

Original Research Article

A cross-sectional study to find out the prevalence and determinants of obesity and hypertension among medical students in Mirzapur, Uttar Pradesh

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ABSTRACT

Background: Obesity is one of the major lifestyle disorders in India and its incidence is increasing during recent decades. Medical students are more prone for obesity, due to their sedentary lifestyle, lack of exercise, disordered eating habits due to lack of leisure time, increased stress and vast topics to learn. So, this study was done with the aim to estimate the prevalence of overweight and obesity among the Medical College students and also to assess the factors influencing it.

Methods: A cross-sectional study was conducted among second- and third-year medical students of Maa Vindhyawasini Autonomous State Medical College, Mirzapur, Uttar Pradesh. The study was conducted from August 2024 to September 2024 for two months. The total sample included 140 students. The information collected was entered in MS Excel, and analysis was done using SPSS version 2. The written informed Consent of the study participants was obtained. The ethical clearance was obtained from the institute, and confidentiality was maintained during the study.

Results: We found that 20% were overweight-at risk, 27.1% had grade 1 obesity and 2.8% had grade 2 obesity among medical students. 4.6% males and 9.3% females were underweight, 42.6% males and 50% females had normal BMI while 52.8% males and 40.7% females were overweight. Overweight was more prevalent in males.

Conclusions: The prevalence was found to be high among medical college students which were contributed by various factors. This can be reduced by modifying their diet, engaging in regular physical activity.

Keywords: Obesity, Overweight, Prevalence, Stress, Medical students, Hypertension

INTRODUCTION

Obesity is one of the major lifestyle disorders in India and its incidence is increasing during recent decades. According to the Indian Council of Medical Research-India Diabetes study 2015, the prevalence of obesity and central obesity among adult ranges from 11.8% to 31.3% and 16.9% to 36.3% respectively.¹

Medical students are more prone for obesity, due to their sedentary lifestyle, lack of exercise, disordered eating

habits due to lack of leisure time, increased stress and vast topics to learn. Thus, they are prone to overweight/obesity-related complications such as hypertension, dyslipidemia, and impaired glucose tolerance. However, it often remains a neglected problem despite its consequences.² This study has been done to find out the prevalence of overweight/obesity and hypertension among medical students, determining the contributing/ associated factors and assess the risk of comorbidities in them.

Study objectives

Objectives were to estimate the prevalence of overweight/obesity and hypertension in medical students and to determine the association between demographic factors, obesity and hypertension.

METHODS

A cross-sectional study was conducted among second and third-year medical students of Maa Vindhyawasini Autonomous State Medical College, Mirzapur, Uttar Pradesh. The study was conducted from August 2024 to September 2024 for two months. The total sample included was 140 students. The students who were present at the time of study and gave consent to participate in the research were included in the study while those who were absent at the time of the study and did not give consent to participate in the research were excluded from the study. The information was collected with the help of a pre-designed, pre-tested questionnaire which included name, age, sex, year of admission, type of diet (vegetarian/non-vegetarian), family history of non-communicable diseases and history of physical exercise. Anthropometric measurements included weight, height, waist circumference, hip circumference, and middle upper arm circumference. The height was measured on a vertical scale with heels, buttocks, and occiput against the wall.

The weighing machine was checked with known weights every day before starting the survey. The participants were made to stand still on the weighing machine, and the weight in kilograms was recorded. For waist circumference, the subject was made to stand with feet 25-30 cm apart, weight evenly distributed. Measurement was taken midway between the inferior margin of the last rib and the crest of the ilium in a horizontal plane. BMI was calculated using Quetelet's index ($\text{BMI} = \text{weight in kg} / \text{Height in m}^2$). The participants were categorized on the basis of BMI (criteria for Asian people) into underweight ($\text{BMI} < 18.5$), normal ($\text{BMI} 18.5\text{--}22.9$), and overweight ($\text{BMI} > 23$). The overweight group was further divided into at risk ($\text{BMI} 23\text{--}24.9$), obese grade I ($\text{BMI} 25\text{--}29.9$), and obese grade II ($\text{BMI} > 30$). Furthermore, each group was subdivided based on cutoff values of waist circumference (< 90 cm [men], > 90 cm [men], < 80 cm [women], > 80 cm [women]) to assess the risk of comorbidities. The blood pressure was measured with the help of sphygmomanometer.

The information collected was entered in MS excel, and analysis was done using SPSS version 2. The written informed Consent of the study participants was obtained. Ethical clearance was obtained from the institute, and confidentiality was maintained during the study.

RESULTS

Among the total participants, 44.3% had normal BMI, 5.8% were underweight, 20% were overweight-at risk,

27.1% had grade 1 obesity, and 2.8% had grade 2 obesity. Approximately half of the participants had normal BMI, while 49.9% were either overweight or obese (Figure 1).

The 4.6% males and 9.3% females were underweight, 42.6% males and 50% females had normal BMI while 52.8% males and 40.7% females were overweight. Overweight was more prevalent in males. Nearly half of the females had normal BMI. Underweight was also slightly higher in females (Figure 2).

Table 1 shows that students who were doing mild physical exercise 16.4% were obese, 2.1% were underweight and 15.7% had normal BMI. Similarly, those who were doing moderate exercise, 17.9% were obese, 2.1% were underweight and 12.1% had normal BMI. Only 0.7% who were doing severe exercise was obese while 4.3% had normal BMI and none were underweight. Among participants reporting no physical exercise, 15% were obese and 1.4% were underweight. No statistically significant association was seen between physical exercise and BMI ($p=0.9$). Regarding dietary history, obesity was observed in 10.7% both in vegetarians and non-vegetarians and 28.6% consuming mixed diet. Normal BMI was seen most common in participants who were consuming mixed diet 24.5%, 14.3% in vegetarians and 5.7% in non-vegetarians. The association was not statistically significant between dietary habits and BMI ($p=0.3$). In case of family history of NCD, obesity was present among 22.1% participants who were having positive family history. Similarly, normal BMI was seen in 24.3% participants with negative family history while 2.1% participants were underweight who were having positive family history of NCD. The association was not statistically significant between family history of NCD and BMI ($p=0.9$) (Table 1).

Table 2 that, among the 108 males, 78.7% had normal waist circumference, while 21.3% had increased waist circumference. Among the 32 females, 71.9% had normal waist circumference and 28.1% had increased waist circumference. Thus, in total 108 (77.1%) participants had normal waist circumference, whereas 32 (22.9%) had increased waist circumference.

The proportion of increased waist circumference was higher among females 28.1% than males 21.3%, but the association between waist circumference and gender was not statistically significant ($p=0.41$) (Table 2).

Table 3 shows that 27.1% study subjects were pre-hypertension 6.4% were hypertensive. Among underweight participants, 5.0% had normal blood pressure, 0.7% was prehypertensive and none were seen hypotensive or hypertensive. Among participants with normal BMI, 31.4% had normal blood pressure, 10.7% were prehypertensive, 1.4% were hypertensive, and only 0.7% were hypotensive.

Among overweight/obese participants, 29.3% had normal blood pressure, 15.7% were prehypertensive, 5.0% were hypertensive, and none were hypotensive. Prehypertension and hypertension were found more common among overweight/obese participants. The association between BMI category and blood pressure was not statistically significant ($p=0.10$) (Table 3).

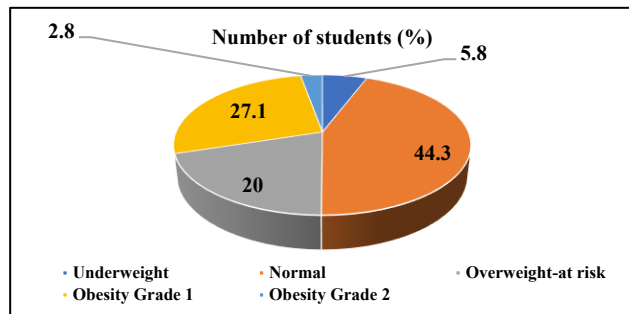


Figure 1: Frequency distribution of study subjects based on BMI categories.

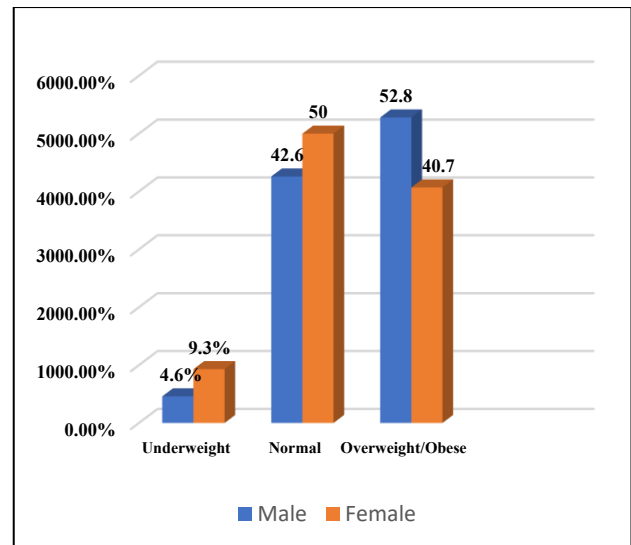


Figure 2: Distribution of study subjects based on BMI categories and gender.

Table 1: Distribution of study subjects on the basis of different demographic details.

Variables	Underweight, N (%)	Normal, N (%)	Overweight/obese, N (%)	P value
Physical exercise				
Mild	3 (2.1)	22 (15.7)	23 (16.4)	p=0.9
Moderate	3 (2.1)	17 (12.1)	25 (17.9)	
Severe	0	6 (4.3)	1 (0.7)	
None	2 (1.4)	17 (12.1)	21 (15)	
Diet				
Vegetarian	3 (2.1)	20 (14.3)	15 (10.7)	p=0.3
Non-vegetarian	0	8 (5.7)	15 (10.7)	
Mixed	5 (3.6)	34 (24.3)	40 (28.6)	
Family history of NCD				
Present	3 (2.1)	28 (20)	31 (22.1)	p=0.9
Absent	5 (3.6)	34 (24.3)	39 (27.9)	

Table 2: Distribution of study subjects based on WC categories and gender.

Gender	Normal WC (%)	Increased WC (%)	Total	P value
Males	85 (78.7)	23 (21.3)	108	p=0.41
Females	23 (71.9)	9 (28.1)	32	
Total	108	32	140	

Table 3: Distribution of study subjects on the basis of blood pressure categories.

Categories	Underweight (%)	Normal (%)	Overweight/ obese (%)	Total (%)	P value
Hypotensive	0 (0)	1 (0.7)	0 (0)	1 (0.7)	p=0.1
Normal	7 (5)	44 (31.4)	41 (29.3)	92 (65.7)	
Prehypertensive	1 (0.7)	15 (10.7)	22 (15.7)	38 (27.1)	
Hypertensive	0 (0)	2 (1.4)	7 (5)	9 (6.4)	
Total	8	62	70	140 (100.0)	

DISCUSSION

In the present study, we found that 20% were overweight at risk, 27.1% had grade 1 obesity and 2.8% had grade 2

obesity among medical students. 4.6% males and 9.3% females were underweight, 42.6% males and 50% females had normal BMI while 52.8% males and 40.7% females were overweight. Overweight was more

prevalent in males. Nearly half of the females had normal BMI. Underweight was also slightly higher in females.

Similar findings were observed in a study done by Thomas et al in Kerala. He found that the prevalence of overweight/obesity was 30.6% among medical students. He also found that there was a statistically significant increase in the prevalence of generalised obesity in males compared to females. However, waist circumference was higher in females and there was no significant association seen between dietary factors, sleep, and physical activity and BMI.³

Anjana et al found in her study that among males, 69.89% were normal weight, 21.50% were overweight, and 8.60% were obese. Similarly, among females, 56.38% were normal weight, 31.91% were overweight, and 11.70% were obese.⁴

Kamat et al found that the majority of the obese subjects were associated with a very fast eating rate, which was less than 15 minutes. She found that 65% of the total number of subjects were in obese category. A positive correlation was seen between the eating rates and BMI in students between the age group 18-24. This shows that the rate of eating could be a causative factor of obesity.⁵

Kishore et al had done a study in Bengaluru and found that the prevalence of overweight and obesity was 14.6% and 11.3%. Overweight and obesity were more common in boys (9.7%, 6.8%) than girls (5%, 4.5%). The 25.9% girls and 11.1% boys were considered to have central obesity. 74.5% of overweight/obese students often feel stress at the time of exams, and 56.0% among them eat more during exams.⁶

Similarly, other studies done among medical students by Adhikari et al in Kolkata in 2014 showed that the prevalence of overweight and obesity was 18% and 2%; Manojan et al in Kerala in 2013 showed that the prevalence was 24.57% and 25.71%; and Gupta et al in Paschim Medinipur in 2007 showed that the prevalence was 17.5% and 3.4%, respectively.⁷⁻⁹ All these studies were based on WHO Asia-Pacific guidelines.

Chhabra et al reported in their study that the prevalence of 11.7% overweight and 2% obesity among medical students in Delhi.¹⁰

The present study shows that 27.1% of study subjects were prehypertensive and 6.4% were hypertensive. Among underweight participants, 5.0% had normal blood pressure, 0.7% were prehypertensive, and none were seen hypotensive or hypertensive. Among participants with normal BMI, 31.4% had normal blood pressure, 10.7% were prehypertensive, 1.4% were hypertensive, and only 0.7% were hypotensive. Among overweight/obese participants, 29.3% had normal blood pressure, 15.7% were prehypertensive, 5.0% were hypertensive, and none were hypotensive. Prehypertension and hypertension

were found to be more common among overweight/obese participants. Similarly, Sharda et al in 2023 observed in their study that 15.56% of students were hypertensive and 40.67% were prehypertensive. Thus, increase prevalence of hypertension was seen in this study. Hypertension was more commonly seen in males (18.83%) as compared to females (12.33%) ($p=0.002$). Overweight/obesity was present in 29.33% of students and it was more common in males (37.67%) as compared to females (21.15%) ($p<0.001$). It was also found that obese students had higher rates of prehypertension (47%) and hypertension (28.8%). A significant association seen between Abnormal waist-hip ratio and waist-stature ratio and hypertension.¹¹

Limitation

The sample size is small, so the results may vary.

CONCLUSION

In the present study, approximately half of the participants had normal BMI while 49.9% were either overweight or obese. A very high prevalence of obesity and overweight was seen in the medical students. This is an alarming signal because medical students are the future doctors in the community. At least they are supposed to have good health. So, early intervention programmes should be implemented to prevent non-communicable diseases among them. Necessary health promotional activities are suggested to adopt healthy life style in their daily routine like regular physical exercises, yoga, dietary changes, less salt intake etc. BMI and waist circumferences are very useful and reliable indicators for regular screening of overweight and obesity which is an important approach in the prevention of obesity. Routine screening and health promotion activities should be conducted in high-risk groups.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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