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Prevalence and risk factors associated with obesity among students of a private university in Sana'a, Yemen



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ABSTRACT

Introduction: There is no published study on obesity among private university students in Yemen. Therefore, this study determined the prevalence and factors associated with obesity among medical students of the University of Science and Technology (UST) in Sana'a, Yemen.

Methods: This cross-sectional study was conducted among 448 students aged 18-29 years and randomly selected from medical faculties of the UST between January and April 2017. Data about sex, age, smoking, participation in physical activities and family history of obesity were collected using a self-administered questionnaire, while anthropometric measurements were performed according to standard criteria, and body mass index (BMI) was then calculated.

Results: The majority of students were males (62.1%), aged 22 years or older (63.4%), having normal weight (54.0%) and reporting no family history of obesity (65.0%). Male gender (OR=3.51; 95% CI = 2.22–5.53, P < 0.001), age of 22 years or older (OR = 2.73; 95% CI = 1.53 –3.67, P < 0.001), smoking (OR = 2.66; 95% CI=1.69–4.18, P < 0.001) and physical inactivity (OR = 3.49; 95% CI = 2.24–5.42, P < 0.001) were the factors significantly associated with overweight and obesity among medical students. In contrast, family history of obesity was not significantly associated with overweight and obesity (P = 0.936).

Conclusion: About a third of students were either overweight or obese, where overweight/obesity are associated with male gender, older age, smoking and physical inactivity. Therefore, there is a need for health education to raise the awareness of medical students regarding healthy diet and lifestyle to manage body weight

Introduction

Obesity is defined as a condition of abnormal or excessive fat accumulation in adipose tissues to the extent that health may be impaired (1). Globally, it has become an epidemic that poses a threat to public health worldwide and is ranked as the fifth leading cause of mortality (2, 3). Together with overweight, obesity is estimated to affect more than one third of the world's population (4, 5). Although it has been considered as a problem of the developed countries, obesity is widespread in the developing countries (6). Body mass index (BMI) is the most useful and simplest measures of obesity at the population level to classify underweight, overweight and obesity in adults (7). According to the World Health Organization (WHO), more than 1.9 billion adults aged 18 years or older were overweight worldwide in 2016, and over 650 million of these were obese (8). In addition, overweight and obesity were estimated to affect more than 340 million children and adolescents aged 5-19 years in 2016 (8). Overweight and obesity are associated with more deaths worldwide

than underweight (8). The reduced daily physical activity by the majority of the world's population is one of the factors contributing to the prevalence of obesity (9). Obesity is a risk factor for several diseases and conditions, including hypertension, type-2 diabetes mellitus, dyslipidemia, metabolic syndrome, coronary heart disease and certain types of cancers (10-13). Several factors are linked with obesity, including sex, age, ethnic origin, culture, eating habits, cultural and life style and reduced physical activity (14, 15). University students are vulnerable to overweight and obesity problems due to several factors such as increased need for energy, increased consumption of fat- and calorie-rich foods, decreased physical activity and emotional changes stimulating their eating desire (16). There is no published study on the prevalence of obesity among private university students in Yemen. Therefore, this study was conducted to determine the prevalence and factors associated with obesity among medical students of the University of Science and Technology (UST) in Sana'a, Yemen.

Methods

A cross-sectional study was conducted among 448 medical students recruited from the Faculty of Medicine and Health Sciences, Faculty of Dentistry and Faculty of Pharmacy at the UST between January and April 2017. UST is one of three private universities with faculties teaching medical sciences. It is a large sized and the first private university in Sana'a - Yemen and consists of seven faculties. The study population included Yemeni students of both sexes and aged between 18 and 29 years. They were randomly selected using multistage sampling in a proportionate manner to the number of students enrolled in all classes of the three faculties from the first to the last academic years. The total number of students enrolled in the three faculties was 1810 students (1000 in the Faculty of Medicine and Health Sciences, 500 in the Faculty of Dentistry and 310 in the Faculty of Pharmacy). The students were selected from each faculty and class based on the proportion of students in each faculty out of the total number of students (one from four), where the first student was chosen randomly from the first four students in the student records, and subsequent students were selected by adding 3 (e.g., 2, 5, 8, etc.). If the selected student refused, he/she was replaced by the next one in the records. Students were excluded from the survey if they were pregnant females, had chronic diseases, were receiving medications on a regular basis, refused to participate or if they delivered incomplete questionnaires. Out of 1810 questionnaires, 448 were selected for final analysis and 18 students were excluded (12 delivered incomplete questionnaires and 6 refused participating in the study). Thus, respondent students represented 24.8% of the students of the three medical faculties. Data about sex, age, smoking, participation in physical activities and family history of obesity were collected using a self-administered questionnaire. Students filled in questionnaires in the presence of one of the researchers after being instructed on the manner of filling them. On the other hand, anthropometric measurements of height and weight were performed in the student's activity room by trained technicians using standardized stadiometer and sensitive balance, respectively. Then, BMI was calculated by dividing the weight in kg by the square height of student in meters and categorized according to the WHO's criteria into underweight (<18.5), normal (18.5 to <25), overweight (25 to <30) and obesity (≥ 30) (7). The data were analyzed using the IBM SPSS Statistics, version 23.0 (IBM Corp., Armonk, NY, USA). Frequencies and percentages were used to describe the categorical data, while means and standard deviations were used to describe normally distributed quantitative data. Chi-square test was used to test the associations between obesity and its associated risk factors.

Differences and associations were considered statistically significant at P values < 0.05.

Results

Table 1 shows that the mean age, weight, height and BMI of the medical students in the present study were 22.7 ± 2.7 years, 64.2 ± 14.2 kg, 165.2 ± 10.2 m and 23.4 ± 4.0 kg/m², respectively. The majority of students were males (62.1%), aged 22 years or older (63.4%) and having normal weight (54.0%). Overweight and obesity were prevalent among 29.5% and 4.7% of the students, respectively. The overall prevalence of overweight and obesity was 34.2% (153/448). On the other hand, 35.0% of the students reported family history of obesity. Those who performed physical activities were 41.3% of the participating students, while 22.8% were smokers. Among smoker students, 91.2% were cigarette smokers and 8.8% were bubble smokers (Table 1).

Table 1. Characteristics of the study participants (N= 448)

Variable	n (%)
Sex	
Male	278 (62.1)
Female	170 (37.9)
Age (years)	
Mean \pm SD	22.7 \pm 2.7
< 22	164 (36.6)
\geq 22	284 (63.4)
Weight (Kg)	
Mean \pm SD	64.2 \pm 14.2
Height (m)	
Mean \pm SD	165.2 \pm 10.2
BMI (kg/m²)	
Mean \pm SD	23.4 \pm 4.0
Normal	53 (11.8)
Underweight	242 (54.0)
Overweight	132 (29.5)
Obese	21 (4.7)
Family history of obesity	
Yes	157 (35.0)
No	291 (65.0)
Physical activity	
Yes	185 (41.3)
No	263 (58.7)
Smoking	
Yes	102 (22.8)
No	346 (77.2)
Type of smoking	
Cigarettes	93 (91.2)
Bubbles	9 (8.8)

Table 2. Risk factors associated with overweight and obesity among medical students of the UST, Sana'a, Yemen (2017)

Variable	N	n (%)	Overweight and obesity OR (95% CI)	P-value
Sex				
Male	278	122 (43.9)	3.51 (2.22 – 5.53)	<0.001
Female	170	31 (18.2)	Reference	
Age (years)				
< 22	164	37 (22.6)	Reference	<0.001
\geq 22	284	116 (40.8)	2.73 (1.53 – 3.67)	
Family history of obesity				
Yes	157	54 (34.4)	1.02 (0.68 – 1.53)	0.936
No	291	99 (34.0)	Reference	
Smoking				
Yes	102	53 (52.0)	2.66 (1.69 – 4.18)	<0.001
No	346	100 (28.9)	Reference	
Physical activity				
Yes	185	35 (18.9)	Reference	<0.001
No	263	118 (44.9)	3.49 (2.24 – 5.42)	

N, number of students participating; n, number of overweight and obese students; OR, Odds ratio; CI, confidence interval

Table 2 shows that sex and age were the sociodemographic characteristics significantly associated with overweight and obesity among medical students of the UST. Males were three and a half times more likely to be overweight or obese compared to females (OR = 3.51; 95% CI = 2.22 – 5.53, $P < 0.001$), while those aged 22 years or older were more than two and a half times more likely to be overweight or obese compared to the younger students (OR = 2.73; 95% CI = 1.53 – 3.67, $P < 0.001$). In contrast, family history of obesity was not significantly associated with overweight and obesity ($P = 0.936$). Table 2 also shows that the habits of smoking and not participating in physical activities were significantly associated with overweight and obesity among medical students. Smokers were more than two and a half times more likely to be overweight or obese compared to non-smokers (OR = 2.66; 95% CI = 1.69 – 4.18, $P < 0.001$). In addition, those who do not participate in physical activities were almost three times and a half times more likely to be overweight or obese compared to those participating in physical activities (OR = 3.49; 95% CI = 2.24 – 5.42, $P < 0.001$).

Discussion

The overall prevalence rate of overweight and obesity among medical students in the present study was 34.2%. The majority of students with abnormally high BMI were overweight (29.5%), while 4.7% of students were obese. These findings are inconsistent with those recently reported among students of Ibb University – a public university to the south of Sana'a, where overweight was found among 11.7% of students while none of them were obese (17). The authors suggested that the absence of obesity among Yemeni students in Ibb University is attributed to the widespread poverty among Yemeni families as a result of the ongoing war and humanitarian crisis (17). Compared to the findings of the present study, lower overweight rates (17.6%, 22.9% and 24%, respectively) but slightly higher obesity rates (6.9%, 5.6% and 7.2%, respectively) were reported among university students from Lebanon, Iraq and United Arab Emirates (UAE), respectively (18–20). Comparable overweight rate of 28.5% and higher obesity rate of 10.2% were found among university students in Amman, Jordan (21). In contrast to the findings of the present study, higher overweight and obesity rates were found among university students from Saudi Arabia (31.0% and 23.3%, respectively) and Kuwait (30.6% and 19.8%, respectively) (22,23). In Ujjain – India, nearly half of medical undergraduate students were overweight or obese (24). Conversely, lower overweight and obesity were found among university students from Iran (10.8% and 1.6%, respectively), Nigeria (10.5% and 1.2%, respectively) and China (11.5% and 2.5%, respectively) (25–27). Based on BMI classification, more than half of students in the present study were normal weight, which is consistent with findings of several studies among students enrolled in other Arabian universities (19–21, 28). This could be attributed to similarities in eating habits among the populations of Arab countries. On the contrary, less than half of King Saud University students in Riyadh, Saudi Arabia (45.8%) were found to have a normal weight (22). The finding that being male is a significant predictor for overweight and obesity among Yemeni university students in the present study is in agreement with those reported among university students from Lebanon, Iraq, Kuwait and Pakistan (18, 19, 29, 30). One of the factors that could explain the significantly higher rate of overweight and obesity among males than females is the more care of females about their personal appearance and weight status, and they tend to eat healthier foods. Extensive communication with movie stars and models in the mass media could have a positive impact on the perception of girls about ideal weight (31). Moreover, females are usually engaged in household activities that increase energy expenditure. However, the finding of the present study is inconsistent with those reported

among university students from Jordan, Iran and Ghana (21, 25, 32), where overweight and obesity were significantly higher among female students. In general, the prevalence of overweight and obesity among males and females varies within the same country and between different countries, and such gender disparities are mainly due to socio-cultural and behavioral differences (33). The present study also revealed a significant association between older age of university students and the likelihood of overweight and obesity. This finding is consistent with those reported among university students from Jordan, Ghana and Taif of Saudi Arabia (21, 32, 34). The link between aging and overweight and obesity can be attributed to reduced physical activity in older students. In contrast to the finding of the present study, age was not significantly associated with BMI status of university students from Iraq and UAE (19, 20). Heritability for obesity is determined by a number of genes, leading to differences in people perceptions of hunger and satiety and increasing the vulnerability of certain populations to obesity (35). However, no statistically significant association was found between family history of obesity with the overweight and obesity among Yemeni university students in the present study. This is inconsistent with the significant association found among university students from Iraq, Jordan and India (19, 21, 24, 36). This indicates that medical students in the present study may acquire obesity in their adulthood rather than childhood as a result of changes in their diets and lifestyles. It is to be noted that family history of obesity is considered a risk factor for developing severe obesity and its associated co-morbidities in children (37, 38). In the present study, about a fifth of medical students were smokers, and this could be attributed to habit of chewing Khat that is usually accompanied by smoking in the Yemeni society. On the other hand, smoking was a significant predictor for the development of overweight and obesity among medical students. This finding is in line with those reported among university students from UEA and Iran (20, 25). One possible explanation for such a relationship could be the desire of obese students to smoke due to their beliefs that smoking has a negative effect on appetite (25). The notion that cessation of smoking could lead to weight gain is supported by the finding of significantly higher mean BMI and obesity among women quitting smoking in the United Kingdom (39). In another context, smoking was not found to be significantly associated with dyslipidemia among Yemeni student from Ibb University (17). The lack of a significant association between smoking and the risk of developing overweight and obesity was also reported among university students from UEA and Ghana (20, 32). In another context, overweight and obesity were found to be significantly higher among non-smoker than smoker Saudi Arabian university students (34). Regular practice of physical activity plays an important role in regulating body weight and reducing stress-induced weight gain (40). In line with this suggestion the lack of regular physical activity was found to be significantly associated with higher risk of developing overweight and obesity among Yemeni medical students. This could be partially attributed to high burden of university-related duties and activities, which negatively affect the participation of students in regular physical activities. Physical activity contributes to an increase in daily energy expenditure, fat oxidation and sensitivity of leptin receptors besides a decrease in leptin level (41). It is noteworthy that practice of physical activity was not significantly associated with dyslipidemia among Yemeni students from Ibb University (17). Like the present study, physical inactivity was found to be significantly associated with overweight and obesity among university students from Jordan and Saudi Arabia (21, 34). Nevertheless, the lack of such an association was reported among university students from Iran and India (24, 25, 36). This study is limited because it is limited to a single university in the capital and may not reflect the general situation at all Yemeni universities. Therefore, it is recommended to conduct

further large-scale studies on obesity and overweight among medical students from private and governmental universities with detailed exploration of the associated risk factors.

Conclusion

Overweight and obesity represent a major problem among Yemeni students in private universities in Sana'a, where about a third of students were either overweight or obese. The male gender, older age, smoking and physical inactivity are significantly associated with a higher risk of developing overweight and obesity among medical students. However, family history of obesity is not a predictor of being overweight or obese. Therefore, there is a need for health education to increase the awareness of medical students about a healthy diet and lifestyle to manage body weight.

Ethical disclosure

The protocol of the study was reviewed and approved by the Research Ethics Committee of the Faculty of Medicine and Health Sciences, UST. Informed consent was obtained from each student after explaining the purpose of the study and before starting the interview.

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Author contributions

AA and ARA designed the study and interviewed the students. AA analyzed data, interpreted findings and drafted the manuscripts. All authors revised and approved the final manuscript submitted to the journal.

Conflict of interest

The authors declare no conflict of interest.

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