



Assessment of Lifestyle Practices and Nutritional Status among Undergraduate Medical Students

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Authors' contributions

This work was carried out in collaboration among all authors. Author MH designed the study. Authors BNK and HR wrote the protocol performed managed the analyses of the study and wrote the first draft of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Background and Objectives: Overweight and obesity are not only the biggest problem among the middle-aged but also among children, teenagers and young adults. Early detection of the factors causing obesity, in turn, helps in the prevention of its complications. The objectives of the study were to assess the various lifestyle practices among medical students and to correlate the relationship between the nutritional status and biochemical parameters.

Methods: A cross-sectional - study was conducted on MBBS students studying at Mandya Institute of Medical Sciences (MIMS), Mandya, Karnataka, India. Self-administered questionnaires were given to the students followed by the recording of their anthropometric measurements. Nutritional status was assessed using the Body Mass Index (BMI). Fasting blood sample was collected from the student and analysed the biochemical parameters.

Results: Out of 325 students, 48.9% were male students and 51.1% were female students. It was found that a higher percentage of female students (53%) was on a balanced diet as compared to male students (47.2%). The daily consumption of fruits and vegetables were less amongst students

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of both genders. Mean values of Fasting Blood Sugar (FBS), Total Cholesterol (TC), Triglyceride (TG) and Low-Density Lipoprotein (LDL-C) were higher among male students as compared to female students. Mean values of few biochemical parameters like FBS, TC, TG and LDL-C were higher amongst obese students along with a corresponding decrease in High-Density Lipoprotein (HDL-C).

Conclusion: Our study showed that unhealthy dietary and lifestyle practices were associated with increased levels of various biochemical parameters and it was more common amongst male students. Increased biochemical parameters like FBS, TC, TG and LDL-C with the corresponding decrease in HDL-C is an alarming sign for increased risk of developing cardiovascular disease among the younger age group.

Keywords: Lifestyle; nutrition; biochemical parameters; cardiovascular diseases & MBBS students.

1. INTRODUCTION

In developing countries, the prevalence of obesity and overweight have been showing increasing pattern recently. Overweight and obesity are not only the biggest problem among the middle-aged but also among children, teenagers and young adults [1]. Overweight and obesity are the life-threatening risk factors for many diet-related non-communicable diseases like type 2 diabetes mellitus, hypertension, stroke and certain cancers. The complications associated with it are preventable with early interventions [2].

Overweight and obesity are the fifth leading risk factors for global deaths. The increasing trend of overweight and obesity in adolescents has been recognised as one of the major public health challenges of the 21st Century across the globe [3].

According to the WHO global estimate, in 2016 more than 1.9 billion adults aged 18 years and older were overweight. Of these over 650 million adults were obese. Recently in India, it has been estimated that in the whole country 135, 153 and 107 million individuals are having generalized obesity, abdominal obesity and combined obesity respectively [3,4].

College life has been an important phase of life in the development of individual identity and lifestyle. It is important to develop a lifestyle which leads to healthy adulthood and to reduce the health problems in later years. The social implication of obesity is a major problem area that is often neglected. The overweight and obese students tend to do less well academically, have poorer job prospects and lower self-esteem [5].

Stress is considered as one of the factors leading to obesity as stressful state results in the irregularity of diet, lack of exercise and

addictions, all these factors are solely responsible for causing overweight and obesity [6]. Medical education is well known for its stress throughout its course of training. The amount of knowledge to be gained is enormous, social isolation, the pressure of examination, discrepancies between expectation and reality all these factors can be anticipated to play an important role in causing psychological stress. Thus medical students belong to the high-risk group in developing overweight and obesity [7].

Even though the knowledge about healthy lifestyle and dietary habits is better among medical students as compared to other students, stress and lack of time for physical activities can lead to the adoption of unhealthy practices [8].

It is therefore important to investigate health behaviours and lifestyle factors like dietary habits, regular exercise and addictive habits among medical students and their relation with nutritional status. Hence the present study was undertaken with the objectives of studying various lifestyle practices among medical students and to assess the correlation between the nutritional status and biochemical parameters among medical students of MIMS, Mandya Karnataka, India.

2. MATERIALS AND METHODS

A cross-sectional - study was carried out on the undergraduate medical students at MIMS, Mandya Karnataka, India, after obtaining clearance from the Institutional Scientific Committee and the Institutional Ethical Committee of MIMS, Mandya, Karnataka, India.

Medical students were explained in detail about the aim of the study. MBBS students studying in Mandya Institute of Medical Sciences, Mandya, Karnataka, India were included in the study.

Written and informed consent was taken from the willing participants. Students who were not willing to take part in the study, students who were absent during the study and those who were having an acute or chronic illness and psychological illness were excluded from the study.

A detailed history including sociodemographic data, family history, history, drug history was noted. The response sheets of a self-administered questionnaire which included questions related to dietary habits, physical activity and addictive habits of the students were collected from the participants. Each question was assessed by 3 levels of response like always, sometimes and never. Anthropometric measurements such as weight, height and body mass index were measured. Nutritional status was assessed by BMI.

2.1 Physical Measurements

Height (cm) was measured using stadiometer, weight (kg) measured by analogue weight scale. Body Mass Index (kg/m²) was calculated using formula weight/height². BMI was classified according to the World Health Organisation (WHO) (Table 1).

Table 1. Classification of BMI according to WHO [9]

BMI	Classification	BMI code
< 18.5	Underweight	1
18.5–24.9	Normal weight	2
25.0–29.9	Overweight	3
≥ 30.0	Obesity	4

2.2 Collection of Blood Sample

For assessing the biochemical parameters, students were advised to be on overnight fasting for 8-10 hours before drawing 3 ml of the fasting venous sample the subsequent morning under aseptic precautions into non-vacuum plain tubes with clot activator. The tubes were allowed to stand for about 25-30 minutes at ambient temperature followed by centrifugation at 3500 rpm for 15-20 min. The serum was separated and processed in the Clinical Biochemistry section of Central Diagnostic Laboratory MIMS, Mandya, Karnataka, India, using the fully automated random access clinical chemistry analyser XL- 300 (Transasia) for the testing of biochemical parameters.

Fasting Blood Sugar (FBS) was estimated by GOD-PAP methodology, serum Triglyceride (TG) by GPO peroxidase methodology and High-Density Lipoprotein (HDL-C) by direct determination (enzyme selective protection method). Low-Density lipoprotein (LDL-C) was calculated using Friedewald's equation.

$$[LDL-C] = [TC] - [HDL-C] - [Triglyceride] / 5.$$

Friedewald's equation used in routine practice for LDL-C is not suitable for triglyceride value > 400 mg/dL; in such cases direct homogenous assay was performed.

The reference ranges for FBS and lipid profile parameters were adapted from the American Diabetes Association (ADA) & ATP III criteria respectively [1].

2.3 Statistical Analysis

The collected data was analysed using Epi-info software. The descriptive statistics like mean, percentage, standard deviation and Inferential statistics such as chi-square test and Fisher's exact tests were applied for analysing the data as applicable. A p-value of less than 0.05 was considered statistically significant.

3. RESULTS

Consenting undergraduate medical students of MIMS, Mandya, Karnataka, India. Between the ages of 18-25 years were participated in the study. Total 325 students were participated in the study, out of that 48.9% (159) were male students and 51.1% (166) were female students (Table 2).

The results regarding questionnaires related to lifestyle, physical activity and personal habits among the study population were analysed and compared by gender. It was found that 47.2% of male students were taking a balanced diet as compared to 53% female students. 40.3% of male students were having food at regular intervals as compared to 42.2% female students. 45.2% male and 48.8% of female students were always having breakfast every day. The comparison of the responses to the question of eating fresh fruits showed that 32.7% male and 35.5% female students were eating fresh fruits. Among 325 students, 19 (11.9%) male and 07 (4.2%) female students were doing regular exercises.

According to the obtained responses, consumption of alcohol and smoking was not common among students.

Table 2. Distribution of MBBS students according to the year of study and gender

Participants	Males		Females	
	Number	%	Number	%
1 st year	45	46.9	51	53.1
2 nd year	39	45.9	46	54.1
3 rd year	41	54.7	34	45.3
4 th year	34	49.3	35	50.7
Total	159	48.9	166	51.1

Table 3. Lifestyle and personal habits among study participants

Questions	Level	Male		Female		Total N
		N	%	N	%	
1. Do you eat a balanced diet (low in sugar and fat)	Always	75	47.2	88	53.0	163
	Sometimes	64	40.3	63	37.9	127
	Never	20	12.5	15	9.0	35
2. Do you eat food at regular intervals	Always	64	40.3	70	42.2	134
	Sometimes	89	55.9	86	51.8	175
	Never	06	3.7	10	6.0	16
3. Do you have breakfast every day	Always	72	45.2	81	48.8	153
	Sometimes	77	49.4	70	42.2	147
	Never	10	6.3	15	9.0	25
4. Do you eat fresh fruits	Always	52	32.7	59	35.5	111
	Sometimes	102	70.4	99	65.6	201
	Never	05	3.1	08	4.8	13
5. Do you eat vegetables regularly	Always	58	36.4	72	43.3	130
	Sometimes	91	63.5	80	48.2	171
	Never	10	6.3	14	8.4	24
6. Do you avoid eating fast food	Always	07	4.4	15	9.0	22
	Sometimes	128	80.5	118	71.0	246
	Never	24	15.1	33	19.8	57
7. Do you do Regular exercise 60 min per day	Always	19	11.9	07	4.2	26
	Sometimes	83	52.2	66	39.7	149
	Never	57	35.8	93	56.0	150
8. Do you avoid watching television/ Internet for a longer time	Always	20	12.5	25	15.1	45
	Sometimes	94	59.1	65	39.15	204
	Never	45	28.3	76	45.7	76
9. Do you avoid drinking alcohol	Always	120	75.4	163	98.2	313
	Sometimes	35	22.0	02	1.2	07
	Never	04	2.5	01	0.6	05
10. Do you avoid smoking	Always	123	77.4	164	98.8	317
	Sometimes	32	20.1	01	0.6	03
	Never	04	2.5	01	0.6	05

Table 4. Distribution of BMI and gender

Year of study	Males		Females	
	Number	%	Number	%
Underweight	21	13.21	25	15.06
Normal	109	68.55	117	70.48
Overweight	27	16.98	21	12.65
Obese	2	1.26	3	1.81
Total	159	100	166	100

p>0.05 Chi-square test

Table 5. Distribution of mean values of biochemical parameters among study subjects

Biochemical parameters	Males (Mean ± SD)	Females (Mean ± SD)	p-value
FBS mg/dl	86.69±8.57	84.37±9.58	0.022*
TC mg/dl	157.05±34.51	152.75±32.18	0.247
TG mg/dl	144.04±57.17	129.02±65.54	0.028*
LDL-C mg/dl	68.09±29.57	62.1±32.07	0.081
HDL-C mg/dl	58±10.1	66.19±12.14	0.001*

* Statistically significant $p < 0.05$. Independent t-test

Table 6. Distribution of mean values of biochemical parameters according to BMI classification among study subjects

Biochemical parameters	Underweight (Mean ± SD)	Normal (Mean ± SD)	Overweight (Mean ± SD)	Obese (Mean ± SD)
FBS mg/dl	83.80±7.92	85.06±9.43	86±7.22	87.06±9.66
TC mg/dl	151.59±25.50	153.35±32.26	164.17±39.76	169.80±66.3
TG mg/dl	128.61±57.02	133.29±60.79	157.58±68.36	164.20±45.87
LDL-C mg/dl	61.39±25.69	63.749±29.81	73.04±34.32	79.4±71.86
HDL-C mg/dl	64.78±12.14	62.65±11.85	58.46±11.30	56.8±8.93

Independent t-test

Regarding the assessment of BMI (Table 4), it was found that 16.98% male and 12.65% of female students were overweight. There was no significant statistical difference ($p > 0.05$) observed between male and female students concerning BMI.

The values of biochemical parameters summarized in Table 5, reflected that the mean values of Fasting Blood Sugar (FBS), Total cholesterol (TC), Triglyceride (TG), Low-Density lipoprotein (LDL-C) were higher among male students as compared to female students, whereas corresponding mean value of HDL-C was low among male students. It was found that mean values of FBS, TG and HDL-C showed a statistically significant difference between male and female students.

The distribution of mean values of FBS and lipid profile among the various BMI groups (Table 6), showed that FBS, TC, TG and LDL-C were higher among obese students followed by overweight students whereas; HDL-C was decreasing from underweight to obese students.

4. DISCUSSION

The worldwide prevalence of obesity nearly tripled between 1985 and 2016 [3]. According to WHO global estimate, in 2016 more than 1.9 billion adults aged 18 years and older were overweight. Of these over 650 million adults were obese [3].

Overweight and obesity are not only the biggest problem among the middle-aged but also among children, teenagers and young adults [2]. Overweight and obesity are the life-threatening risk factors for many diet-related non-communicable diseases like type 2 diabetes mellitus, hypertension, stroke and certain cancers [10]. Hence early detection of the factors causing obesity, in turn, helps in prevention of its complications.

In this study, we found that 34.1% and 40.1% of students were regularly eating fresh fruits & vegetables respectively. Also, 96.3% and 97.5% of students reported being non-smoker and non-alcoholic respectively (Table 2). Part of the result is in concurrence with the study conducted by Padmasree D et al. among the undergraduate medical students, which found that factors such as irregular diet, restaurant visits, family history of diabetes and obesity were associated with a significantly higher risk of overweight and obesity [11].

In our study population, we found that 14.8% were overweight and 1.5% were obese (Table 3). The percentage of overweight and obesity found in this study (Table 3), contrasted the results of study Chaitali et.al among medical students in Bangalore that showed a higher prevalence of overweight (19.1%) and obesity (22.1%) among the study participants and further a statistically significant association was found between overweight/obesity and skipping of breakfast [12].

Regarding the biochemical parameters (Table 4), the results showed that FBS, TC, TG, LDL-C were higher among male students with corresponding lower values of HDL-C as compared to female students, at similar manner with the results reported by Jagruti Dholakia et al among undergraduate medical students were partially in concurrence with our study and showed that mean values of FBS & TG were higher among male students as compared to female students with a corresponding lower HDL-C as compared to female medical students. Whereas TC and LDL-C were higher among female students [13].

A study conducted by Gulam SB et al, among undergraduate medical students compared to three BMI groups (underweight, normal and overweight) with regards to TC, LDL-C, HDL-C, TG, and Very Low-Density Lipoprotein (VLDL-C). They found that there was no significant difference in TC (P=0.37), LDL-C (P= 0.53) TG (P=0.06) and HDL-C, (P=0.54) in three BMI groups but values were increasing from underweight to obese. These results are in concurrence with our study (Table 5). We found similar findings like increasing FBS, TC, TG, LDL-C from underweight to obese, with a corresponding decrease in HDL-C values [14].

In the present study, it was found that a higher percentage of male students had increased levels of biochemical parameters like FBS, TC, TG and LDL-C and also were following unhealthy lifestyle habits as compared to female students.

The main limitation of the present study was the sample size being small and hence could not be divided into students residing in the hostel and day scholars for comparing lifestyle habits questions. Lifestyle habits questions were not compared with BMI. Even though the mean values of biochemical parameters were higher among male students as compared to female students, the mean values were within the normal reference range according to ADA and ATP criteria.

5. CONCLUSION

Obesity has become the major public health problem in the world and its prevalence is increasing every year drastically. Stress is considered as one of the factors leading to obesity. As stressful state results in the irregularity of diet, lack of exercise and addictions, all these factors are solely responsible for causing overweight and obesity.

Medical education is well known for its stress throughout its course of training. Thus medical students belong to the high-risk group in developing overweight and obesity. Early detection of the factors causing obesity, in turn, helps in the prevention of its complications. Hence the high-risk group should be screened to evaluate the status of cardiovascular events.

Our study showed that less than half of the students were following healthy lifestyle habits among that percentage of female students following healthy lifestyle habits were more as compared to male students. Male students had increased mean values of biochemical parameters as compared to female students and we also observed that there is an increasing trend in the biochemical parameters from underweight to obese. Hence timely identification and correction of food habits and maintaining an optimal weight are important at teenagers for overall well-being.

Overweight and obesity among medical students are to be considered as the alarming sign because today's medical students are the future doctors, health leaders and role models to the society. Hence creating awareness regarding weight management, physical activity and adoption of healthy eating and lifestyle changes are essential among medical students.

CONSENT

"Written and Informed consent was obtained from the willing MBBS students."

ETHICAL APPROVAL

Ethical approval obtained from the Institutional Scientific Committee and the Institutional Ethical Committee of MIMS, Mandya, Karnataka, India.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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