The Prevalence of Overweight and Obesity Among A'Sharqiyah University Students in Sultanate of Oman: A Randomized Study

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Abstract

Obesity is considered as a risk factor for many health problems such as type 2 Diabetes Mellitus, cancers, coronary heart disease, hypertension, dyslipidemia, and metabolic syndrome. The prevalence of overweight and obesity have increased steadily among world population in both developed and recently in the developing countries. People in the Gulf Cooperation Council region over the years changed their dietary habits from consumption of whole grain products, fruits and vegetables to diets high in simple carbohydrates and fats and changed their lifestyle to almost sedentary one. These changes have led to increased rates of overweight, obesity and their health complications. The purpose of this study was to assess the rates of overweight and obesity and to find out body composition of A'Sharqiyah University students in Oman. A total number of 226 students aged 18-24 years participated in this study and anthropometric measurements were taken including height, weight, body mass index, body fat percent, and visceral fat level (VFL). Bioelectrical impedance analysis machine was used for this purpose. Female students had lower rates of overweight (27% vs 39%) and obesity (3% vs 16%) comparing with male students ($P < 0.05$). Female students were leaner than their counterpart male students. Male students had higher VFL% but female student had higher BF% comparing with male students ($P < 0.05$). This study have shown that the prevalence of overweight and obesity among A'Sharqiyah University students were lower than those of the Gulf Cooperation Council but to continue with this lifestyle and unhealthy dietary habits will lead to an increase in overweight and obesity rates which will have a negative impact on the health status of Omani population in general and on A'Sharqiyah University students in particular. Therefore and adjustment of life style and dietary habits are needed to prevent the increase in overweight and obesity rates and to prevent their complications.

Keywords: *Body composition; Anthropometric measurements; Obesity; Overweight; A'Sharqiyah University; Oman*

Introduction

The prevalence of overweight and obesity have increased steadily among world population in both developed and recently in the developing countries. This increase is having a negative impact on societies especially on health and economy sectors. Obesity is considered the fifth leading cause of mortality worldwide [1-2]. It is considered as a risk factor for many health problems such as type 2 Diabetes Mellitus, cancers, coronary heart disease, hypertension, dyslipidemia, and metabolic syndrome [3]. In the GCC region, there have been rapid changes in the cultural, economical and social parts of life due to the discovery of oil and economical boom that these countries witnessed in 1970's and 1980's. These changes that affected the life style of the population in the entire region were associated with an alarming increase in overweight and obesity [4]. The new life style that has been adopted by people in the region was the main cause of overweight and obesity as it had a negative impact on the dietary habits of the population in the region. [5]. Studies have demonstrated that people in the GCC region shifted from the consumption of whole grain products, fruits and vegetables to diets high in simple carbohydrates [6]. These dietary changes have been causing a boost in the prevalence of both overweight and obesity in the region. Overweight and obesity

were noticeable in all age groups but was more apparent among adolescents [7]. Due to the fact that college students are the mainly adolescents and because they tend to follow unhealthy eating patterns because of so many reasons, these changes lead to an increase in their body weight. The rates of body weight increase were higher in females comparing with males [8]. According to WHO, obesity is generally more common among women than men [1]. However, studies on college students revealed higher rates of obesity in males than in females [9]. In a study carried out on college students in Saudi Arabia, revealed that 30.6% of female students were either overweight or obese [10]. There were no studies regarding overweight and obesity prevalence among Omani university students. Therefore, the aim of this randomized pilot study is to determine the prevalence of overweight and obesity rates among A'Sharqiyah university students in Sultanate of Oman and to find out their body composition.

Materials and Methods

Sample and Design

This study was carried out at College of Applied Sciences at A'Sharqiyah University, in Sultanate of Oman during the cultural week that was held in the spring semester of 2015. A total number of 226 students aged 18-24 years participated in this study. All students who volunteered to participate in this study were Omani students from different colleges at the University. The data collection and anthropometric measurements lasted for 3 days during the activities of the cultural week.

Anthropometric measurements

Anthropometric measurements were taken including height, weight, body mass index (BMI), body fat percent (BF%), and visceral fat level (VFL). Weight, BMI, BF%, and VFL were determined by using a bioelectrical impedance analysis (BIA) machine: Omron body composition monitors (BF511, Omron Healthcare Co. Ltd., Kyoto, Japan). During the process of taking measurement, the individual was instructed to stand straight, with the head in the Frankfurt plane, feet together, knees straight, and heels, buttocks, and shoulder blades are in contact with the vertical surface of the scale [11]. In order to assess body weight status, Body mass index (BMI) was used .BMI is the ratio of weight (in kilogram) to height (in meter square). According to the National Institutes of Health (NIH), adults were classified based on their BMI to underweight (BMI < 18.5), normal (BMI = 18.5-24.9), overweight (BMI = 25-29.9), or obese (BMI ≥ 30). Furthermore, obesity was subdivided to tow grades: Grade 1 (BMI = 30-39.9) and Grade 2 or morbid obesity (BMI ≥ 40) [12]. Taking into consideration age and gender, the participants were classified as having low (BF% < 8), normal (BF% = 8-19.9), high (BF% = 20-24.9), or very high (BF% ≥ 25) body fat [13]. Visceral fat was also measured using the impedance machine and the students were classified as having normal (VFL = 1-9) or high (VFL = 10-30) visceral fat [14].

Statistical analysis

The Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 17 was used for data analysis. Results were expressed as means ± standard deviations. Differences were considered statistically significant at P value < 0.05.

Results

Students' characteristics

A total of 226 students participated in the study, consisting of 183 females (81 %) and 43 males (19 %). The average age of the total sample was 21.5 ± 1.6 years. The mean weight and height of the students were 57.8 ± 14.5 kg and 157.5 ± 6.9 cm respectively. The average BMI, BF% and VFL of the participants were respectively 23.3 ± 4.7, 29.9 ± 10.2 and 7.3 ± 1.4 as demonstrated in Table 1.

The study has revealed that 53 female students (29%) were underweight (BMI < 18.5) and only 3 male students (6%) were underweight. Females also had 75 students (41%) with normal body weight whereas only 13 male student or (31%) were in the same category (BMI 18.5-24.9). Overweight (BMI 24.9-29.9) prevalence was higher in males comparing with females. Overweigh in females and males were 49 students (27%) and 17 students (39%) respectively and the difference was significant (p < 0.05). Male students have also showed higher rates of obesity (BMI 30-39.9) and morbid obesity (BMI > 40) when compared with their female counterparts. Only 6

(3%) female students were obese among them 2 (1%) female students had morbid obesity (BMI > 40) whereas 10 (24%) male students were obese and 3 (8%) male students had morbid obesity as shown in Table 2.

Characteristic	Means ± SD*
Age (years)	21.5 ± 1.6
Weight (kg)	57.8 ± 14.5
Height (cm)	157.5 ± 6.9
BMI (kg/m^2)	23.3 ± 4.7
BF Percentage	29.9 ± 10.2
VFL Percentage	7.3 ± 1.4

Table 1: *Characteristics of the participants (means ± SD*).*
Standard deviation.

BMI	Females		Males		Both genders	
	Mean ± SD	Number (%)	Mean ± SD**	Number (%)	Mean ± SD**	Number (%)
< 18.5	16.23 ± 1.61	53 (29)*	17.65 ± 1.11	3 (6)	16.94 ±1.3	56 (24.8)
18.5-24.9	19.89 ± 3.33	75 (41)*	20.55 ± 3.65	13 (31)	20.22 ± 3.48	88 (38.9)
25-29.9	25.26 ± 4.11	49 (27)*	27.32 ± 2.61*	17 (39)	26.29 ±3.33	66 (29.2)
30- 39.9	30.34 ± 8.12	4 (2)	32.17 ± 5.32*	7 (16)*	31.26 ± 6.67	11 (4.9)
> 40	40.56 ± 4.23	2 (1)	44.21 ± 6.38*	3 (8)*	42.39 ± 5.43	5 (2.2)
Total		183 (100)		43(100)		226 (100)

Table 2: *BMI distribution among male and female students.*
Significant difference p < 0.05.
**Standard deviation.*

When comparing male students with female students, the study has demonstrated that males had higher BMI than females. Table 3 has shown the average BMI of males was 24.5 ± 4.7 and BMI of females was 22.2 ± 2.1 and the difference was statistically significant at (p < 0.0.5). There was also a significant difference between male and female students with regard to their weight and height average. Male students had also higher weight and height average. The average weight for male students was 65.3 ± 14.5 kg and for female student was 50.4 ± 12.7kg (p < 0.05). Female students had higher body fat percentage (BF%) than male student. Females had an average of BF% 30 ± 9.9 whereas males had 28.9 ± 9.6 and the difference was statistically significant (p < 0.05). On the contrary, male students had higher values of visceral body fat than female students. Males had 8 ± 1.4 and females had 6.5 ± 1.1. The results are shown in Table 3.

	Females (n = 183)	Males (n = 43)
Age	20 ± 1.2	23 ± 1.6
BMI	22.2 ± 2.1	24.5 ± 4.7*
Weight (Kg)	50.4 ± 12.7	65.3 ± 14.5 *
Height (Cm)	152.8 ± 7.4	162.3 ± 6.9*
BF %	30 ± 9.9*	28.9 ± 9.6
VFL %	6.5 ± 1.1	8 ± 1.4*

Table 3: *Age, BMI, Weight, Height, BF% and VFL% comparison among female and male students.*
Significant difference p < 0.05.

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Female students had higher percentage of low and normal body fat content when compared with male students. 29 (16%) and 112 (61%) of the female students had low and normal body fat percentage respectively. Whereas one male student (3%) and 15 males students (35%) had low and normal body fat content respectively. More male students had high and very high fat percentage than female students. 18 male students (43%) had fat content 20-24.9% compared with only 18 females students (10%) had the same body fat percentage. More male students had also very high fat percentage than female students. 43 male students or 19% had very high fat percentge compared with 18b female students or 10% had the same fat content. The difference was statistically significant (p < 0.05). The results are shown in Table 4.

BF%	Females		Males		Both Geneders	
	Number (%)	Mean ± SD**	Number (%)	Mean ± SD**	Number (%)	Mean ± SD**
Low < 8	29* (16)	6.2 ± 1.4	1 (3)	6.6 ± 1.5	30 (13.3)	6.3 ± 1.5
Normal 8-19.9	112* (61)	14.7 ± 3.6	15 (35)	15.8 ±3.3	127 (56.2)	15.4 ± 3.5
High 20-24.9	24 (13)	22.1 ± 2.4	18 * (43)	22.9 ± 2.1	42 (18.6)	22.5 ± 2.3
Very high ≥ 25	18 (10)	31.4 ± 4.4	9 * (19)	32.6 ± 5.1	27 (11.9)	32.1 ± 4.7
Total	183 (100)		43 (100)		226 (100)	

Table 4: Body fat (%) among females and male students.

Significant difference p < 0.05.

**Standard Deviation.*

The studey has shown that more female students had normal visceral fat percentage compared with their male counterparts. 112 female students (61%) and 16 male students (37%) had normal VFL% however, more male students 27 (63%) had high (10-30) VFL % compared with 71 femal students or 39%. The results are shown in Table 5.

VFL %	Females		Males		Both Genders	
	Number (%)	Mean ± SD**	Number (%)	Mean ± SD**	Number (%)	Mean ± SD**
Normal (1-9)	112 (61) *	2.4 ± 1.7	16 (37)	2.8 ± 2.1	128 (56.6)	2.5 ± 1.6
High (10-30)	71(39)	12.5 ± 3.5	27 (63) *	19.3 ± 6.3	98 (43.4)	15.9 ±4.9
Total	183 (100)		43 (100)		226 (100)	

Table 5: Visceral Fat Levels (%) among females and male students.

* Significant difference p < 0.05.*

** Standard Deviation.*

Higher visceral fat levels were noticed only in students who had very high body fat percentage. 201 students (89.1%) had normal VFL% although some of them had high body fat percentage. Only 25 students or (10.9%) who had very high body fat percentage had very high visceral fat level. Table 6 explained the result obtained from this study.

Underweight and normal weight students had normal visceral fat levels. Overweight students were split between normal VFL (29 students or 12.9%) and high VFL (16 students or 6.9%). All obese students had high visceral fat levels (43 students or 19.2 %). The data are shown in Table 7.

BF Percentage	VFL %		Total
	Normal (1-9)	High (10-30)	
Low (< 8)	(n = 28) 12.4*	0	(n = 28) 12.4
Normal (8-19.9)	(n = 104) 46.2*	0	(n = 104) 46.2
High (20-24.9)	(n = 35) 15.6*	0	(n = 35) 15.6
Very High (≥25)	(n = 34) 14.9*	(n = 25) 10.9	(n = 59) 25.8
Total	(n = 201) 89.1*	(n = 25) 10.9	(n = 226) 100

Table 6: The relationship between body fat (%) and visceral fat levels among students.
Significant difference p < 0.05.

BMI (kg/m^2)	VFL %		Total
	Normal (1-9)	High (10-30)	
< 18.5	(n = 30) 13.1%*	0	(n = 30) 13.1%
18.5-24.9	(n = 108) 47.9 %*	0	(n = 108) 47.9%
25-29.9	(n = 29) 12.9%*	(n = 16) 6.9%	(n = 45) 19.8%
≥ 30	0	(n = 43) 19.2%*	(n = 43) 19.2%
Total	(n = 167) 73.9 %	(n = 59) 26.1 %	(n = 226) 100%

Table 7: The relationship between BMI and visceral fat levels among students.
Significant difference p < 0.05.

Discussion

The purpose of this study was to assess body size and composition and to find out the prevalence of overweight and obesity among A'sharqiyah university students in Sultanate of Oman. The current data demonstrated that 56 students (24.8%) were underweight. 29% of female students and 6 % of male students were underweight. The majority of the students, 88 students (34.9%) had normal weight and more females had normal weight compared with male students. 41% of the females and 31 % of the males had normal body weigh which is considered a good indicator for their health status. There were 66 students (29.2%) who were overweight and here also more females were overweight that males. 7.1 % of the students were obese. These findings were consistent with the results of similar studies in other Middle East and some Western countries. In Lebanon, the prevalence of overweight and obesity among male college students was 37.5% and 12.5%, respectively [16]. In Kuwait the corresponding percentages were 32% and 8.9% [17], while in the United States and the United Arab Emirates overweight and obese accounted for about 35% of the male college students [18]. In contrast, only 7.9% of Iranian male college students were above the normal body weight [19]. That rate decreased to 2.9% among Chinese college students with a percentage of obesity as low as 0.4 [20].

A study conducted by the author n Syria in 2013, found that the prevalence of overweight and obesity among university students was 47% (21). This is corresponding with the results obtained from this study. Despite the small sample sizes and the fact that self reported height and weight were used in some of the above mentioned studies, their findings still reflect differences in the severity of obesity problems among young adults across countries. Recently, obesity has been defined in terms of adiposity, rather than the relation of body weight to height and, in turn, body composition became a more desirable determinant of obesity than BMI [22]. That goes well with our results which confirmed that 29.2% of students are overweight and 7.1 are obese according to their BMI. However, 30.5% of the students were considered obese according to their BF%. The present work also demonstrated that the total body fat exceeded its normal values in 43.3% of the participants which is considered very alarming. Compared to those of similar studies, our results also revealed that normal, overweight and obese A'Sharqiyah university students have on average more fat in their bodies than their

Lebanese fellows [23], and their average BF% was higher than that in USA male college students of different ethnicities [24]. Moreover statistical analysis of the current data showed linear relationship between BF% and VFL among students. Health threatening values of VFL ($\geq$ 10) were only found in subjects with very high BF% ($\geq$ 25) and showed up in all obese ht students. In literature, visceral fat has been closely linked to non-communicable diseases such as type 2 Diabetes Mellitus and coronary heart disease [25]. Therefore, urgent dietary management should be going hand in hand with regular medical follow up to overcome or, at least, minimize the risk of the above mentioned diseases among students(with high VFL) at A'Sharqiyah University [26].

Conclusions

The results of this study have deomnstarted that rates of overweight and obesity among University students in Sultanate of Oman are still lower than rated in surrounding countries but they are on the rise. The majority of the students possess normal VFL. High VFL's were encountered only in the extremely overweight and obese participants males and females alike and, thus, can be used as a warning indicator for life threatening health problems associated with obesity such as diabetes and heart attack. F overweight and obesity and the shift in body composition can be attributed to increase in the rates of skipping meals together with low vegetables and fruits intake. The university and college campuses represent a good opportunity for promoting nutritional education of a large number of students. Our findings suggest the need for strategies and coordinated efforts at all levels (family, university, community and government) to reduce the tendency of overweight and obesity among college students and to promote healthy eating habits among Omanu youths.

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