Prevalence of overweight and obesity and their associated factors among health sciences college students, Saudi Arabia

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Abstract

Context: The healthcare sciences college students have a lifestyle with low physical activity and disordered eating habits, which exposes them to a higher risk of obesity. Health science college students were the target group of particular interest in this study as they are future physicians. If they are overweight or obese, they will carry the wrong impression to the general population. **Aim:** To assess the prevalence of overweight and obesity among healthcare science college students at private university in Saudi Arabia. Also, it assesses the relationship between the sociodemographic characteristics and risk of overweight and obesity in this population. **Methods:** A cross-sectional study was conducted among healthcare science college students. A validated, structured, closed-ended questionnaire was self-administered through the Monkey survey. All data were analyzed using SPSS. **Results:** 401 students participated, in which 33.4% were male and 66.6% were female students; and the mean age was 22 years. The study showed that 23.7% of participants were overweight, and 11% were obese. The prevalence of obesity was higher among males. Family history of obesity and fatigue were risk factors for obesity. **Conclusion:** The healthcare Science College students showed a high prevalence of obesity and overweight. This is strengthening the need to encourage a healthy lifestyle, healthy food habits, and physical activities to avoid obesity-related complications.

Keywords: Healthcare students, obesity, overweight, prevalence, Saudi Arabia

Introduction

Overweight and obesity is a complex multifactorial chronic disease.[1,2] According to the World Health Organization (WHO) overweight and obesity are excessive fat accumulation that presents a risk to health. Body mass index (BMI) is an instrument recommended to classify obesity, and BMI $\geq$25–30 Kg/m² would

be considered as overweight, and BMI >30 Kg/m² would be considered as obese.[1] Obesity is a challenge at the university period as it is a transition from overweight status to obesity because of alternating physical activity and dietary patterns.[1,2]

According to a study of obesity and eating habits, it was found that there is a rapid socio-cultural change as a result of the growing economy of the Arab region. This has affected the eating patterns and thus it has been reported for the recent increases in overweight and obesity among Saudi population.[3] Another important factor in obesity is psychological stress such as college life in medical schools.[4] College can play a significant role in

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encouraging healthy behavior in students. Unhealthy lifestyle is prevalent among college students and therefore there is a need to integrate health education programs for college students.[5]

Despite the serious complications associated with obesity in healthcare college students, there are limited studies on overweight and obesity risk among medical and healthcare college students in Saudi Arabia. Therefore, the current study aimed to identify the prevalence of overweight and obesity among health science college students. Also, it aims to examine the association between obesity and risk behaviors and gender among students in health colleges, as this may support in the promotion of health among the future healthcare professionals.

Material and Methods

Participants and procedure

A cross-sectional questionnaire-based study was conducted to evaluate the prevalence of overweight and obesity and their associated factors among students in health sciences college at Dar Al Uloom University (DAU), Saudi Arabia. Convenient sampling was used, and the participants were all students, both genders, enrolled during the academic year 2019–2020 at college of medicine and dental college, and excluded the students declining the research participation request.

The study was conducted online by sending the survey monkey link to the participants as a personal invitation with detailed information of the study. The participant was giving informed consent electronically after reading the detailed information by clicking on agreeing to participate. The responses were collected using an online survey from January to March 2020.

Ethics

The objectives of the study were explained to the participants, and informed electronic consent obtained. Participation was voluntary, and confidentiality was assured. The study was conducted in accordance with the Helsinki Declaration of 1975, as revised in 2000, and ethical and institutional approval was obtained from the Research Ethics Committee of the College of Medicine.

Research instrument

The interview questions were formulated based on an extensive review of the literature and discussions with colleagues and obesity research experts. This approach facilitated and ensured the validity of the survey. The researchers reviewed the document in two phases to ensure that the data gathered from the questionnaire were reliable and accurate. In the first phase, items were examined for ambiguity and redundancy by academic faculty members. The questionnaire was in English. In the second phase, all questions were checked to ensure issues related to health behaviors that contribute to obesity and overweight were included in the survey. A pilot study of 30 students was commenced to check language simplicity and question understandability. The

survey was amended prior to use to reflect the outcomes of the pilot trial, and then the conclusive version of the survey was used.

The survey instrument comprised 27 items with a closed-ended response format. The questionnaire was anonymous, confidential, and self-administered. It comprised five main categories of health-related behaviors that contribute to obesity and overweight: sociodemographic information; dietary behaviors, physical activity profile information, factors related to obesity like genetic, socioeconomic, metabolic factors, lifestyle choices, endocrine diseases and medications, and anthropometric measurements such as weight, height, and BMI measurements. In this study, Cronbach's alpha was 0.78 for the survey.

Statistical analysis

Data analysis was done by using IBM Statistical Package for the Social Sciences (SPSS) Version 24.0 statistical software. A descriptive statistic (frequencies, percentages, mean, and standard deviations) were performed to describe the participants' characteristics. Chi-square test was done to evaluate the association with sociodemographic variables and other selected variables of the study with their likelihood of being with obese. The Multivariate Binary Logistic Regression Analysis was used to assess the combined and individual associations between the student's demographics and dietary behaviors, physical practices, and risk factors with their odds of having been obese. The association between those factors with the student's odds of having obesity was expressed as an Adjusted Odds Ratio (O.R) with 95% confidence Interval. The Categorical Cronbach's alpha was used to assess the reliability of the students measured indicators of food consumptions, and the Kuder-Richardson K-R test of reliability was used to assess the reliability of the Binary measured indicators and risk factors. For this study, $P < 0.05$ was considered statistically significant.

Results

A total of 433 medical and dentistry students consented to participate in the study. However, 401 participants completed the study and excluded 32 incomplete response sheets. The final sample was 401 students and out of this 30.9% (124) were dental students and 69.1% (277) were medical college students. The findings from the descriptive statistics of students' sociodemographic characteristics are shown in the Table 1. It showed most of the students, 66.6% (267) were female and the remainder were males. The mean age was 22.2 + 2.9 years, and the youngest students included in the study were aged 18 and the eldest were 34 years old.

Also, it was found that the mean + SD body weight for the students was 65.64 + 17.7 kg, and the mean + SD height was 164.41 + 9.4 cm. The computed BMI from the weight and height of the students was centered at 24.04 + 5.11 points. The data analysis, according to the WHO classification of BMI, the percentage of obese medical and dentistry students was 11.2%. The analysis of the housing type used by students showed that

20.7% of them lived by their own, another 10% lived in shared housing with other peers, and most of them 69.3%, however, lived with their own families.

The data was analyzed the student's obesity for statistically significant associations with the student's measured sociodemographic factors, and other health-related risk factors. In Table 2, the analysis findings suggested that the student's gender was significantly correlated with obesity. Male students were more likely to be obese compared to female students. The mean age of the students differed significantly between obese and non-obese students. Those obese students were significantly older on average than the non-obese students. However, the association between the student's age groups and the obesity showed no statistically significant association, *P* = 0.122.

Interestingly, there was no statistically significant association between the students' health college type with obesity, *P* = 0.180, but medical college students were found to be slightly more inclined to be obese compared to dentistry college students. Also, there was no statistically significant association between the academic level with obesity *P* = 0.933. Likewise, there was no statistically significant association between the student's housing type with obesity, *P* = 0.322, but those students residing alone were found to be slightly more inclined to be obese in general compared to those who reside with friends and family.

Unsurprisingly, the analysis findings suggested that students with a positive family history of obesity and chronic illness were significantly more inclined to be obese. However, no statistically significant association was found between having skin stretch marks, *P* = 0.280, or students smoking habit with obesity, *P* = 0.160, but daily smokers were found to be slightly more prone to be obese. Interestingly, the student's past history of obesity correlated significantly with their current obesity state, *P* < 0.001.

Table 3 showed the data analysis of the student's obesity for statistically significant associations with the eating and dietary behaviors as a risk factor. Results show that there was no statistically significant association between students' dietary behaviors and the likelihood of being obese. However, an independent group's *t*-test showed a statistically significant difference in mean measured water consumption cups per day between obese and non-obese students. Obese students consumed a significantly higher number of water cups per day (Mean = 7.10, SD = 4.2) than none-obese students consumed daily water cups (Mean = 5.53, SD = 3.1), *P* = 0.020.

Table 4 showed the data analysis of the student's obesity for statistically significant associations with the physical behaviors and other health-related risk factors. There was a statistically significant association between obesity and the student's recent attempts to lose weight via dieting or other weight-reduction methods, *P* < 0.001, according to the Chi-squared test those students who dieted recently to lose weight were significantly more predicted to be obese currently.

Table 1: Sociodemographic characteristics of participants (*n*=401)

	Frequency	Percentage
Gender		
Female	267	66.6
Male	134	33.4
College		
Dentistry College	124	30.9
Medicine college	277	69.1
Age (Years), mean (SD)		22.20 (29)
18-22 years	288	71.8
23-29 years	102	25.4
>=30 years	11	2.7
Body Mass Index, mean (SD)		24.04 (5.11)
Underweight	42	10.5
Normal	219	54.6
Over-weight	95	23.7
Obese class I	26	6.5
Obese Class II	16	4
Obese class III	3	0.7
Academic Grade		
Juniors	141	35.2
Sophomore	168	41.9
Senior	92	22.9
Living/housing		
Alone	83	20.7
With friend	40	10
With family	278	69.3

Table 2: Bivariate analysis of the student's obesity for statistically significant associations with demographic, past medical history and physical characteristics (*n*=401)

	Obese *n* (%)		*P*
	No (*n*=356)	Yes (*n*=45)	
Gender			
Female	244 (68.5)	23 (51.1)	0.020
Male	112 (31.5)	22 (48.9)	
Age (Years), mean (SD)	22.04 (2.7)	23.24 (3.9)	0.050
Family History of Obesity			
No	247 (69.4)	14 (31.1)	<0.001
Yes	109 (30.6)	31 (68.9)	
History of chronic illness			
No	316 (88.8)	34 (75.6)	0.012
Yes	40 (11.2)	11 (24.4)	
Have been obese in the past			
No	283 (79.5)	20 (44.4)	<0.001
Yes	73 (20.5)	25 (55.6)	
Are you able to walk for 30 min without getting tired?			
No	62 (17.4)	15 (33.3)	0.011
Yes	294 (82.6)	30 (66.7)	

Table 5 showed the Multivariate Binary Logistic Regression analysis. It was conducted to assess the combined and individual associations between student's demographic, past medical and eating and dieting habits with their odds of being obese. The model was overall statistically significant, denoting that one or more of the tested predictor independent variables had a

Table 3: Bivariate analysis of the student's obesity for statistically significant associations with their dietary behavior (*n*=401)

	Obese n (%)		*P*
	No (*n*=356)	**Yes (*n*=45)**	
How often do you breakfast			
Never	20 (5.6)	2 (4.4)	0.765
Weekly	77 (21.6)	8 (17.8)	
Daily	259 (72.8)	35 (77.8)	
How often do you take dinner			
Never	20 (5.6)	2 (4.4)	0.765
Weekly	77 (21.6)	8 (17.8)	
Daily	259 (72.8)	35 (77.8)	
Daily consumed cups of fresh water, mean (SD)	5.53 (3.1)	7.10 (4.2)	0.020
How often do you take fast foods intake?			
Never	32 (9%)	7 (15.6)	0.347
Weekly	241 (67.7)	30 (66.7)	
Daily	83 (23.3)	8 (17.8)	
How often do you consume soft drinks			
Never	92 (25.8)	8 (17.8)	0.174
Weekly	167 (46.69)	19 (42.2)	
Daily	97 (27.2)	18 (40%)	
How often do you take snakes			
Never	21 (5.9)	6 (13.3)	0.234
Weekly	142 (39.9)	17 (37.8)	
Daily	193 (54.2)	22 (48.9)	
How often do you take sweets			
Never	25 (7%)	6 (13.3)	0.308
Weekly	205 (57.6)	22 (48.9)	
Daily	126 (35.4)	17 (37.8)	

Table 4: Bivariate analysis of the student's obesity for statistically significant associations with their physical behavior and other factors (*n*=401)

	Obese n (%)		*P*
	No (*n*=356)	**Yes (*n*=45)**	
How often do you exercise for thirty minutes or more			
Never	121 (34)	20 (44.4)	0.370
Weekly	148 (41.6)	15 (33.3)	
Daily	87 (24.4)	10 (22.2)	
How much time do you spend using e-Devices			
Never	19 (5.3)	1 (2.2)	0.231
<=14 h/week	183 (51.4)	19 (42.2)	
>14 h/week	154 (43.3)	25 (55.6)	
Recently, have you tried to lose weight via diet			
No	176 (49.4)	9 (20)	<0.001
Yes	180 (50.6)	36 (80)	
Recently, have you tried to lose weight via other weight reduction methods			
No	186 (52.2)	11 (24.4)	<0.001
Yes	170 (47.8)	34 (75.6)	
Do you get enough sleep (for 6 to 8 h at least)			
No	126 (35.4)	16 (35.6)	0.983
Yes	230 (64.6)	29 (64.4)	

statistically significant association with the student's odds of being obese, *P* < 0.001. Interestingly, the students family history of obesity predicted higher odds of the students being obese too, *P* = 0.002, those students with positive family history for obesity are 3.53 times more predicted to be obese than those with a negative family history of obesity on average, accounting for the other predictors in the analysis model.

Discussion

Medical students are more prone to obesity because of their unhealthy lifestyle with less physical activity and disordered eating habits. Medical students were the target group of particular interest in this study as they are future physicians. If they are overweight or obese, they will carry the wrong impression on the general population.[6,7] This study aimed to define the prevalence of overweight and obesity among health science college students and to determine if there is a relationship among certain sociodemographic characteristics and overweight or obesity in this population.

The medical field is a challenging and stressful profession. Stress is an important factor that causes diet deviation, or physical inactivates and addiction and hence it is a risk factor to obesity.[8,9] In the current study, 23.7% of participants were overweight, and 11% were obese, this prevalence rate was higher than those reported by Mehmood *et al.*,[10] who concerned with the frequency of obesity and comorbidities among Northern Border University in Saudi Arabia and they found that 21.7% were overweight and 8.4% were obese. A similar study among Iraqi students at Kerbala University showed that the prevalence of overweight and obesity was 22.9% and 5.6%.[11] In Egypt, the prevalence of obesity was 13.4% among Ain Shams university students.[12]

Table 5: Multivariate Logistic Binary Regression Analysis of the university students' odds of being obese (*n*=401)				
	Adjusted Odds Ratio (OR)	95% C.I.for OR		*P*
		Lower	Upper	
Gender=Male	1.623	0.750	3.512	0.219
Age of student	1.511	0.798	2.860	0.205
College=medicine	2.349	0.885	6.236	0.087
Positive Family History of obesity=Yes	3.525	1.604	7.746	0.002
Presence of Chronic Illness/comorbidity=Yes	2.877	1.114	7.425	0.029
Feels easily exhausted with ADL=Yes	0.559	0.221	1.408	0.217
Able to walk for 30 minutes with No fatigue=Yes	0.269	0.101	0.714	0.008
Previously Identified as Obese=Yes	2.355	1.083	5.120	0.031
Physical Exercise level	0.636	0.375	1.078	0.093
Weekly E-Device usage rate	1.690	0.854	3.342	0.132
Daily water Consumption.	1.124	1.009	1.253	0.034
Tried dieting to lose weight=Yes	3.497	1.374	8.899	0.009
Non-Healthy food Consumptions factor score	0.795	0.556	1.136	0.208
Dieting Effort/Behavior factor score	0.793	0.535	1.175	0.248

The current study found that age was not associated with obesity, however, participants aged above 25 years old were at risk of obesity. This mirror results of several studies conducted among young[13] and older adults as the fat deposit in the abdomen increases with age.[14] The current results reported that the prevalence of obesity was higher among males. This is agreed with other studies in terms of the high prevalence of obesity among male medical students. Also, a study in Greece showed that 40% of males and 23% of female students had a BMI of ≥25.0 kg/m².[15] A study in Slovakia showed that 16% of males but only 2% of female medical students had a BMI >25.0 kg/m².[16] In contrary, Al Rashdan *et al.*[17] and Ng SW[18] Rasheed P *et al.*[19] reported that overweight and obesity were higher among females compared to males students. These observed difference in gender obesity and overweight could be related to a complex multifactorial influence.

There is a direct association between obesity and several chronic diseases.[20] According to the current results, obese students who had a history of chronic illnesses and comorbidity or family history of obesity were found to be significantly more inclined to be obese. These results are consistent with Anupama *et al.*[21] in Pune,[22] who found that family history was significantly associated with the risk of overweight and obesity. These results could be explained as the family history of obesity is strongly linked to adult obesity, which is likely to be because of both genetic and behavioral factors.[23]

Smoking is associated with obesity and it is recognized that obesity influences smoking behavior.[24,25] However, the current study found no significant association between smoking and obesity and this could be explained by a small proportion of the sample ever smoked and most of the sample were female who are less frequently smoke in comparison with the male as per WHO latest data. This could have implications for future studies looking for the associated smoking behavior with obesity in healthcare professionals. Consequently, these associations can have a fundamental implication for public-health interventions strategies to lessen the prevalence of these significant risk factors.

Obese participants tend to present with borderline fatigue.[26] The current study also showed that the obese students are significantly less active and tend to be fatigued with walk for 30 or more minutes, suggesting that those who can endure prolonged walking greater than 30 min are less likely to be obese. A possible answer could be the rise in proinflammatory cytokines in obese subjects,[27] which would lead to higher fatigue.[28] But other factors such as decreased physical fitness should be additionally explored.

This study reported no significant association between taking breakfast and obesity occurrence. However, the incidence rate was higher among student who was taking the breakfast daily 77.8%, these results mismatched with Anupama *et al.*[21] and Madan[29] who reported a significant association between frequency of skipping breakfast and risk of obesity. This could be related to other risk factors related to the complexity of obesity. Some researchers investigated the role of consuming water before or with a meal reduces energy intake through the consequent meal and risk of obesity.[30] Another hypothesis is that water consumption is supposed to have a small energy consuming effect in weight status.[31,32] The study findings revealed a statistically significant difference in water consumption between obese and non-obese students; obese students consumed a significantly higher number of water cups per day than non-obese students. These results incompatible with a longitudinal study which revealed that high water consumption causing a long term loss in weight status.[33] Also, two systematic reviews carried among adults recorded that increased water consumption might have a beneficial effect on adults dieting for weight loss.[30,34] The consumption of sugar-sweetened beverages was a factor of obesity with the most consistent evidence.[35,36] A recent meta-analysis proposed that decreasing their consumption could reduce obesity epidemic.[37] However, the current results reported there is no statistically significant association between taking dinners, soft drink, or fast food consumption, and sweets consuming with students' probability of being obese.

Also, the present results reported that there is no association between sleeping disturbance and obesity. These results mismatched with a previous study that showed that obese subjects have excessive fatigue independently of sleep-disordered breathing and sleep apnea.[38,39] The most modern progress of lifestyle modification programs combines dietary and exercise interventions with behavioral strategies to enhance adherence to long-term weight control.[40] Concerning different methods that were followed by current population, there was a statistically significant association between obesity and the student's recent attempts to lose weight via dieting. According to the current study results, those students who dieted recently were significantly more predicted to be obese. In the same manner, students' recent usage of weight-reducing methods markedly associated with their current obesity state.

Primary care practitioners play a key role in overweight and obesity prevention through promoting public health campaigns such as obesity screening program. Boosting the knowledge of medical students about risk of obesity and its serious physical and psychological problems, including diabetes mellitus and other cardiovascular disease will be effective in enhancing the population awareness of preventive modalities against it.

Conclusions

The present study showed a high prevalence of overweight and obesity among health science college students. The prevalence were significantly higher among male participants and the family history and smoking were the most significant risk factors. Consequently, there is a need for a regular health education program to change college students' health and nutritional behavior. Such programs will emphasize the healthy lifestyle, improved self-efficacy in diet, and physical activity for college students.

Declaration of participants consent

The author certify that they have obtained all appropriate participants consent forms.

Inclusion in the authors'/contributors' list

The manuscript has been read and approved by all the authors, the requirements for authorship have been met, and each author believes that the manuscript represents honest work

Contributors

All authors contributed to the study design and data collection and analysis, interpretation of the study results and critical revision of the manuscript.

Conflicts of interest

There are no conflicts of interest.

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