Original Research Article

Assessment of body mass index and prevalence of obesity among undergraduate medical students: an observational study in a tertiary care teaching hospital of Madhya Pradesh

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ABSTRACT

Background: Obesity is the major cause of various non-communicable diseases including diabetes mellitus, hypertension. The modifiable factors like stress, sedentary life, consumption of soft drinks and fast foods and lack of physical activity are responsible for it. Objective: to find dietary pattern, physical activity and status of overweight and obesity among medical students.

Methods: It was a cross sectional observational study conducted on MBBS undergraduates studying in a g medical college at Sagar district of Madhya Pradesh, India. Out of nearly 500 medical students studying in different semesters, 300 students were participated in the study though the required sample size was 184 only. Structured questionnaire for interview, calibrated portable weight scale for weight measurement and stadiometer for height measurement were used.

Results: The students were categorised into underweight, normal and overweight/obese on the basis of their calculated BMI (body mass index) value as per norms of World health organization for south Asian populations. 26.7% medical students were found to be overweight or obese based on BMI cut off value 23.00 kg/m^2. There was lack of inclusion of fresh fruits and green vegetables in regular diet in 50% and nearly 95% of medical students respectively. The low level of physical activity was found in more than 85% of the medical students.

Conclusions: The involvement of medical students in physical and sports activities is dire need for their good health.

Keywords: Obesity, Fast food, Soft drink, Physical activity

INTRODUCTION

The prevalence of obesity with its detrimental consequences like hyperlipidaemia, hyperinsulinaemia, hypertension, early atherosclerosis, heart diseases, diabetes mellitus and risk of cancers is rising abruptly among young professionals worldwide. India though a developing country fighting with major problem of undernutrition, hidden malnutrition now have to fight on new front of obesity and life style diseases. The recently published report of NFHS -4 says the prevalence of obesity has almost doubled in last 10 years.

The professional students, including medical students are in a high risk side when obesity is concerned. This is mainly because of the modernization and industrialization which has lead to sedentary life style and unhealthy eating pattern.[1] The ideal definition, based on percentage body fat, is impracticable for epidemiological use to identify obesity. The body mass index (weight/height^2) is widely used in adult populations, and a cut off point of 30 kg/m^2 is recognised internationally as a definition of adult obesity (Table 1).[2] Important differences exist in the form of higher/lower body fat content for a given BMI in South-east Asians, Polynesians, Micronesians and Asian

Indians.[3,4] With this in mind the International Diabetes Federation has accepted BMI value of >25 kg/m2 and 23 kg/m2 as the cut-off for obesity for Asian men and women respectively.[5] The Western Pacific Regional Office of the World Health Organization (WHO) has recommended lowering the BMI cut off levels for Asian people to 23.0 for overweight and 25.0 for obesity.[6] The obesity related disorders occur at a much lower body mass index (BMI) in ethnic Asian populations than in ethnic Caucasian.

Table 1: WHO classification of overweight/obese.

	BMI
Underweight	<18.5
Normal weight	18.5-24.9
Overweight/pre obese	25.0-29.9
Class I obesity	30.0-34.9
Class II obesity	35.0-39.9
Class III obesity	>40.0

Rationale of the study

Obesity is one of the life style associated disorders in India with the prevalence of overweight being 9.4% and of obesity 2.4%. Studies among medical students in India report prevalence of overweight in the range of 11.7% to 25.71%.[7-10]

Medical students are the future doctors/ medical teachers and are source of inspiration for good health /healthy life styles to the community in general and to the youth in particular. Obesity is one of biggest challenges that Indians need to overcome because we are genetically predisposed to weight gain. The hasting neck to neck competition for entry to medical courses, compel students to get away from sports, outing and exercises and remain stick to books and coaching centres. The problem of living away from home/ family may also lead to consumption of street foods/packed items/junk foods. Medical students are more prone to obesity due to their lifestyle with less physical activity and disordered eating habits and thereby are prone to obesity related health hazards.[7,11] This constitutes the rationale for conducting the study. This study is to assess the prevalence of obesity and overweight among medical students in a medical college based on Asia-Pacific BMI guideline.

Objectives

- To assess the BMI of medical students and find out prevalence of overweight /obesity among them.
- To introspect the factors leading to raised BMI/ obesity among medical students.
- To make aware the medical students the status of their BMI (normal/obesity/obesity complications) and suggest measures for modifications of life style and reduce burden of raised BMI /obesity.

METHODS

This is a cross sectional observational study conducted in Bundelkhand Medical College in Sagar district of M.P., India on students of medical undergraduates (MBBS) including internship students. The students were not willing to participate in the study and or not available for anthropometric measurements were excluded. There were 500 medical students enrolled in the Bundelkhand Medical College during study.

Sample size

300 (required sample size is 184 i. e. where the prevalence (p) was 25.711% based on a study among medical students (Kerala -2013).[7] The required precision of the estimate (d) set as 5% confidence level 95%.[12]

Sampling method

Stratified random sampling i.e. 60 students will be selected from each admission year (2013 to 2018) (60*5=300 as admission batch 2015 is missing).

Data collection

A standardized, pretested questionnaire was used to collect the data from the students for required study variable. The study variables included were biographical data like name, age, sex, permanent residence, urban/rural area, family income and diet, frequency of consumption of meat, fast food, fried snacks, chocolates, ice creams, sleep pattern, consumption of alcohol and smoking status will be studied. The responses under dietary habits, physical activity and sedentary habits will be based on Dietary Guidelines for Indians (2011) by National Institute of Nutrition, Hyderabad and The Global Physical Activity Questionnaire developed by WHO for physical activity surveillance in countries.[13,14]

For anthropometry the weight of the students was measured with light clothing without shoes using a portable weighing scale to the nearest 0.5 kilogram (kg). Height was measured in meter (m) using portable stadiometer with heels, buttocks, occiput against the wall and head in Frankfurt plane to the nearest 0.5 centimetres (cm). BMI was calculated as weight in kilograms divided by height in square meters (kg/m2). Based on BMI cut-offs for Indians, BMI 18.5-22.9 kg/m^2 was categorized as normal weight, BMI <18.5 kg/m^2 as underweight, BMI ≥ 23- 24.9 kg/m^2 as overweight and BMI ≥25 kg/m^2.[7,8] Data was analysed using SPSS software. Descriptive statistics like mean with standard deviation for continuous variables, Chi-square test for the analysis of categorical variables and t test were applied as per requirement.

RESULTS

Among the 300 medical students participated in the study 168 (56%) were females and 132 (44%) were males. The

mean age of the students was 21.32 years (S.D. 2.503 years) and the median age was 20.50 years. The mean weight of girl students was 54.26 ±7.8 kg and of male students was 62.94±8.8 kg. The average height of the students was 1.62 mtr±0.08 mtr with females mean height 1.58±0.08 and males mean height of 1.67±06 mtrs. The average calorie consumption of the students was 2517.68 (s.d. 454) calories per day. The daily average calorie consumption of males was higher than females (females 2328.88±369.57 calories and males 2754.70±441.24 calories). The difference in average calorie intake by male and female students was found to be insignificant (independent t test value -9.069, p=0.058) (Table 2). Among all the students 147 (47.3%) were vegetarian and rest 163 (52.7%) consume either of chicken, fish and egg atleast once a week.

Table 2: Sex wise distribution of average daily calorie intake by medical students.

Sex of students	Number	Average daily calorie intake	Std deviation	Std. error of mean
Females	168	2329.22	368.477	28.599
Males	132	2754.70	441.248	38.406
Total	300	2517.68	454.013	

The difference in mean was insignificant with t value -9.069, p value 0.058.

Table 3: Average BMI of medical students and sex-wise comparison.

Sex of students	Number	Mean BMI	Std deviation	Std. error of mean
Females	168	21.75	3.3	0.2651479
Males	132	22.43	3.4	0.2687764
Total	300	22.03	3.08	

The difference in mean was insignificant with t value -1.08, p value 0.374.

Table 4: Distribution of obesity / overweight among medical students.

BMI	Weight category	Females	Males	Total
		N (%)	N (%)	N (%)
<18.5	Under weight	18 (10.2)	4 (3.0)	22 (7.3)
18.5-22.99	Normal weight	96 (57.5)	102 (77.3)	198 (66)
>23	Overweight and obese	54 (32.3)	26 (19.7)	80 (26.7)
Total		168 (56)	132 (44)	300 (100)

*Significant difference in distribution of obesity among male and female students. (chi square value 14.78 and p value.001)

Table 5: Eating and dietary habits among medical students.

Weight category	Intake at least one time per day or more	Less than one time per week	Total
Fruits			
Under weight	12	10	22
Normal	104	94	198
Overweight	34	46	80
Total	150	150	300
Green vegetables			
Under weight	0	22	22
Normal	8	190	198
Overweight	8	72	80
Total	16	284	300
Soft carbonated drinks			
Under weight	0	22	22
Normal	28	170	198
Overweight	18	62	80
Total	46	256	300
Junk foods			
Under weight	0	22	22
Normal	12	186	198
Overweight	2	76	80
Total	14	286	300

Table 6: Physical activity among medical students.

Weight category	Regular activity for atleast 30 minutes for 5 days a week	Activity for less than 30 minutes for 5 days per week	Total
Morning/evening walk			
Under weight	5	15	22
Normal	36	162	198
Overweight	14	66	80
Total	55	145	300
Running			
Under weight	0	22	22
Normal	20	170	198
Overweight	10	70	80
Total	16	284	300
Cycling			
Under weight	3	19	22
Normal	7	163	198
Overweight	2	62	80
Total	12	288	300
Sports/exercise/gym			
Under weight	4	18	22
Normal	12	186	198
Overweight	4	76	80
Total	20	280	300

According to formula used for BMI calculation, the average BMI of the medical students was 22.03±3.3 kg/m^2. The average BMI of females was lesser 21.75±3.4 kg/m^2 than males 22.43±3.08 kg/m^2. The difference was found insignificant on applying independent t test and equal variance assumed. (t value-1.08; p=0.374) (Table 3). According to WHO classification of overweight/obese for the south East Asian populations more than one fourth of total students (26.7%) were overweight and obese. Obesity was more common in female students than male students and the difference was found to be significant (chi square value 14.78 and p=0.001).

The inclusion of healthy food like intake of fruits and vegetables lead to stay with normal weight. While fruit intake was regular /daily by 150 (50%) of the students, regular intake of green vegetables was seen in only 16 (5.33%) cases. The use of soft drinks was commoner than practice of eating junk foods. Nearly 46 (15.33%) students use to have soft drink on regular basis and only 14 (4.67%) use to eat junk foods regularly. Medical students were less attentive in regular physical activity. only 55 (18.33%) do regular morning and or evening walk, only 16 (5.33%) do running, only 12 (4%) do cycling and only 20 (6.66%) do regular gym or exercise or sports activity for more than 30 minutes for 5 days a week.

DISCUSSION

This was a cross sectional observational study, where we assessed BMI in medical students and also had a look over the dietary and food habits as well as physical activities done by medical students. As we know that sound body have sound mind, and sound mind is must for massive Medical science course.

The study found interesting results for BMI, fruit and vegetable intake, soft drink and fast food consumption, and engagement of medical students in physical activities. Medical sciences course itself is vast, lengthy and stressful. An study done in a medical college of north India found that medical students have more academic stress compared to others.[15] Starting from admission to course and upto completion of internship, students spend most of their time in lecture halls, clinical wards, labs and library. They hardly get any time for regular sports activities. The hasty daily routine, affects their choice of diet also. The lack of good breakfast and balanced diet in different meals also has bad effects on their health.

In this study we found that the medical students, whether male or female have daily average calorie consumption of moderate worker male and female respectively (Table 2). Though many times these students are practically sedentary workers, have long sittings for studies. The mean weight 58±9.0, the mean height 1.62 mtr±0.08 mtr and the mean BMI of students 22.03±3.0 kg/m^2 was found to lesser than the medical students of Indian state Haryana.[16]

The mean BMI of medical students was within normal range with males having slightly higher BMI than Females as expected and the difference was insignificant

(Table 3). In our study only 26.7% students were overweight and obese (with BMI of more than 23) while studies done in neighbouring state Gujarat found 34.05% students were overweight and obese (with BMI of more than 25) (Table 4).[17]

Our study found that 50% students were not having fruits and more than 90% students do not have vegetables in daily diet (Table 5). Fruits and vegetables play an important role in improving general health. Fruit and vegetable consumption is inversely related to total and low density lipoprotein cholesterol and to risk of cardiovascular disease. This study found that only few (4.66%) medical students were in practice of daily consumption of junk foods. Various studies indicated a positive association between fast food intake and BMI in both cross-sectional and longitudinal analyses among young adults.[17]

A significant proportion (nearly 15%) of medical students love to have daily soft drinks. One study exhibited that high BMI was significantly associated with soft drink intake, especially carbonated beverages which were sweetened by using sugar. Adult students are highly exposed to unhealthy eating habits, particularly fast food and soft drinks, leading to body weight gain.[17] Study done in a medical college of Kerala found that nearly 63% of obese medical students consumed fast food/ junk foods which is less common in our study with only 20.5% of obese / overweight students consumed it.[7]Soft drinks may also decrease satiety and increase subsequent food intake.[17]

Medical students were least engaged in physical activities. Nearly 18% of medical students had daily walk of more than 30 minutes for 5 days or more per week. Other physical activities like cycling, running, sports, exercise, yoga and gym were practiced by only 5% to 6% of the medical students (Table 6). Studies done in medical students of other Indian states also revealed that high proportion of medical students has low levels of physical activity.[7,17] Physical activity is a major determinant of health and it helps in improving physical fitness, reduces the risk of non-communicable life style diseases like hypertension and diabetes. This significantly low level of physical activity can be attributed to the lifestyle of a medical student that requires long hours of sitting for his/her studies.[18]

CONCLUSION

The prevalence of overweight and obesity among medical students was found to be 26.7%. The higher prevalence of overweight and obesity compared to other studies may be mainly due to more stringent Asia-Pacific Obesity guideline and criteria of obesity for South Asian population used by International Diabetes Federation which consider BMI cut off value of 23.00 for females and 25.00 for males. So to avoid any confusion cut off of BMI value 23.00 was taken and accommodated in single

group of overweight and obesity. It was observed that though most of the students had normal BMI, only few were involved in taking regular soft drinks and fast foods but the most important thing that there was lack of physical activities among medical students. This study reinforces the need to encourage healthy lifestyle, healthy food habits and a physically active daily routine, among medical students and need to be focused to prevent this obesity related disease epidemic. The physical activity provides strength, immune power as well as refreshes the mood by alleviating stress. The college administration may provide adequate facilities for sports, gym, and yoga for medical students and may also organise motivational camps, sports competition for better involvement of medical students in these activities.

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