

Correlation of Physio-Biochemical Parameters with Dietary Pattern Among Medical Students of Western UP - A Cross-Sectional Study

Kavisha Agarwal¹, Anshu Tandon², Priti Rath³, Megha Kulshreshtha²

¹Post Graduate, Department of Physiology, LLRM Medical College, Meerut, UP

²Associate Professor, Department of Physiology, LLRM Medical College, Meerut, UP

³Professor, Department of Physiology, LLRM Medical College, Meerut, UP

Corresponding Author: Dr. Kavisha Agarwal

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ABSTRACT

Background: Dietary habits established during young adulthood play a crucial role in determining long-term health and metabolic outcomes. Medical students are particularly vulnerable to unhealthy eating behaviors due to academic stress, irregular schedules, and hostel living, which may adversely affect physiological and biochemical health. This study aimed to assess dietary patterns and their association with physiological and biochemical parameters among medical students especially between day scholars and hostelers.

Material and Methods: This cross-sectional study included 150 first-year MBBS students. Dietary habits and demographic data were collected using a structured questionnaire. Anthropometry and body composition were assessed using bioelectrical impedance analysis. Fasting blood samples were analyzed for hemoglobin, Blood Glucose, lipid profile, vitamin B12, and vitamin D3. Statistical analysis was performed using SPSS version 25.0, with $p < 0.05$ considered statistically significant.

Results: The mean age of the 150 first-year MBBS students was 19.72 ± 1.30 years; 62.67% were males, 37.33% were females and 79.33% were hostelers, 20.67 %were day scholars. Breakfast skipping was common (54.0%), although 79.33% of participants consumed three meals daily. No significant differences were observed between hostelers and day scholars in biochemical parameters or body composition measurements (all $p > 0.05$).

Conclusion: Breakfast skipping was highly prevalent among medical students irrespective of residence status. No significant differences were observed in biochemical parameters or body composition between hostelers and day scholars. Our findings emphasize the need to promote regular breakfast consumption and healthy dietary practices to support long-term metabolic health.

Keywords: Medical students; Dietary habits; Body composition; Biochemical parameters; Nutritional status.

INTRODUCTION

Nutrition is a key determinant of health, influencing physiological function, metabolic balance, disease risk, and overall well-being. Dietary habits established during young adulthood, particularly among medical students, have long-term health implications. Academic stress, irregular schedules, hostel living, and clinical responsibilities often promote unhealthy eating behaviors and adverse physiological and biochemical outcomes. [1,2]

Globally, dietary patterns among young adults have shifted toward energy-dense, processed foods with reduced consumption of fruits, vegetables, and whole grains. Medical students often adopt unhealthy dietary habits, including meal skipping, frequent fast-food intake, and excessive caffeine consumption. Combined with sedentary lifestyles, poor sleep, and stress, these behaviors increase the risk of obesity, metabolic disorders, and abnormalities in BMI, blood pressure, glucose, lipid profile, hemoglobin, and liver and renal function parameters. [3,4]

Physiological indicators such as BMI, waist-hip ratio, blood pressure, and pulse rate, together with biochemical markers including fasting blood glucose, HbA1c, lipid profile, hemoglobin, and liver enzymes, provide important measures of nutritional and metabolic health. Meal timing and frequency have been associated with type 2 diabetes, cardiovascular diseases, and other chronic conditions. [5]

In India, rapid nutritional transition and urbanization have led to greater consumption of refined carbohydrates, processed foods, and fast foods, particularly among young adults. Hostel living, peer influence, financial constraints, and academic stress further promote unhealthy dietary practices among medical students. [6] Dietary assessment methods such as food frequency questionnaires and 24-hour dietary recalls help identify dietary patterns [7] for their association with physiological and biochemical health outcomes.

By understanding the relationship between dietary patterns and physio-biochemical parameters, there is an opportunity to help medical students meet their dietary goals, which are negatively impacted by personal and structural academic barriers. [8] As future physicians, their personal dietary habits also influence their ability to provide effective nutrition counseling to patients. However, limited studies have comprehensively evaluated these associations among Indian medical students. Therefore, the present study aims to assess dietary patterns and examine their correlation with key physiological and biochemical parameters among medical students, with particular emphasis on differences between day scholars and hostelers, to provide evidence for improving their health and nutritional practices according to their place of residence.

MATERIALS & METHODS

This cross-sectional study was conducted in the Department of Physiology, LLRM Medical College, Meerut, in collaboration with the Central Laboratory, SVBP Hospital. Institutional Ethics Committee approval was obtained with no. SC-1/2026/1961 before commencement of the study, and written informed consent was obtained from all participants.

The sample size was calculated using the Laplace formula ($n = Z^2 pq / d^2$), considering an 89% prevalence of vitamin D deficiency, 95% confidence interval, and 5% margin of error, yielding a minimum sample size of 150 participants.

Criteria for selection: First-year MBBS students aged 18–25 years who had completed at least three months of the MBBS course. Students with chronic illnesses (diabetes, hypertension, renal or endocrine disorders, PCOD, thalassemia) or those unwilling to participate were excluded.

Demographic characteristics including dietary habits, and medical history were collected using a structured questionnaire.

Dietary assessment included meal frequency and daily eating routine among hostellers and day-scholars. Anthropometric measurements including height, weight, waist circumference, and body mass index (BMI) were recorded using standard protocols. Body composition parameters, including total body water, fat-free mass, skeletal muscle mass, body fat percentage, and visceral fat level, were assessed using a Charder MA601 Bioelectrical Impedance Analyzer (BIA) following manufacturer-recommended procedures.

After an overnight fast (8–12 hours), venous blood samples (5–7 mL) were collected for estimation of hemoglobin, fasting blood glucose, lipid profile (total cholesterol, triglycerides, HDL-C, LDL-C), serum vitamin B12, and 25-hydroxy vitamin D using standardized laboratory methods and automated analyzers. Biochemical parameters were interpreted according to established WHO, ADA, AHA, NCEP ATP III, and Endocrine Society guidelines. [9-13]

Statistical Analysis

Statistical analysis was performed using SPSS version 25.0. Continuous variables were expressed as mean $\pm$ standard deviation (SD), and categorical variables as frequency and percentage. They were further grouped into two groups - hostellers and day scholars because dietary pattern was affected by their residence. Group correlation was performed using the independent t-test and Chi-square test for dietary patterns and physio-biochemical parameters. A p-value <0.05 was considered statistically significant.

RESULT

A total of 150 medical students participated in the study. The mean age of the participants was 19.72 ± 1.30 years. Males constituted the majority of the study population (94, 62.67%), while females accounted for 56 (37.33%) participants. Most students were hostellers (119, 79.33%), whereas 31 (20.67%) were day scholars (table 1).

Table 1: Demographic profile of participants (n=150)

Parameters		No.	Percentage
Age group (mean $\pm$ SD) yrs		19.72 $\pm$ 1.30	
Sex	Male	94	62.67
	Female	56	37.33
Living area	Hosteler	119	79.33
	Day scholar	31	20.67

Overall, 46.0% of participants consumed breakfast regularly, while 54.0% skipped it occasionally, with regular breakfast intake being slightly higher among hostellers (47.06%) than day scholars (41.94%). Regular lunch and dinner consumption was reported by 84.67% and 83.33% of participants, respectively, and was more common among hostellers than day scholars. Most participants (79.33%) consumed three meals per day, whereas 20.67% reported eating only two meals daily, with a higher

proportion of hostellers following a three-meal pattern. On applying chi-square test, no statistically significant difference was observed between hostellers and day scholars regarding breakfast regularity ($\chi^2 = 0.260$, $df = 1$, $p = 0.6102$), lunch regularity ($\chi^2 = 3.301$, $df = 1$, $p = 0.0692$), or the number of meals consumed per day ($\chi^2 = 0.630$, $df = 1$, $p = 0.4275$). However, a statistically significant association was observed for dinner regularity ($\chi^2 = 6.839$, $df = 1$, $p = 0.0089$) (table 2).

Table 2: Distribution of cases according to their daily eating routine of medical students

Daily eating routine		Number	Hosteler (n=119)	Day scholar (n=31)	Chi square	df	P value
Breakfast	Regular	69 (46.0%)	56 (47.06%)	13 (41.94%)	0.260	1	0.6102
	Skip sometimes	81 (54.0%)	63 (52.94%)	18 (58.06%)			
Lunch	Regular	127 (84.67%)	104 (87.39%)	23 (74.19%)	3.301	1	0.0692
	Skip sometimes	23 (15.33%)	15 (12.61%)	8 (25.81%)			
Dinner	Regular	125 (83.33%)	104 (87.39%)	21 (67.74%)	6.839	1	0.0089*
	Skip sometimes	25 (16.67%)	15 (12.61%)	10 (32.26%)			
No. of meals per day	Two times	31 (20.67%)	23 (19.33%)	8 (25.81%)	0.630	1	0.4275
	Three times	119 (79.33%)	96 (80.67%)	23 (74.19%)			

Note – * Highly significant

The laboratory parameters were comparable between hostelers and day scholars, on applying t test, no statistically significant differences observed for any parameter ($p>0.05$). Mean hemoglobin, fasting blood sugar, total cholesterol, HDL, LDL, VLDL,

triglycerides, LDL/HDL ratio, and TC/HDL ratio were similar in both groups. Likewise, vitamin D₃ and vitamin B₁₂ levels did not differ significantly, indicating a comparable biochemical and nutritional profile among hostelers and day scholars (table 3).

Table 3: Laboratory parameters among hosteler /day scholar

Parameters	Hosteler (n=119)	Day scholar (n=31)	t value	p value
Hb (gm/dl)	14.10±1.96	14.05±1.68	-0.130	0.8967
S. Cholesterol (mg/dl)	160.55±29.58	162.74±25.91	0.376	0.7074
HDL (mg/dl)	64.70±21.50	70.32±19.53	1.320	0.1889
LDL (mg/dl)	78.01±22.84	78.06±23.71	0.011	0.9914
VLDL (mg/dl)	20.57±10.62	21.48±7.34	0.449	0.6538
Triglycerides (mg/dl)	96.16±37.17	99.90±37.06	0.499	0.6183
LDL/HDL Ratio	1.21 ± 0.51	1.11 ± 0.45	-0.995	0.3214
TC/HDL Ratio	2.48 ± 0.91	2.31 ± 0.78	-0.952	0.3424
FBS (mg/dl)	80.07±18.78	83.47±10.59	0.967	0.3350
Vit D3 (ng/ml)	11.39±12.33	12.72±10.83	0.548	0.5847
Vit B12 (pg/ml)	201.27±86.80	233.65±113.57	1.729	0.0858

Body composition parameters were comparable between hostelers and day scholars, on applying t test, no statistically significant differences observed for any

variable ($p>0.05$). Total protein, skeletal muscle mass, fat-free mass, and total body water were similar in both groups (table 4).

Table 4: Body fat composition among hosteler /day scholar

Body fat composition	Hosteler (n=119)	Day scholar (n=31)	t value	p value
Total protein	8.80±2.03	9.03±1.70	0.580	0.5630
Skeletal Muscle Mass (SMM)	24.32±5.61	24.85±4.68	0.484	0.6293
Percentage Body Fat (PBF)	24.59±9.28	21.84±8.09	-1.507	0.1340
Visceral Fat	63.37±31.04	53.82±24.48	-1.588	0.1145
Fat Free Mass (FFM)	44.59±9.48	45.32±7.93	0.394	0.6941
Total Body Water (TBW)	36.66±6.94	37.19±5.80	0.391	0.6965

DISCUSSION

It is widely recognized that, on an average, medical students do not maintain optimal

dietary habits. However, there is still uncertainty about whether most medical students actually wish to follow a healthy

diet. The present study evaluated the dietary habits, laboratory parameters, and body fat composition among hosteler and day scholar medical students.

The majority of participants were male (62.67%), with a mean age of 19.72 ± 1.30 years, and nearly four-fifths (79.33%) were hostel residents. Comparable results reported by similar studies on medical students by García-Cardona D et al. [14] and Patel PH et al. [15] who reported mean ages of 20.0 ± 2.7 years and 20.0 ± 1.49 years, respectively. This age group is critical, as dietary and lifestyle habits established during this period can have a lasting impact on long-term health and biochemical profiles. Gender results are varied across the studies, Sulania A et al. [16] reported 64.7% males while Kraljević G [17] reported 67.30% females in their study.

Most of the undergraduate medical students (62%) lived in hostel as reported by Kaur G et al. [2] which was similar to our study. Medical students often reside in hostels to accommodate the demanding nature of their training and ensure easy access to academic facilities. However, hostel living is commonly associated with dependence on mess food, irregular meal timings, limited dietary variety, and increased consumption of processed and packaged foods, which may influence dietary habits and nutritional status.

Breakfast skipping emerged as the most common unhealthy dietary practice in the present study, with 54.0% of students reporting that they skipped breakfast at least sometimes. The prevalence was slightly higher among day scholars (58.06%) than hostelers (52.94%). Studies have consistently reported a high prevalence of breakfast skipping among college students. Deliens T et al. [18] attributed this behavior to academic stress, busy schedules, and irregular sleep patterns. Similarly, Papadaki A et al. [19] found that students living away from home skipped breakfast more frequently.

Regular lunch and dinner consumption was reported by more than 80% of participants,

although day scholars skipped these meals more frequently than hostelers. Most students (79.33%) consumed three meals daily, reflecting relatively satisfactory meal frequency despite the high prevalence of breakfast skipping. These findings are consistent with observations by Sogari G et al. [20], who reported that although breakfast skipping is common among university students, lunch and dinner are generally consumed more regularly because they are often structured meals within institutional schedules or hostel mess timings. Another study by Mizia S et al. [21], showed that the students usually consumed 3–4 meals a day. Regular meal frequency is important for maintaining metabolic stability and preventing fluctuations in blood glucose levels.

The comparison of laboratory parameters between hostelers and day scholars demonstrated no statistically significant differences in hemoglobin, fasting blood sugar, lipid profile, vitamin D3, or vitamin B12 levels. Although day scholars showed marginally higher vitamin B12 levels, the difference was not statistically significant ($p=0.0858$). Dzed L et al. [22] found a high prevalence of Vitamin B12 deficiency among boarding school children from seven districts. Hostel meals often provide less non-vegetarian food, which may contribute to lower vitamin B12 intake. In contrast, day scholars are more likely to consume regular home-prepared meals with better dietary quality and greater intake of vitamin B12-rich foods.

Vitamin D deficiency was common in both groups, with mean levels below the recommended normal range, which may be due to prolonged classroom activities, and limited sunlight exposure, as reported in Indian studies by Harinarayan et al [23] and Holick [24].

Body composition analysis also revealed no statistically significant differences between hostelers and day scholars. Skeletal muscle mass, body fat percentage, visceral fat, fat-free mass, total body water, and total protein were comparable between the two groups.

Although hostelers demonstrated slightly higher percentage body fat and visceral fat, these differences did not reach statistical significance. Similar observations have been reported among college students where body composition parameters were generally within normal limits due to relatively young age and moderate physical activity. [25] The absence of significant biochemical and body composition differences despite variations in breakfast consumption suggests that residence status by itself may not be a major determinant of nutritional health in young medical students.

Limitation of the study

The study was done in single medical college with a relatively small sample. Dietary habits were assessed using a self-reported questionnaire, which is subject to recall and reporting bias. In addition, physical activity, sleep quality, psychological stress, and detailed dietary intake were not quantitatively evaluated. The unequal distribution of hostelers and day scholars may also have reduced the statistical power to detect small differences between-groups.

CONCLUSION

The present finding indicates that breakfast skipping is highly prevalent among medical students among hostelers as well as day scholars. However, this unhealthy dietary behaviour was not associated with significant differences in biochemical parameters or body fat composition between hostelers and day scholars because only residence status itself not impact major changes on overall health. The present result highlights the importance of promoting regular meal consumption, particularly breakfast, among medical students to encourage lifelong healthy dietary practices.

Declaration by Authors

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