Original Research Article

The Magnitude and Related Risk Factors of Obesity and Overweight among Medical Students at Shendi University, Sudan

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Abstract: *Background*: Today, obesity is a serious health issue that is growing around the world. Almost 500 million adults worldwide were obese, and 1.5 billion were overweight, according to a World Health Organization (WHO) report. This number is estimated to increase in the years to come. *Objective:* To evaluate the prevalence of obesity and overweight among medical students at the Shendi University College of Medicine and its relationship to demographic parameters. *Materials and Methods:* A cross-sectional descriptive-analytic study was conducted on medical students of the faculty of medicine at Shendi University, and a sample of students was systematically randomly collected. Data was collected by using an open and closed questionnaire. Direct measurement of weight and height, then the calculation of BMI. Also, direct measurement of waist and hip, then the calculation of WHR. *Results:* 43% of the students were classified as average. 26% of people were overweight, and 21% were obese. In other words, the study discovered that women are more likely than men to be overweight or obese. According to the findings, those who live in urban areas gain weight noticeably more than people who live in rural areas. Regarding the behavioral aspect, there was a substantial relationship between those with a positive family history of obesity and those who are of normal weight, as well as a positive relationship between those who ate more than two meals each day. *Conclusions:* University students frequently engage in risky health behaviors, so it's important to educate them on how to prevent them, especially when it comes to topics like exercise and nutrition. For the sake of their health and the health of future generations, prospective healthcare professionals must adopt the proper eating habits and a healthy lifestyle. We advise modifying BMI to account for fat distribution and coexisting diseases to gain a thorough understanding of the current situation.
Keywords: Obesity, Overweight, BMI, WHR, Shendi University, Sudan.

INTRODUCTION

Obesity is becoming a global epidemic and belongs to major risk factors for the most prevalent diseases such as cardiovascular, metabolic, oncological, and other chronic diseases and is the leading cause of premature death [1-5]. The WHO reports that the prevalence of overweight and obesity is rising. The excessive accumulation or abnormal distribution of body fat (BF), which negatively impacts health, is referred to as obesity [6]. It is primarily categorized using the extremely limiting body mass index (BMI, kg/m2) [7]. Type 2 diabetes mellitus (T2DM), hepatic steatosis, cardiovascular conditions, stroke, dyslipidemia, hypertension, gallbladder issues, osteoarthritis, sleep apnea and other breathing issues, and specific cancers (endometrial, breast, ovarian, prostate, liver, gallbladder, kidney, and colon) can all raise the probability of mortality and make obesity more difficult to treat [8]. Pituitary, thyroid, and adrenal gland illnesses are regarded as distinct pathologies but may signify obesity in some cases [9, 10]. The most widely used index for measuring obesity is the Body Mass Index (BMI), which is defined by weight in kilograms divided by height in meters squared ($kg.m^2$). According to WHO, obesity is defined as BMI $\geq$ 30 $kg.m^2$ [11]. BMI has been one of the

most widely adopted weight-related anthropometric measures [12, 13]. The disease predictability of BMI is confined as it does not distinguish between muscle and fat accumulation or distribution of adipose tissue [14, 15]. Although commonly recognized as a particular indicator of fat distribution, waist circumference is ineffective in differentiating between subcutaneous and visceral fat mass. Much epidemiologic research has discovered that waist circumference does have a strong correlation with the risk of metabolic diseases and predicts mortality risk better than BMI [16, 17]. Waist circumference and WHR have been used as other markers for abdominal obesity [18]. Although WHR is being investigated, it is not as commonly used as it was a decade ago. Visceral obesity is linked to dyslipidemia, hypertension, and cardiovascular hazards, and abdominal visceral fat is particularly linked to these conditions [19, 20]. Obesity is affected by multiple components of our lifestyle, including exercise, diet, and stress. Thus lifestyle interventions have been developed that address exercise, diet, and typically, at least one other component such as counseling and stress management [21]. These changes are meant to be sustainable and accessible and effective in reducing the risk of diabetes and cardiovascular disease [22, 23]. A growing public health issue is obesity. The prevalence of obesity worldwide is rising, which poses various dangers for the emergence of cardiovascular disease and other illnesses. This issue cannot be solved quickly or easily. The reasons vary, and there are different numbers of obese and overweight persons in different places.

MATERIALS AND METHODS
Study design:
This is a cross-sectional, descriptive-analytic specific community-based study aimed to determine the prevalence of overweight and obesity among medical students in the faculty of medicine at Shendi University.

Study area:
The study was conducted in the faculty of medicine at Shendi University which is established in 1990. The university is located in Shendi city- Sudan.

Study period: The study was started from September 2022 to January 2023.

Sampling Size: Two hundred samples (n=200) will be collected.

Data Collection
Data was collected using an open and closed questionnaire, composes of questions, about socio-demographic features like age, sex, residence, and income. The behavioral factor includes eating habits, physical exercise and smoking habits, and family obesity history. The students themselves answered all of the questions. Height was measured by using fibroblastic tape of 150cm in length and a ruler to determine the maximum point of the head, and students fix their hells to the wall, weight was then measured by using a water bath scale then the researcher calculated the BMI which is the weight of the person in kg divided by height on meter square. Waist and hip were measured by using fibroblastic tape 150cm in length. Then the researcher calculated the WHR which is the waist of the person in any measure divided by the hip on the same measure the measure type is not important because that is a ratio.

Data analysis and presentation:
All collected data were analyzed using SPSS for Windows, version 16. Paired Student t-test was used for calculating the degree of variation, with a P. value (≤ 0.05) considered significant. Analysis of variance (ANOVA) was used for continuous data and the statistical results were presented as means $\pm$ SD.

Ethical Considerations:
Ethical approval for the study was obtained from the Board of the Faculty of Medicine at Shendi University. The written informed consent form was obtained from each guardian of the participant as well as from the subject himself before recruitment into the study. All protocols in this study were done according to the Declaration of Helsinki (1964).

RESULTS

Table 1: Socio-demographic status of study population (N=200)

Item	Frequency	Percentage %
Age Group		
18 - 20 years	80	40.0
21 - 23 years	60	30.0
24 - 26 years	60	30.0
Gender		
Male	60	30.0
Female	140	70.0
Residence		
Urban	134	67.0
Rural	66	33.0
Social Status		
Single	174	87.0
Married	23	11.5

Item	Frequency	Percentage %
Divorced	3	1.5
Do you practice sport		
Regular	32	16.0
Irregular	87	43.5
Non	81	40.5
Type of Obesity		
General	76	38.0
Visceral	14	7.0
Truncal	5	2.5
Non	105	52.5
Do you have D.M		
Type I	5	2.5
Type II	2	1.0
No	193	96.5
How many main meals		
One	8	4.0
Two	77	38.5
Three	89	44.5
More	26	13.0
Family Income per month		
High	27	13.5
Moderate	158	79.0
Low	15	7.5
Total	**200**	**100.0**

Table 2: Relationship between Gender and BMI

Gender		BMI				Total	*P. v*
		Underweight	*Normal weight*	*Overweight*	*Obesity*		
Male	N	6	30	17	7	60	.069
	%	3.0%	15.0%	8.5%	3.5%	30.0%	
Female	N	13	56	35	36	140	
	%	6.5%	28.0%	17.5%	18.0%	70.0%	
Total	N	**19**	**86**	**52**	**43**	**200**	
	%	**9.5%**	**43.0%**	**26.0%**	**21.5%**	**100.0%**	

Table 3: Relationship between Residences and BMI

Residence		BMI				Total	*P. v*
		Underweight	*Normal weight*	*Overweight*	*Obesity*		
Urban	N	16	48	37	33	134	.022
	%	8.0%	24.0%	18.5%	16.5%	67.0%	
Rural	N	3	38	15	10	66	
	%	1.5%	19.0%	7.5%	5.0%	33.0%	
Total	N	**19**	**86**	**52**	**43**	**200**	
	%	**9.5%**	**43.0%**	**26.0%**	**21.5%**	**100.0%**	

Table 4: Relationship between Family Income per month and BMI

Family Income per month		BMI				Total	*P. v*
		Underweight	*Normal weight*	*Overweight*	*Obesity*		
High	N	0	8	6	13	27	.010
	%	0.0%	4.0%	3.0%	6.5%	13.5%	
Moderate	N	16	73	42	27	158	
	%	8.0%	36.5%	21.0%	13.5%	79.0%	
Low	N	3	5	4	3	15	
	%	1.5%	2.5%	2.0%	1.5%	7.5%	
Total	N	**19**	**86**	**52**	**43**	**200**	
	%	**9.5%**	**43.0%**	**26.0%**	**21.5%**	**100.0%**	

Table 5: Relationship between Do you practice sport and BMI

Do you practice sport		BMI				Total	P. v
		Underweight	*Normal weight*	*Overweight*	*Obesity*		
Regular	N	1	18	10	3	32	.039
	%	0.5%	9.0%	5.0%	1.5%	16.0%	
Irregular	N	8	29	23	27	87	
	%	4.0%	14.5%	11.5%	13.5%	43.5%	
Non	N	10	39	19	13	81	
	%	5.0%	19.5%	9.5%	6.5%	40.5%	
Total	**N**	**19**	**86**	**52**	**43**	**200**	
	%	**9.5%**	**43.0%**	**26.0%**	**21.5%**	**100.0%**	

Table 6: Relationship between There is a history of obesity in the family and BMI

There is a history of obesity in the family		BMI				Total	P. v
		Underweight	*Normal weight*	*Overweight*	*Obesity*		
Yes	N	3	19	24	24	70	.000
	%	1.5%	9.5%	12.0%	12.0%	35.0%	
No	N	16	67	28	19	130	
	%	8.0%	33.5%	14.0%	9.5%	65.0%	
Total	**N**	**19**	**86**	**52**	**43**	**200**	
	%	**9.5%**	**43.0%**	**26.0%**	**21.5%**	**100.0%**	

Table 7: Relationship between Have you used any medication for obesity and Type of Obesity

Have you used any medication for obesity		Type of Obesity			Total	P. v
		General	*Visceral*	*Truncal*		
Yes	N	6	6	1	13	.002
	%	6.3%	6.3%	1.1%	13.7%	
No	N	70	8	4	82	
	%	73.7%	8.4%	4.2%	86.3%	
Total	**N**	**76**	**14**	**5**	**95**	
	%	**80%**	**14.7%**	**5.3%**	**100%**	

DISCUSSION

The prevalence of obesity/overweight in medical students in the faculty of medicine at Shendi University was 48% and this considers a high prevalence rate of obesity/overweight, which compared with the studies done in the USA [24], Thailand [25], and Malaysian [26], Turkey [27], and less likely compared to study done on Kuwait [28], south of Iran [29]. The prevalence of overweight/obesity is greater for female students with a percentage of 70% and 30% in male students compared to none obese/overweight (*P. value* = 0.06). This high percentage of female gaining weight usually refer to hormonal factors mainly estrogen and progesterone, which are trained to increase at this level of age. Also, the Sudanese community prefers obese women to thinner ones. This result agrees with most obesity prevalence studies: refer study done in Saudi Arabia where Overweight and obesity are more prevalent in Saudi women than in Saudi men [30] and also a typical raise in female obesity and overweight found in students of dental collage of Karachi in Pakistan 2007 which he found that overall 60.8% female and 44.4% males found to be overweight or obese [31]. However there is another study done on Malaysian students that found the adverse result to those previous results, this study found an increased prevalence of obesity in the male gender [26].

The students who reside in urban areas are more likely to be overweight or obese than those who reside in rural areas, overweight or obesity were 67% of four urban students and 33% of rural students. These findings also agree with the study in Thailand, where people who live in urban areas showed obesity prevalence than those who live in rural areas [25]. This study shows that the overweight and obese prevalence is directly linked with monthly income. High and moderate monthly income is the more prevalent overweight/obesity among medical students of Shendi University. They represent 79% in middle monthly income, and 13.5% in high monthly income oppose to 7.5% in low income. The overweight/obesity prevalence seems to be changed with the different monthly incomes. A previous study in Turkey mentioned that overweight and obesity prevalence is directly associated with household income [27]. Overweight/obese students represent 4% of students who eat one meal, 38.5% of students who eat two meals, 44.5% of students who eat three meals, and 13% of students who eat more than three meals. The frequency of exercise and its relation with BMI. Only 59.5% of students who practice exercise regularly are overweight/obese, compared to 16% who practice exercise irregularly and 40% of students who don't practice exercise. The percentage of overweight/obese

students with a family history of obesity was 35%, compared to 65% for those without a history. Also in Thailand, 2014, by Karl Peltzer and his colleagues, Obesity among young people increases lifetime cardiovascular risk. This study analyzes a random sample of university students to determine the prevalence of overweight/obesity and its contributing factors. The study population was (43.2%) males and (56.8%) females. Among men, the prevalence of underweight was 10.8%, normal weight 64.4%, overweight 18.9%, and obesity 5.8%, while among women, the prevalence of underweight was 17.6%, normal weight 62.1%, overweight 14.1%, and obesity 5.2%. Overall, 22% were overweight or obese (24.7% men and 19.3% women) [32]. Diabetes mellitus (DM) is a systemic metabolic disorder that can lead to diabetic nephropathy (DN), a leading cause of end-stage renal disease around the world [33].

CONCLUSION

University students frequently engage in risky health behaviors, so it's important to educate them on how to prevent them, especially when it comes to topics like exercise and nutrition. For the sake of their health and the health of future generations, prospective healthcare professionals must adopt the proper eating habits and a healthy lifestyle. We advise modifying BMI to account for fat distribution and coexisting diseases to gain a thorough understanding of the current situation.

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