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Original Article

A Cross-Sectional Study Evaluating the Psychological Impact of Obesity and Overweight in Medical Students at Umm Al-Qura University

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Abstract

Background: Obesity and overweight are both common and have a high prevalence in Saudi Arabia. With the increase in body mass index (BMI), other complications can also occur, including mental health complications. Studies have shown a positive association between overweight/obesity and mental health issues. The aim of the study is to investigate the association between obesity, overweight and mental disorders.

Methods: A cross-sectional survey was conducted among medical students at Umm Al-Qura University in Mecca. The study was carried out in Makkah from March till October 2022. For data collection, an online questionnaire was created using Google Forms. Data were collected using the depression anxiety stress scale (DASS).

Results: The study included 403 university students, all of whom were medical students ranging from the second academic year to internship Out of all the participants, 20.1% were found to be overweight, while 18.3% were found to be obese. The overall prevalence rates were 62% for depression, 62.5% for anxiety, and 52.6% for stress. The association of body mass index (BMI) with depression, anxiety, and stress failed to show statistical significance (P-values = 0.399, 0.468, and 0.532, respectively). However, gender showed a statistically significant association with stress (P-value=0.004). Depression and anxiety showed statistically significant associations with age groups (P-values = 0.048 and 0.006, respectively).

Conclusions: Gender showed a statistically significant association with stress. Additionally, age groups were found to have a statistically significant association with both depression and anxiety. These results failed to show a strong association between depression, stress, anxiety, with obesity.

Keywords: *Obesity, Overweight, Anxiety, Depression, Stress*

Introduction

Obesity and overweight are defined by excessive or abnormal fat accumulation, which may disrupt the quality of life (1). Obesity is a common and serious global health issue, particularly in developing countries. One of the highest obesity prevalence rates is seen in Saudi Arabia (2). Obese adults are defined by a body mass index (BMI) of 30 or higher and are subdivided into three categories or classes according to the World Health Organization (1). People with a BMI lower than 18.5 are classified as underweight, BMI between 18.5 to 25 are classified as healthy weight, BMI between 25 to 29.9 are classified as overweight, and BMI more than 30 are classified as obese. It is well established that obese people develop chronic illnesses such as cardiovascular disease and type 2 diabetes (3), but obesity's relation to mental health issues is less established. The obesity rate in Saudi Arabia was estimated at 23% of the adult population in 2022 (4). The widespread of obesity was projected to increase from around 21% to 78% in women and from 12% to 41% in men between 1992 and 2022 (5).

Mental health disorders are defined as severe medical conditions influencing people's thoughts, feelings, and behaviors (6). A broad spectrum of conditions is correlated with mental illnesses such as depression, panic disorder, eating disorder, bipolar disorder, schizophrenia, and post-traumatic stress disorder (7). According to estimates from the World Health Organization (WHO), roughly 25% of people worldwide experience mental illness in developing and developed countries (8). However, there is a lack of reliable estimates of the prevalence of mental illness in Saudi Arabia (9).

International research has been conducted on the association between overweight and mental health problems among different groups of people of different ages, including adolescents and children (10, 11). Some studies showed that being overweight or obese is strongly related with mental health issues (12). However, other international studies showed no association of depressive, somatoform, or anxiety disorders with overweight. Still, the number of such studies was less than the number indicating a positive association (13).

In a comprehensive review and meta-analysis published in the International Journal of Obesity (IJO), researchers investigated the association between obesity and psychiatric problems in the general population. 16 studies that matched the inclusion criteria. Although the studies' effects were not consistently measured, cross-sectional data suggested a relationship between obesity and anxiety (14). In Saudi Arabia, male students at King Khalid University were the subjects of a study looking at the connection between obesity and mental illnesses. The findings indicated a link between obesity and stress, anxiety, and depression (15).

The relationship between obesity and mental illness has had variable results, with some studies supporting it and others finding no correlation. But overall, the research indicates that mental illness in adults, adolescents, and children is strongly related with obesity and overweight. The aim of the study is to investigate the association between obesity, overweight and mental disorders.

Methods

Study population and sampling

A simple random cross-sectional study was made through an online survey using Google Forms, which was shared among medical students from Umm Al-Qura University. The students included those in their second to sixth academic years and interns. The study was carried out in Makkah from March till October 2022. The survey was randomly distributed on social media platforms and was collected from individuals of different genders and ages. The ethical approval has been obtained from The biomedical research ethics committee by registration number HAPO-02-K-012. Every participant has agreed to the consent which indicated that any information obtained will only be used for research purposes and will not be shared. The data was mainly collected by a student participating in the research, but data collectors were also used.

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The website OpenEpi version 3.0 was used to compute the necessary sample size for this study. We considered the following: the number of second to sixth-year students as well as interns at the medical school at Umm Al-Qura University (around 1440 individuals), a confidence interval (CI) level of 95%, and the prevalence of psychological disorders. The size of the sample was determined to be 304 people, which was increased to 400 individuals to account for any potential data loss.

Inclusion and exclusion criteria

This study included male and female medical students enrolled in Umm Al-Qura University from the second academic year to the intern year (seventh year). All students outside Umm Al-Qura college of medicine have been excluded.

Assessment tool

We used the Depression Anxiety Stress Scale (DASS), which is a set of 42 items that can be answered with a rating scale (from 0 to 4). It determines a person's negative emotional states, such as depression, stress, and anxiety (16). Before the participant started answering the DASS questionnaire, they were required to provide personal information, including name, age, gender, city of residence, height, and weight, to calculate their BMI and whether they have any related medical history that could affect obesity and overweight.

Statistical analysis

We used the statistical package for the social sciences (SPSS) (Armonk, New York, IBM Corp) for data analysis. The item scores of each DASS subscale were added up, and the results were divided into "normal," "mild," "moderate," "severe," and "extremely severe." For some analyses, "severe and extremely severe" groups were considered one group to increase the statistical power of the significance tests. Age and BMI were also categorized according to quartiles and standard groups, respectively.

Continuous variables were skewed and summarized using the median and interquartile range (IQR) after applying a Kolmogórov-Smirnov test to check for a normal distribution. Categorical variables were summarized using proportions. For the analyses of the relationship between obesity and DASS components, underweight students were excluded. Chi-square test was used to test for the statistical associations between categorical variables. The significance level was set at 0.05.

Results

A total of 403 responses were analyzed. The age ranged from 18-32 years with a median of 22 years (IQR: 20-23 years). Males represented 51.4%, and all students were medical students from the second academic year to the intern year. Smokers represented only 8.7%. The GPA and background characteristics of the students are shown in **(Table 1)**.

Table 1: Background characteristics of the students.

		N	%
Age	18-20	103	25.6%
	21-22	184	45.7%
	>22	116	28.8%
Gender	Male	207	51.4%
	Female	196	48.6%
Academic year	2nd year	51	12.7%
	3rd year	103	25.6%
	4th year	64	15.9%
	5th year	123	30.5%
	6th year	53	13.2%
	Intern	9	2.2%
GPA*	3.5-4	279	69.2%
	3-3.5	100	24.8%
	2-3	23	5.7%
	<2	1	0.2%
Smoker	Yes	35	8.7%
	No	368	91.3%

**GPA: Grade point average*

The median BMI was 23.4 (IQR 20.1-27.8). The BMIs were divided into subgroups, and the results showed that 16.1% were underweight, 45.4% were normal weight, 20.1% were overweight, and 18.3% were obese. The details and classes of obesity are demonstrated in **(Figure 1)**.

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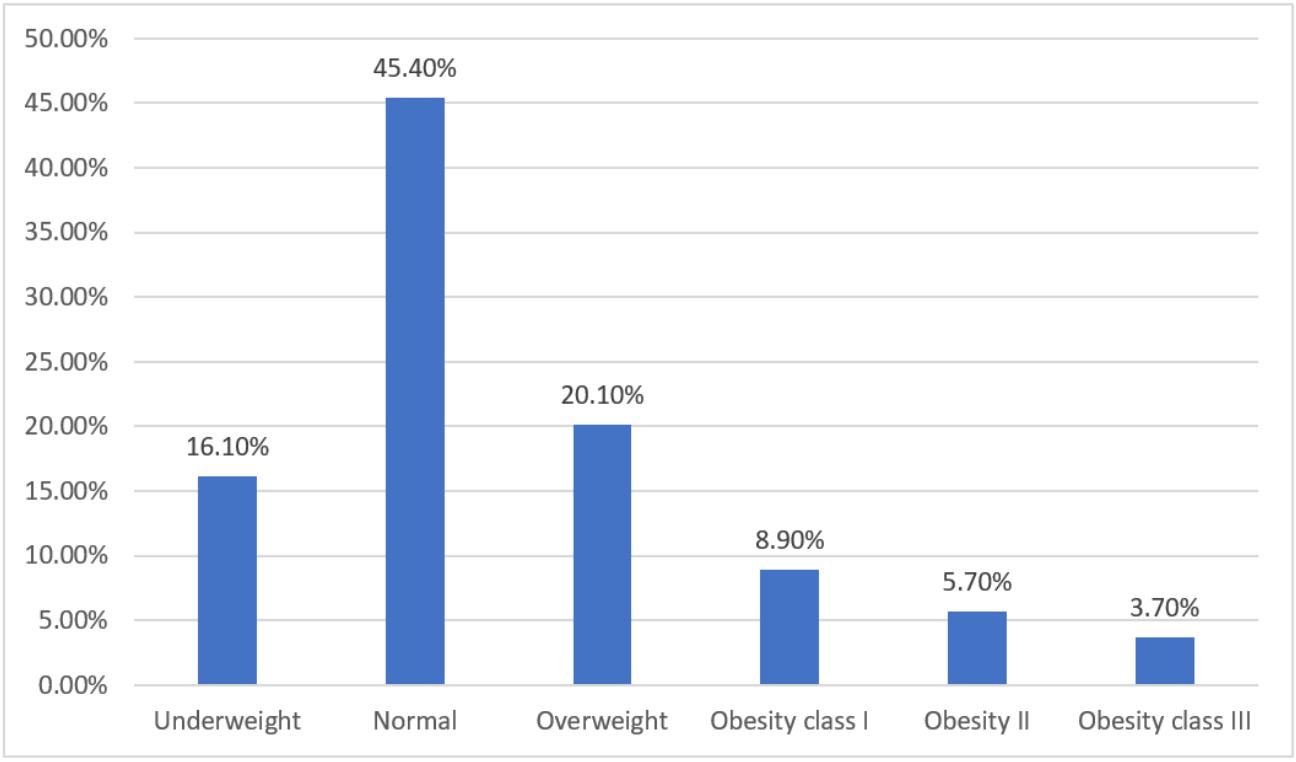

Figure 1: Distribution of students by body mass index (BMI)

Based on the different severity scales of the DASS-42 tool, the overall prevalence rates were as follows: depression: 62%; anxiety: 62.5%; and stress: 52.6%. Anxiety had the highest rate of severe and extremely severe cases at 15.6% and 18.4%, respectively, followed by depression with 14.9% severe and 13.4% extremely severe. Stress revealed 14.6% severe cases and 5.5% extremely severe cases. The severity results of DASS-42 are detailed in **(Table 2)**.

Age was divided into three groups (18–20 years, 21–22 years, and 23 years) based on the 25th and 75th quartiles. The severity of mental illnesses was tested for significance concerning BMI, age groups, and gender. The associations between BMI categories are shown in **(Table 3)**.

Table 2: Mental illness among students by severity

	Depression	Anxiety	Stress
Normal	153 (38%)	151 (37.5%)	191 (47.4%)
Mild	45 (11.2%)	36 (8.9%)	53 (13.2%)
Moderate	91 (22.6%)	79 (19.6%)	78 (19.4%)
Severe	60 (14.9%)	63 (15.6%)	59 (14.6%)
Extremely severe	54 (13.4%)	74 (18.4%)	22 (5.5%)

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Table 3. Association of obesity with depression, anxiety, and stress among students.

N=338		BMI*						P-value
		Normal		Overweight		Obese		
		N	%	N	%	N	%	
Depression	Normal	66	36.1%	31	38.3%	31	41.9%	0.399
	Mild	22	12.0%	8	9.9%	8	10.8%	
	Moderate	40	21.9%	18	22.2%	17	23.0%	
	Severe & extremely severe	55	30.1%	24	29.6%	18	24.3%	
Anxiety	Normal	70	38.3%	33	40.7%	24	32.4%	0.468
	Mild	12	6.6%	9	11.1%	11	14.9%	
	Moderate	34	18.6%	14	17.3%	15	20.3%	
	Severe & extremely severe	67	36.6%	25	30.9%	24	32.4%	
Stress	Normal	83	45.4%	42	51.9%	41	55.4%	0.532
	Mild	25	13.7%	11	13.6%	7	9.5%	
	Moderate	35	19.1%	14	17.3%	14	18.9%	
	Severe & extremely severe	40	21.9%	14	17.3%	12	16.2%	

*(n=338, excluding underweight) *BMI: Body mass index*

Gender showed a statistically significant association with stress (P-value=0.004), while depression and anxiety failed to show statistically significant with gender. The results of the association of gender with depression, anxiety, as well as stress are demonstrated in **(Table 4)**.

Table 4. Association of gender with depression, anxiety, and stress among the students

N= 403		Gender				P-value
		Male		Female		
		N	%	N	%	
Depression	Normal	79	38.2%	74	37.8%	0.408
	Mild	22	10.6%	23	11.7%	
	Moderate	53	25.6%	38	19.4%	
	Severe & extremely severe	53	25.6%	61	31.1%	
Anxiety	Normal	75	36.2%	76	38.8%	0.482
	Mild	23	11.1%	13	6.6%	
	Moderate	40	19.3%	39	19.9%	
	Severe & extremely severe	69	33.3%	68	34.7%	
Stress	Normal	112	54.1%	79	40.3%	0.004
	Mild	27	13.0%	26	13.3%	
	Moderate	40	19.3%	38	19.4%	
	Severe & extremely severe	28	13.5%	53	27.0%	

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Depression and anxiety showed statistically significant associations with age groups (P-value=0.048, 0.006, respectively). The results of the relationship between age groups are shown in **(Table 5)**.

Table 5. Association of age groups with depression, anxiety, and stress among students

		Age groups						P-value
		18-20 Years		21-22 Years		≥23 Years		
		N	%	N	%	N	%	
Depression	Normal	28	18.3%	71	46.4%	54	35.3%	0.048
	Mild	9	20.0%	23	51.1%	13	28.9%	
	Moderate	32	35.2%	40	44.0%	19	20.9%	
	Severe & extremely severe	34	29.8%	50	43.9%	30	26.3%	
Anxiety	Normal	30	19.9%	67	44.4%	54	35.8%	0.006
	Mild	5	13.9%	20	55.6%	11	30.6%	
	Moderate	22	27.8%	44	55.7%	13	16.5%	
	Severe & extremely severe	46	33.6%	53	38.7%	38	27.7%	
Stress	Normal	45	23.6%	83	43.5%	63	33.0%	0.592
	Mild	12	22.6%	26	49.1%	15	28.3%	
	Moderate	22	28.2%	39	50.0%	17	21.8%	
	Severe & extremely severe	24	29.6%	36	44.4%	21	25.9%	

Discussion

To the best of our knowledge, no previous study of this nature has been done using the validated screening DASS scale in the Western region of Saudi Arabia to investigate the association between obesity, overweight and mental disorders. The Saudi Arabian population has a developing prevalence of obesity and overweight in general (17) and among students at Umm Al-Qura University in Makkah (18, 19). It is believed that due to the stress of academic life, student health becomes worse. Additionally, the lifestyle, overall environment, and food consumed may explain why this is a developing issue in Makkah in general (20).

Based on the BMI classification of weight status according to the WHO (1), the prevalence of overweight and obesity this study had was 38.4% overall (20.1% overweight and 18.3% obese). Thus, those with BMI above the average represented more than one-quarter of the study sample. Similarly, a recent study conducted on male students at King Khalid University in Abha revealed overweight and obesity 40.4% (22.1% and 18.3% respectively) among students (15). Another study done in UAE showing even more prevalence of increasing BMI in Middle East, the prevalence of overweight and obesity, were (43.0% and 32.3% respectively) (21). While there is clear agreement that being overweight and obese are issues that keep increasing, whether mental disorders are linked directly with the increase in BMI must be clarified. Previous studies have revealed variability of findings on this subject. While some studies have found strong associations of mental disorders with obesity (22), some other researchers have found the opposite. some results show that obese individuals have fewer mental disorders than the non-obese population (23).

Many other researchers have focused on the association of mental health with obesity or overweight. However, few have used the DASS to examine not only the severity of each negative emotional state (depression, anxiety, and stress) but

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also their direct connections with the BMI. Such data could help to address mental health problems and other health risks of obesity that can influence the quality of life. These include osteoarthritis, skin changes like stretch marks (24), diabetes mellitus, and hypertension (25).

Anxiety had the highest proportion of cases (63.5%) compared to depression and stress (62% and 52.6%, respectively), regardless of severity. This is consistent with another study in Abha, which showed anxiety was also the dominant of these three (73.2%), while the depression rate was 65.7% (26). On the other hand, A study done in Brazil showed different results on medical students, showing stress was the dominant out of the three (47.1%) (27). This shows the importance of programs for treatment and screening for mental illnesses. Thankfully, the Saudi National Health and Stress Survey (SNHSS) intends to increase health promotion, offer services for health education, and provide essential help for mental illness in Saudi Arabia (28).

Both depression and anxiety had no significant association with gender, unlike stress. However, it must be mentioned that females overall had more severe and extremely severe cases of depression, anxiety, and stress than male students (31.1% vs. 25.6%, 34.7% vs. 33.3%, and 27% vs. 13.5%, respectively). A study done in Saudi Arabia has revealed that females are strongly associated with depression, anxiety, and stress in general (29), Another study done in Canada also showed higher number of stress and anxious symptoms in females compared to males (30). Additionally other study showed prevalent with female medical students in particular (31). As mentioned before, anxiety is the most common psychological problem among medical students at Umm Al-Qura University. In 2013, for every nine people in the world, one was found to have at least one anxiety disorder (32). These conditions significantly worsen in populations with poor health services or low income (33).

One limitation of this study is that the information was self-reported. Moreover, it is likely that some participants made false statements or had biases. The honesty of the participants is the only thing we can rely on. Furthermore, DASS risk assessment cannot assess suicidality, and such cases should be examined with clinical interviews instead (34).

Conclusion

The present results failed to show a strong association between depression, stress, anxiety, with obesity. while gender showed a statistically significant association with stress, and age groups showed a statistically significant association with depression and anxiety. In addition, the study demonstrated the overall high prevalence rate of depression, anxiety and stress among medical students at Umm Al-Qura University. The university should establish programs to improve students mental and physical health. More studies in this topic are needed to establish a strong relation between mental disorders and obesity.

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Disclosure

Conflict of Interest

The authors declared that there are no conflicts of interest.

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Ethical Consideration

The study was approved by the Medical Ethics Committee of Umm Al-Qura University, Saudi Arabia, with ethical approval number: (HAPO-02-K-012).

Data Availability

All datasets collected during this study are available upon reasonable request from the corresponding author.

Author Contribution

Hashim Al-Sharif and Mokhtar Shatla conceived the research idea, developed the study design, and supervised the project. Hashim Al-Sharif, Mokhtar

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Shatla, Motaz Sahal, Nawaf Alazwari, Sultan Alneefia, Musaad Al-Mhmadi and Mohammed Fouda were responsible for the data collection, analysis, interpretation, and drafting of the manuscript.

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