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Weight Trends and Contributing Factors among Medical Students: A Cross-Sectional Study in Kancheepuram District, Tamil Nadu

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ABSTRACT

Introduction: Obesity poses a significant health challenge worldwide, affecting various populations,including medical students. This study investigates the prevalence of obesity among medicalstudents and its correlation with lifestyle factors and academic stress.

Methods: A cross-sectional study of 424 MBBS students across all four academic years collected anthropometric measurements and administered a questionnaire to assess various lifestyle factors. Statistical analysis was performed to analyze the data.

Results: Among the participants, 185 students (43.6%) were classified as either overweight or obese.A higher proportion of males (55.7%) exhibited general obesity compared to females (37.8%).Students residing away from home showed a higher prevalence of obesity (52.3%). 68.4% of students frequently consumed fast food, and 55.1% regularly consumed sweets. 61.8% of students reported insufficient physical activity. A positive family history of obesity was notedin 39.2% of students, and higher alcohol intake was associated with an increased risk of obesity, with 47.6% of students who consumed alcohol being classified as overweight orobese. No significant association was found between the year of study and smoking with overweight and obesity.

Conclusion: Medical students are at significant risk of obesity, increasing their susceptibility to obesity-related health complications. The study highlights the high prevalence of obesity andoverweight among medical students and identifies several modifiable risk factors contributingto this trend. Addressing these factors through targeted interventions and promoting healthier lifestyles is crucial to mitigate the risk of obesity-related health complications among this population.

Keywords: Medical, mitigate, obesity, alcohol

INTRODUCTION

Obesity, theoretically characterized by the health risks associated with an excess of adipose tissue beyond typical population norms, is practically defined by the World Health Organization (WHO) as a Body Mass Index (BMI) of 30 kg/m^2 or above for adults. WHO acknowledges the notable rise in obesity prevalence across all age demographics [1]. BMI thresholds have been adjusted for Asian adults to ≥27.5 kg/m^2 [2]. Obesity correlates with an increased risk of health complications, encompassing systemic inflammation, insulin resistance, and lipid imbalances, thereby predisposing individuals to a spectrum of chronic conditions like cerebrovascular and cardiovascular ailments, cancer, and potentially fatal outcomes [3-5].

According to the Global Burden of Disease Study in 2019 [6], obesity rates exhibit a notable gender disparity, with higher prevalence observed among women compared to men across all age groups. Both overweight and obesity prevalence tend to escalate with age, reaching peak levels between 50 to 65 years, followed by a slight decline thereafter.Projections suggest that by 2030, approximately 2.16 billion adults will grapple with overweight issues, while 1.12 billion individuals will contend with obesity, constituting 38% and 20% of the population, respectively. An alarming 57.8% of the global adult population, estimated at 3.3 billion individuals, may fall under the overweight or obese category by 2030 [7].

Obesity in India is shaped by a multitude of factors. It is notably more prevalent among women, urban dwellers, and individuals over 40. Higher educational attainment and reduced physical activity levels are also linked to elevated obesity rates. Maternal age at marriage, dietary habits, and consumption of unhealthy foods play

pivotalroles in obesity prevalence. Genetic predispositions and environmental influences, such as easy access to unhealthy foods and limited recreational opportunities, further exacerbate the escalating obesity rates across the nation [8,9].

In India, obesity poses a substantial health challenge, particularly among medical students. Current statistics reveal that 30.4% of medical students are overweight, yet only a mere 15% of primary care physicians acknowledge the gravity of obesity's burden in the country. This disparity in awareness is alarming, given that these students represent the future of healthcare provision. The study highlights the potential benefits of obesity educational initiatives designed specifically for medical students. These programs have been shown to be effective in improving results by reducing bias, broadening awareness, and boosting confidence in counseling techniques [10-12].

The unique difficulties and demands faced by medical students can lead to unhealthy lifestyle choices. Stress from exams, long study sessions, and rigorous academic responsibilities can often result in poor eating habits, limited physical activity, and inadequate sleep. All these things work together to make medical students more likely to engage in unhealthy habits including smoking, drinking too much alcohol, and not doing enough physical exertion [13-15].This paper aims to assess the prevalence of obesity in medical students in Kancheepuram District and its relation to various lifestyle factors and academic stress. These correlations shall identify the underlying factors associated with weight trends in this population.

LITERATURE REVIEW

Anand et al.[11] conducted a cross-sectional study with 161 medical undergraduate students in their sixth semester.Anthropometric examinations and the administration of a pretested questionnaire led to a 93.6% response rate. Results revealed a male majority of 60% and a female minority of forty percent among the participants. Most students were categorized as having a normal BMI, comprising 55.9% of the total. The proportions of students classified as obese, overweight, and underweight were 4.4%, 30.4%, and 9.3%, respectively. 37% of students perceived themselves as overweight or obese. A significantly higher proportion of females compared to males perceived themselves as overweight. Among students classified as overweight or obese based on BMI, only one-third were found to be physically active. It was concluded that overweight or obese students often failed to perceive themselves as such, leading to a lack of engagement in weight control practices.

A cross-sectional study by Majra[16] was conducted among fourth-year MBBS students. Data were collected using a pre-tested self-administered multiple-choice questionnaire, focusing on behavioral factors such as smoking, alcohol consumption, junk food intake, and physical activity before and during their tenure in medical college. Results revealed that out of 176 respondents, 53% were males and 47% were females. The study observed an increase in the number of smokers approximately 20%, and in alcohol consumers nearly 40% since joining medical college. The proportion of students engaging in physical activity decreased while their dietary habits worsened during the same period. The study concluded that health-risking behaviors increased, while health-promoting behaviors declined among medical students during their tenure in medical college.

A cross-sectional study by Reang and Bhattacharjya[17] was conducted among undergraduate medical students, utilizing self-administered GHQ-12 and stressor questionnaires to assess stress levels. Results indicated a high prevalence of stress notably more common among females. Many students reported constant strain (33.56%) and sleep disturbances due to worry. Stress was pervasive across all semesters with first-year students experiencing stressors such as academic competition, frequent examinations, time constraints for recreation, and homesickness. This chronic stress may lead to maladaptive coping mechanisms such as overeating, consumption of high-calorie comfort foods, and reduced engagement in physical activity, ultimately increasing the risk of obesity and being overweight.

A cross-sectional study by Alhashemi et al.[18] examined obesity prevalence and daily habits among medical students. Conducted with 514 participants it found that twenty-two percent were overweight or obese. Most ate fast food weekly, and thirty-nine percent consumed three or more meals daily. Additionally, approximately seventy-six percent didn't engage in sports, and sixty percent relied on buses for transportation. Stress eating was significantly linked to overweight status, with almost seventy percent of stress eaters having a history of being overweight. Gender differences were noted, with males less likely to be stress eaters.

A descriptive cross-sectional study by Shah et al.[2] was conducted involving 147 first-year MBBS students.Ethical approval was obtained for the study. Results revealed that over ninety percent of students consumed fast food, with thirty-four percent categorized as pre-obese or obese. Approximately sixty percent were within the normal weight range, while eight percent were underweight. The study concluded a significant association between BMI and factors such as fast food consumption, reduced physical activity, and intake of soft drinks.

MATERIALS AND METHODS

Study Design and Setting

A cross-sectional study was conducted among medical college students at a tertiary care hospital in Kancheepuram, Tamil Nadu, India.

Study Duration and Sample Size Calculation

The study spanned four months to gather comprehensive data on the prevalence of obesity and overweight among medical students. Based on an estimated prevalence rate of 40% for obesity and overweight in this population, a sample size of 384 participants was calculated. Considering the possibility of a non-response rate of approximately 10%, the target number of participants for interviews was adjusted to 404 individuals. This adjustment ensured a sufficient sample size to yield statistically significant results and enhance the reliability of the study findings.

Participant Selection

Students from all semesters were included in the study using a simple random sampling method. Individuals who were not willing to participate or inaccessible for more than 3 visits were excluded.

Data Collection

Each student was administered a standardized, validated semi-structured questionnaire encompassing baseline characteristics such as year of study, sex, BMI, waist-hip ratio, place of residence, and behavioral traits including dietary preferences (vegetarian/non-vegetarian), eating habits (regular/irregular), duration of physical activity, consumption of fried snacks and fast food, intake of sweets, vegetables, fruits, alcohol, smoking habits, past experiences of obesity, presence of endocrine disorders, and regular medication intake. Data was collected through interviews with the research participants.

Ethical Considerations

The research commenced after obtaining approval from the IEC board of Saveetha Medical College and Hospital. Informed consent was obtained from all participants after clearly elucidating the study's objectives. Data confidentiality was ensured, and participants were informed of their right to withdraw from the study at any point without facing any adverse consequences.

Statistical Analysis

The data were analyzed using the SPSS software, version 16.0. Descriptive statistics was followed by various statistical tests, including the chi-square test and Pearson's correlation test to examine the associations between categorical variables and the presence of obesity or overweight among medical students. The normality of the samples was assessed. Comparisons were made among categorical variables across four groups. Some groups had small sample sizes necessitating caution in interpretation and potentially limiting the applicability of certain statistical tests such as the chi-square test alone. The significance level was set at $p < 0.05$.

RESULTS

Table 1 represents the distribution of baseline characteristics among the study population. The majority of participants were in their third year 146 (34.4%), followed by the second year 124 (29.2%) and the first year 103 (24.3%). Fourth-year students comprised the smallest proportion 51 (12.0%) of the sample. The study sample consisted of slightly more male participants 218 (51.4%) than female participants 206 (48.6%). The majority fell within the "normal" range (18.5 – 24.9), accounting for 231 (54.5%) of the sample. 142 (34.2%) were categorized as "overweight" (BMI 25 – 29.9), while 40 (9.4%) were classified as "obese" (BMI above 30) (Figure1).

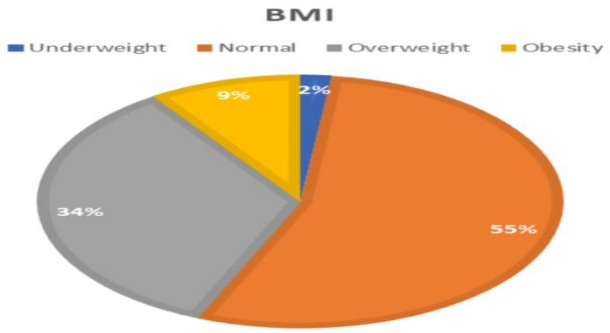

Figure 1: Pie-chart representing the BMI distribution among the medical students.

A small proportion of participants were categorized as "underweight" (BMI below 18.5), constituting 8 (1.9%) participants. 235 (55.4%) had a waist-hip ratio falling within the range of 0.8 – 0.89. A smaller proportion had ratios of 0.7 – 0.79 which included 24(5.7%) participants, 0.9 – 0.99 had 150 (35.4%) participants, and greater than 1 comprised 15 (3.5%) participants. Nearly half of the participants were day scholars 204 (48.1%), while a similar proportion resided in hostels 200 (47.2%). A smaller percentage lived in flats/paying guest accommodations 20 (4.7%) (**Table 1**).

The distribution of various factors influencing obesity and overweight among medical students. 219 (51.7%) of participants engaged in physical activity for 30 minutes to 1 hour per day, followed by less than 30 minutes in 105 (24.8%) participants and 1 hour to 90 minutes in 77 (18.2%) participants. Most participants reported following a mixed diet 289 (68.2%), while 135 (31.8%) adhered to a vegetarian diet a significant proportion of participants consumed fast foods weekly, such as 146 (34.4%)reported consumption once a week, and 143 (33.7%) reporting twice a week. Participants reported varying frequencies of sweet consumption, with the majority reporting occasional consumption 185 (43.6%) or consumption "often" 160 (37.7%). 175 (41.3%) reported consuming 100 – 250 grams of fruits and vegetables 219 (51.7%) per day. A small percentage of participants reported smoking 59 (13.9%) or consuming alcohol 78 (18.4%). A minority of participants reported the presence of any endocrinal disorders or chronic illnesses 30 (7.1%) (**Figure2**).

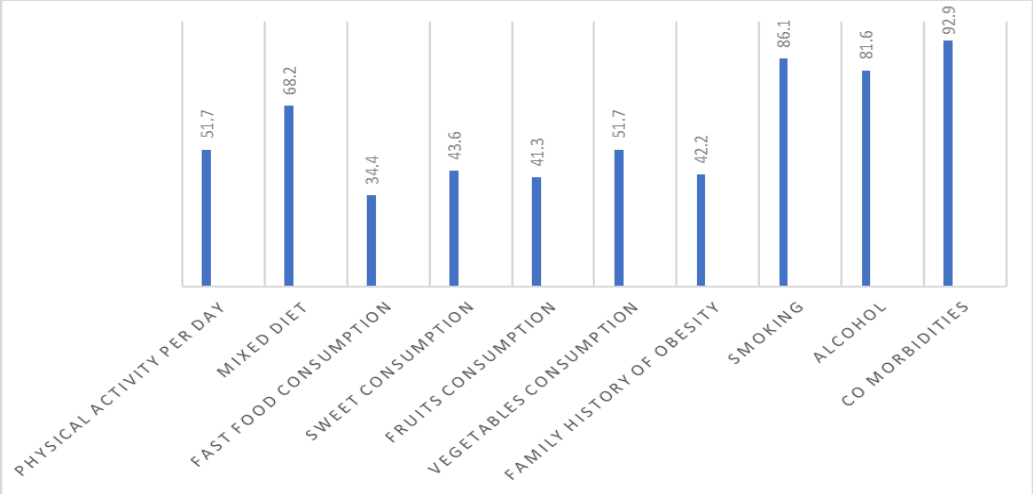

Figure 2: Frequency of factors affecting obesity and overweight among medical students.

Table 1: Frequency of baseline characteristics of participants.

Baseline characteristics		Frequency (N=424)	Percentage (%)
Year of study	First year	103	24.3
	Second year	124	29.2
	Third year	146	34.4
	Fourth year	51	12.0
Sex	Male	218	51.4
	Female	206	48.6
BMI	Below 18.5 (underweight)	8	1.9
	18.5 – 24.9 (normal)	231	54.5
	25 – 29.9 (over weight)	145	34.2
	Above 30 (obesity)	40	9.4
Waist hip ratio	0.7 – 0.79	24	5.7
	0.8 – 0.89	235	55.4
	0.9 – 0.99	150	35.4
	Greater than 1	15	3.5
Place of stay	Day's scholar	204	48.1
	Hostel	200	47.2
	Flat/paying guest	20	4.7

Table 2 illustrates the association between baseline characteristics and obesity. There is no statistically significant association between the year of study and obesity ($p = 0.115$) (Figure2). A significant association between sex and obesity ($p < 0.001$) is notably higher among males compared to females. A significant association between waist-hip ratio and obesity ($p < 0.001$). A significant association between place of stay and obesity ($p < 0.001$). Individuals residing in hostels have a higher proportion of obesity compared to day scholars and those in flats/paying guest accommodations.

Table 2: Association between baseline characteristics and obesity.

Baseline characteristics		Underweight	Normal	Overweight	Obesity	P value
Year of study	First year	1 (0.98%)	63 (61.16%)	35 (33.98%)	4 (3.88%)	0.115
	Second year	2 (1.67%)	56 (45.36%)	46 (37.09%)	20 (15.88%)	
	Third year	4 (2.73%)	83 (56.84%)	47 (32.19%)	12 (8.24%)	
	Fourth year	1 (1.96%)	29 (56.86%)	17 (33.33%)	4 (7.85%)	
Sex	Male	3 (1.37%)	95 (43.57%)	92 (42.20%)	28 (12.86%)	<0.001
	Female	5 (2.42%)	136 (66.01%)	53 (25.72%)	12 (5.85%)	
Waist hip ratio	0.7 – 0.79	3 (12.5%)	13 (54.17%)	5 (20.8%)	3 (12.5%)	<0.001
	0.8 – 0.89	5 (2.12%)	196 (83.40%)	34 (14.48%)	0	
	0.9 – 0.99	0	22 (14.66%)	99 (66%)	29 (19.34%)	
	Greater than 1	0	0	7 (46.66%)	8 (53.34%)	
Place of stay	Day's scholar	1 (0.49%)	132 (64.70%)	55 (26.96%)	16 (7.85%)	<0.001
	Hostel	7 (3.5%)	84 (42%)	87 (43.5%)	22 (11%)	
	Flats/ paying guest	-	15 (75%)	3 (15%)	2 (10%)	

Table 3 reveals significant associations between various behavioral factors and BMI categories among medical students. Increased duration of physical activity per day was linked to a lower prevalence of overweight and obesity ($p < 0.001$). Following a vegetarian diet was associated with reduced rates of overweight and obesity ($p < 0.001$), whereas higher consumption of fast foods and sweets correlated with elevated prevalence of overweight and obesity ($p < 0.001$). Conversely, a higher intake of fruits and vegetables was associated with decreased prevalence of overweight and obesity ($p < 0.001$). Family history of obesity exhibited a significant association with a higher prevalence of overweight and obesity ($p < 0.001$). No significant association was found between smoking habits and BMI categories ($p = 0.54$), but alcohol consumption showed a significant association with increased prevalence of overweight and obesity ($p < 0.001$). Furthermore, the presence of endocrinal disorders or chronic illnesses was significantly associated with a higher prevalence of overweight and obesity ($p < 0.001$).

Table 3: Association between behavioral factors and BMI.

Behavioral factors		Underweight	Normal	Overweight	Obese	P value
Duration of physical activity per day	Less than 30 minutes	3 (2.85%)	24(22.85%)	56 (53.35%)	22(20.95%)	<0.001
	30 minutes – 1 hour	3 (1.36%)	137 (62.55%)	63 (28.79%)	16 (7.30%)	
	1 hour – 90 minutes	1 (1.29%)	56 (72.72%)	20 (25.99%)	-	
	90 minutes –2 hours	1 (4.76%)	12 (57.14%)	6 (28.57%)	2 (9.53%)	
	Greater than –	-	2 (100%)	-	-	

	2 hours					
Type of diet	Vegetarian	2 (1.48%)	87 (64.44%)	44 (32.59%)	2 (1.49%)	<0.001
	Mixed	6 (2.1%)	144 (49.8%)	101 (34.9%)	38 (13.1%)	
Frequency of consumption of fast foods	Weekly once	2 (1.36%)	101 (69.17%)	42 (28.79%)	1 (0.68%)	<0.001
	Weekly twice	5 (3.49%)	80 (55.94%)	48 (33.58%)	10 (6.99%)	
	Weekly thrice	0	29 (43.28%)	26 (38.80%)	12 (17.92%)	
	More than three times a week	0	9 (42.86%)	6 (28.57%)	6 (28.57%)	
	Rarely	1 (2.12%)	12 (25.55%)	23 (48.93%)	11 (23.40%)	
Frequency of consumption of sweets	Very often	0	18 (33.34%)	25 (46.29%)	11 (20.37%)	<0.001
	Often	2 (1.25%)	74 (46.25%)	65 (40.62%)	19 (11.88%)	
	Occasionally	6 (3.24%)	119 (64.32%)	51 (27.56%)	9 (4.88%)	
	Rarely	0	20 (80%)	4 (16%)	1 (4%)	
Consumption of fruits a day	Nil	1 (1.58%)	13 (20.63%)	31 (49.20%)	18 (28.59%)	<0.001
	100 – 250 grams	3 (1.71%)	93 (53.14%)	67 (38.28%)	12 (6.87%)	
	250 – 500 grams	4 (2.31%)	116 (67.05%)	43 (24.85%)	10 (5.79%)	
	Greater than 500 grams	0	9 (69.24%)	4 (30.76%)	0	
Consumption of vegetables a day	Nil	0	13 (23.22%)	28 (50%)	15 (26.78%)	<0.001
	100 – 250 grams	5 (2.28%)	126 (57.55%)	70 (31.96%)	18 (8.21%)	
	250 – 500 grams	3 (2.4%)	76 (60.8%)	39 (31.2%)	7 (5.6%)	
	Greater than 500 grams	0	16 (66.67%)	8 (33.33%)	0	
Family history of obesity	Parents	2 (1.58%)	55 (43.67%)	53 (42.06%)	16 (12.69%)	<0.001
	Twin siblings	0	3 (33.34%)	3 (33.33%)	3 (33.33%)	
	Siblings	0	32 (52.47%)	18 (29.50%)	11 (18.03%)	
	Close relatives	0	23 (46.93%)	23 (46.93%)	3 (6.14%)	
	Nil	6 (3.35%)	118 (65.92%)	48 (26.81%)	7 (3.92%)	
Habit of smoking	Yes	2 (3.38%)	23 (38.98%)	25 (42.37%)	9 (15.27%)	0.54
	No	6 (1.66%)	208 (56.98%)	120 (32.87%)	31 (8.49%)	
Consumption of alcohol	Yes	2 (2.58%)	25 (32.05%)	29 (37.17%)	22 (28.20%)	<0.001
	No	6 (1.7%)	206 (59.5%)	116 (33.5%)	18 (5.2%)	
Endocrinal	Yes	1 (3.34%)	5 (16.66%)	18 (60%)	6 (20%)	<0.001

disorders or chronic illnesses	No	7 (1.77%)	226 (57.36%)	127 (32.23%)	34 (8.64%)	

DISCUSSION

The global rise in obesity presents a pressing health concern, with staggering projections for the future. In 2005, estimates indicated 937 million overweight and 396 million obese adults worldwide, constituting 23% and 9.8% of the adult population, respectively. By 2030, these figures are forecasted to soar to 2.16 billion overweight and 1.12 billion obese adults, comprising 38% and 20% of the population, respectively. Alarming trends suggest that by 2030, a staggering 57.8% of the global adult population, totaling 3.3 billion individuals, could be afflicted with overweight or obesity, underscoring the urgent need for comprehensive preventive measures [19].

Variations in the prevalence rates of overweight and obesity among medical students have been documented with reported rates ranging from 6.5% to 19.48% for obesity and 15.22% to 44.9% for overweight. These figures underscore the multifaceted nature of factors influencing the weight status of medical students, including their levels of physical activity, dietary habits, and overall lifestyle choices. Notably, studies by Yousif et al.[20], Rai and Makaju[21], Mehmood et al.[22], and Khan et al.[19]have revealed that a considerable proportion of medical students exhibit low activity levels.Similarly, high rates of fast food consumption have been observed reporting weekly intake of fast food or more. The observed prevalence rates of overweight and obesity among medical students vary, which is consistent with the findings of our study. Our study also identified a range of factors influencing weight status among medical students, including physical activity levels and dietary habits. For instance, our results revealed that a significant proportion of students exhibited inadequate physical activity levels and reported frequent consumption of fast food and sweets, aligning with the broader trends reported in the literature [19-22].

The association between overweight and obesity among medical students and lifestyle factors has been a subject of interest in several studies. Rehman et al.[23] found that 65% of students with a BMI <23 maintained healthy dietary patterns and engaged in outdoor activities, highlighting the impact of lifestyle choices on weight status. Similarly,Alhashemi et al.[18]revealed that daily fastfood intake was significantly linked to higher BMI among male students, underscoring the influence of dietary habits on obesity risk. Moreover, their study emphasized the dominance of eating habits over physical activity in determining BMI levels. Our study findings align with these observations, as we also identified lifestyle factors such as dietary patterns and physical activity levels as significant contributors to overweight and obesity among medical students [18,23].

Academic stress and workload have been identified as significant contributors to poor dietary habits and insufficient physical activity among medical students, potentially leading to overweight and obesity. AlJaber et al.[24] highlighted that students experiencing high-stress levels were more inclined to consume unhealthy foods, indicating a potential link between stress and dietary choices. Moreover,Alhashemi et al.[18]demonstrated a significant association between stress eaters and overweight status, underscoring the impact of psychological factors on weight management. Additionally, Khan et al.[19] reported that approximately 30.5% of male and 16% of female medical students had a BMI ≥25.0 kg/m², affecting 21% of the total medical student population.These findings align with our study results in which 61.8% of students reported inadequate physical activity levels, potentially indicating the impact of academic stress on reduced exercise habits. Additionally, 68.4% of students reported frequent consumption of fast food, suggesting a possible coping mechanism for stress through unhealthy eating behaviors.

The prevalence of obesity among medical students is a significant concern, as it poses potential health risks and academic challenges. Studies by Yousif et al.[20], Rai and Makaju[21], and Suraya et al. [25]have reported obesity rates ranging from 6.5% to 30.1% among medical students, with associated risks of chronic diseases such as hypertension and diabetes. Our study findings support these trends, with 19.48% of medical students in our sample being overweight. Notably, obesity can also impact academic performance, as observed in our study where higher BMI was associated with lower academic grades, particularly among female students [20,21,25].

Promoting healthy habits among medical students is vital. Integrating obesity-specific education and behavior change techniques into the curriculum can enhance their ability to guide patients. Implementing tailored weight reduction programs and environmental modifications fosters a supportive environment for sustaining healthy lifestyles [26-28].

Strengths of our study lie in its substantial sample size, encompassing 424 medical students across various academic years, enabling a comprehensive assessment of overweight and obesity prevalence. The combination of anthropometric measurements and a detailed questionnaire facilitated a thorough exploration of lifestyle factors associated with these conditions. However, inherent limitations include the cross-sectional design, which constrains causal inference, and potential bias stemming from self-reported data. Moreover, the study's single-center nature may restrict the generalizability of findings to broader populations. To mitigate these limitations, future research could integrate objective measures alongside self-reported data for heightened accuracy.

Collaboration across multiple centers could enhance the generalizability of findings to diverse populations and settings.

Future research should prioritize longitudinal studies to track weight fluctuations and identify critical factors among medical students. Evaluating targeted interventions' effectiveness, exploring mental health and stress's interplay with weight status, and assessing nutrition education's impact is crucial. Understanding cultural/environmental factors and evaluating medical education's influence on weight management practices are also essential [20,26,28,29].The main limitations of the study are its cross-sectional design, which precludes establishing causal relationships between the identified factors and weight trends. Also, the study was conducted in just one medical institution, providing limited generalization of the findings to another region or population. The self-reported nature of data on some of the lifestyle factors might have summoned some reporting bias, therefore probably affecting the precision of the outcomes [30,31,32].

CONCLUSION

In conclusion, our study highlights the concerning prevalence of overweight and obesity among medical students, with lifestyle factors such as poor dietary habits and inadequate physical activity playing significant roles. The findings underscore the importance of targeted interventions aimed at promoting healthy lifestyle behaviors among medical students to mitigate the risks associated with overweight and obesity. Efforts to incorporate obesity-specific education and counseling into medical curricula, along with the implementation of environmental and behavioral interventions, are crucial steps in addressing this public health issue within the medical student population.

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