashmir do not show as much of lowering in their B.M.R. as males when compared to the various standards.

The comparison further reveals that the B.M.R. of Kashmiris is higher than that of people from rest of the country. But, for want of requisite data from other authors, it has not been possible to treat the differences statistically except with those of Sen and Banerjee (16) and Shiv Kumar *et al.* (17). These studies reveal a significant difference only in the case of females.

The study does not reveal any statistically significant difference between the summer and winter values of B.M.R. and therefore, does not confirm the reports of other authors (5, 6 and 18). The failure to increase the B.M.R. in winter may be due to acclimatisation of the subjects to the cold winter. Thus Ramaswamy *et al.* (12) report no change in B.M.R. as a result of fall in ambient temperature, in persons fully adapted to cold while unacclimatised persons did increase their metabolism.

Some of the factors to which the higher metabolism of Kashmiris may be attributed to are:—

Climate: In contrast to the tropical climate in most of India, the climate of Kashmir is quite cold for the major part of the year. The temperature ranges between a minimum of minus 10 °C and a maximum of 37 °C.

It is possible that in cold climate the muscle tone is kept at a higher level due to constant cold stimulus, and the individual, even after half an hours rest, is not able to relax fully, resulting in a higher B.M.R.

Altitude: Apart from the cool climate, hypoxia at high altitude can also cause a stimulation of the basal metabolism by increasing adrenaline production. But this is not likely to be a factor of importance in the present study as Kashmir is at less than the critical altitude of 13000 ft., below which hypoxia is of insufficient magnitude to stimulate the B.M.R. (4). However, it has been reported that women from hills of Assam have a higher B.M.R. as compared to those from the plains (1). Similarly people residing in Nilgiri hills for three years had a higher metabolism than those residing for one and a half month only (11).

Diet: The staple diet of Kashmiris is rice, but so is the case with Bengalis and Madrasis, who have not shown any significant elevation in B.M.R. as compared to other Indians with one exception, in which higher values have been reported for Bengalis (2). The present study is based on non-vegetarians, but the total protein intake is not higher than that of other Indians.

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