

Obesity among Female Intermediate Nursing Students of Health Science College in Dammam City, Saudi Arabia: Prevalence and Associated Factors

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ABSTRACT

Background: Obesity is a public health problem that has raised concern worldwide in both developing and developed countries. **Objectives:** To determine the prevalence of obesity among female intermediate nursing students of health science collage in Dammam city, Saudi Arabia by using body mass index (BMI) and waist to hip ratio (WHR) and to find the possible association with some dietary and lifestyle habits. **Subjects and Methods:** A cross-sectional epidemiological study conducted at Health Science Collage in Dammam among 260 female intermediate nursing students. Data was collected using an interviewer-administered questionnaire, which included socio-demographic characteristics, dietary and lifestyle habits of university students. Physical measurements were done using the BMI and WHR. **Results:** About 71.5% of university students were not sharing family members in their meals, 35.7% had snacks as their main pattern of eating, and 46.9% were eating while watching television. A high percentage (82.7%) and 73.1% of the students were consuming fast foods 1-6 times per week and drinking soft drinks ≥ 7 times per week, respectively. Also, 9.6%, 10.0% and 11.5% of them were not consuming fruits, vegetables, and dairy products respectively. BMI showed that about half (51.5%) of the students had normal weight, 23.1% were overweight, 3.8% were obese, 2.3% had severe obesity, and 19.2% were underweight. About one third (33.1%) of students had abnormally unacceptable WHR. it was found that 83.6% of those with normal weight by BMI had acceptable WHR, and 81.6% of those who were overweight by BMI had unacceptable WHR. Family history of obesity was the only factor that was found to be independently and significantly associated with obesity (OR= 1.381, 95% CI=1.41-2.266), $P<0.05$. **Conclusion:** A high prevalence of obesity as estimated by both BMI and WHR and unhealthy dietary habits was reported. It is recommended to have intervention programs to raise the awareness of adolescents about obesity and screening for obesity should be performed by family physicians during their routine daily activity.

Keywords: Obesity, University students, Body mass index, Waist to Hip Ratio, Saudi Arabia.

Sabra AA. Obesity among female intermediate nursing students of health science college in Dammam city, Saudi Arabia: prevalence and associated factors. *Canad J Clin Nutr* 2014; 2 (1): 29-45

DOI: <http://dx.doi.org/10.14206/canad.j.clin.nutr.2014.01.04>

INTRODUCTION

Obesity is a public health problem that has raised concern worldwide. According to the World Health Organization (WHO), there will be about 2.3 billion overweight people aged 15 years and above, and over 700 million obese people worldwide in the year 2015 (1). Several studies showed that overweight and obesity are major causes of comorbidities, including type II diabetes, cardiovascular diseases, various cancers and other health problems, which can lead to further morbidity and mortality (2, 3). The high total cost (direct and indirect) of overweight and obesity represents a relative economic burden on gross domestic product in most world countries (4-7). The prevalence of obesity has doubled over the last decades in several developing countries as well as in the USA and most Western countries. Its increasing prevalence has compelled the WHO to include obesity on the list of the essential health problems in the world (8).

In gulf countries, the prevalence of obesity and overweight is increasing in both adults and children (9-11). In Kuwait, the prevalence of overweight and obesity increased by 20.6% and 15.4% and by 13.7 and 8.4% among men and women, respectively (9). In Qatar, it is estimated that 29.3% of females and 17.4% of males are obese (10). In Bahrain, the prevalence of obesity was more significant among females, 32%, than males, 25%, throughout all age groups (11). In Kingdom of Saudi Arabia (KSA), the increasing problem of obesity has been reported in 2005 with an overall obesity prevalence of 35.5% (12). Obesity and overweight are increasing, in the total Saudi population the prevalence of overweight was 27.23% and 25.20% in the males and females respectively, while the prevalence of obesity was 13.05% and 20.26% in the males and females respectively (13). In the eastern province of Saudi Arabia (2008), the overall prevalence of obesity was 43.8%, while 35.1% were overweight (14). Prevalence of obesity among Saudi adolescents in Eastern Saudi Arabia was higher in male than female students (19.3% versus 11.8%) while a higher proportion of female students than males were overweight (17.2% versus 10.2%) (15).

Numerous studies have compared the appropriateness of various anthropometric indices for assessing obesity and predicting obesity-related health risks, including BMI, waist-to-hip ratio (WHR), waist circumference (WC), and waist to height ratio (WHtR) (16-20). However, there is no agreement on which index should be applied universally for defining obesity. WHO defined overweight as a BMI of 25 - 29.9 kg/m² and obesity as a BMI of ≥ 30 kg/m² (21). BMI provides the most useful population-level measure of overweight and obesity as it is the same for both sexes and for all ages of adults (1). WHR was shown to be a good predictor of health risk (22), and a high WHR (> 0.9 in men and > 0.8 in women) indicates abdominal fat accumulation (23, 24). The aim of present study was to determine the prevalence of obesity among female intermediate

nursing students of health science collage in Dammam city, KSA by using BMI and WHR and to find the possible association with some dietary and lifestyle habits.

SUBJECTS AND METHODS

Study Design

A cross-sectional epidemiological study was conducted at Health Science Collage in Dammam, Eastern Province, Saudi Arabia during the year 2010-2011. The target population consisted of all the 320 female intermediate nursing students (levels 1 to 3) registered during the year of study. Interns were excluded because they practice outside the college and were not accessible during the time of the study. The response rate was 81.3%, where a total of 260 students accept to be included in the study. Necessary permissions to conduct the study were obtained from concerned university authorities. The objectives of the study were explained to the participating students after which they gave their informed consent. Confidentiality of the information was strictly adhered to by assuring the attendees that no details about their status will be released and data will be only used for research purpose.

Data was collected using the following tools:

1-An interviewer-administered questionnaire included the following sections:

- a) Socio-demographic variables: age, nationality, marital status, parents' education, and family income.
- b) Dietary and lifestyle habits: sharing family members in meals, eating while watching television, computer or using mobile phone, pattern of eating, fast food consumption, drinking carbonated drinks, and type of fat used for family cooking and the pattern of consuming dairy products, vegetables and fruits.

2-Physical Measurements:

- a) Body Mass Index: Weight and height were measured using a digital physician weighing scale model SECA 708 and a height measuring rod model SECA 220 attached to the digital scale. The scales were previously checked for reliability. Practical demonstrations were conducted to ensure accuracy of measurements. Weight was measured in kilograms (kg) with students barefooted and wearing their usual light clothes. Weight was recorded to the nearest 100 gm. Height was measured in centimeters (cm) to the nearest 0.5 cm. Obesity was defined by the body mass index (BMI), weight in kilograms divided by the square of height in meter. It was classified as: underweight (BMI <18.5 kg/m²); normal (BMI=18.5-24.99 kg/m²); overweight (BMI=25-29.99 kg/m²); obese (BMI= 30-34.99 kg/m²); and severe obesity (BMI>35 kg/m²).⁽²⁵⁾For the ease of statistical analysis, associations and interpretation of the results, BMI classification was categorized into 3 groups: underweight (BMI <18.5 kg/m²); normal

(BMI=18.5-24.99 kg/m²); and overweight (includes overweight, obese, and severe obese) i.e.(BMI>25 kg/m²).

b) Waist-to-Hip Ratio: The waist is defined as the smallest circumference between the nipples and top of the thighs, the hip is the largest circumference between the waist and the knees. The waist was measured with the student standing with his abdomen relaxed by measuring the narrowest point at his waist, or if this is not apparent, at the level of the iliac crest. The hip measurement was taken over minimal clothing, and is at the level of the greatest protrusion of the buttock). The waist-to-hip ratio was calculated by dividing waist by hip measurements and a value less than 0.80 was considered acceptable (22-24). Students with positive risk factors were given health education and advised to consult their health care providers.

Statistical Analysis

Data collected were checked for accuracy and completeness and were coded and entered into the Statistical Package for Social Sciences (SPSS) software version 16. Descriptive statistics for all studied variables and Chi-Squared test were used. Logistic regression analysis was used to find the association between the characteristics of the university students (Independent variables) and obesity (depression and anxiety) (Dependent variable), and *P*-value level <0.05 was considered significant throughout the study.

RESULTS

Table 1 shows the socio-demographic characteristics of the female nursing students. It was evident that 48.5% of the students were in the third year, 57.7% in the age group 20-22 years, 63.8% single and 96.6% were Saudis. Regarding the family income, half of the students (50.0%) had family income 5000-10,000 Saudi Riyals and 69.2% were living in apartments. Table 2 demonstrated the nutritional habits of the female nursing students. About 71.5% of them were not sharing family members in their meals and 35.7% had snacks as their main pattern of eating. It was clear that 46.9% and 11.5% of them were eating while watching television and using computer or mobile phone, respectively.

A high percentage 82.7% and 73.1% of the students were consuming fast foods 1-6 times per week and drinking soft drinks ≥ 7 times per week, respectively. About half (46.5%) of the students reported the use of unsaturated fats for family cooking, while almost a quarter of them (25.0%) does not know the type of fats (oils) used for their family cooking. More than half of students consumed fruits and dairy products (51.9%) and vegetables (55.0%) 1-6 times per week. However, 9.6%, 10.0% and 11.5% of them were not consuming fruits, vegetables, and dairy products respectively, Table 2. According to Table 3, BMI showed that about half (51.5%) of the students had normal weight, 23.1% were overweight, 3.8% were obese, 2.3% had severe obesity, and 19.2% were

underweight. About one third (33.1%) of students had abnormally unacceptable Waist-to-Hip Ratio.

According to Table 4, It was found that there is a statistical significant association between BMI of the students and their age ($P < 0.05$), where overweight was demonstrated in 20% of students in the age group 18-<20 years, 32.0% in the age group between 20-<22 years and in more than half (55.6%) in the age group ≥ 22 years. Moreover it was found that overweight was recorded in 37.0%, 25.0%, and 23.2% of the students whom fathers had primary, illiterate, secondary and university education, respectively with a statistical significant association ($P < 0.05$). By studying the association between BMI of university students with other students' characteristics (year of study, nationality, marital status, and monthly income), it was found that there was no statistically significant association. Table 5 demonstrated the association between nutritional Habits and BMI of female nursing students. It was found that 31.1%, 42.6%, and 26.2% of the students who was eating while watching television were overweight, normal weight, and underweight., respectively with a statistical significant association, $P < 0.001$.

By studying the association between BMI of university students with their nutritional habits (sharing family members in their meals, using computer or mobile phone while eating, pattern of eating, fast food, soft drink consumption, fruit, vegetable, and dairy product consumption, it was found that there was no statistically significant association. By studying the association between BMI and WHR of female university students (Table 6), it was found that 83.6% of those with normal weight by BMI had acceptable WHR, and 81.6% of those who were overweight by BMI had unacceptable WHR. The statistical difference between groups was found to be statistically significant ($P = 0.000$). Table 7 represents the results of the logistic regression analysis of significant factors predicting occurrence of obesity by BMI among female nursing students. Family history of obesity was the only factor that was found to be independently and significantly associated with obesity (OR= 1.381, 95% CI=1.41-2.266), $P < 0.05$.

DISCUSSION

Obesity is a global health problem in both developing and developed countries (1, 8). The prevalence of overweight and obesity, severe obesity in the present study (23.1%, 3.8% and 2.3% respectively). A study done in Al-Khobar city, KSA among male secondary school students aged 14-19 years showed that 14.1% were overweight and 16.7% were obese (15). A study done by Sabra *et al.*, in 2007 among male university students in Dammam city showed that The prevalence of overweight and obesity was 24.5% and 22.6% respectively (26). In 2010 A high prevalence of overweight and obesity was 47.9% was reported among Saudi female university students in Riyadh, KSA (27). A National Survey of the prevalence of overweight and obesity in Saudi population aged

15-20 years, a prevalence of 12% and 7% for males (28). On the other hand, similar prevalence was reported in Jeddah, KSA among students of both sexes, with a mean age of 15.3 years (29).

The etiology of obesity is multifactorial, involving complex interactions among the genetic background, hormones and different social and environmental factors, such as sedentary lifestyle and unhealthy dietary habits (8). In the present study, the association between BMI of university students with other students' characteristics (year of study, nationality, marital status, and monthly income), it was found that there was no statistically significant association. The increased risk of obesity among married females was reported by other researchers (27, 30). Low income families may face lack of safe places for physical activity and lack of consistent access to healthful food choices, particularly fruits and vegetables and they have a higher intake of total and saturated fat (31). Family income in the present study was not found to be associated with the occurrence of obesity. This is not consistent with results obtained from a study conducted in USA among older non-Hispanic white children where children in families with low income were significantly more likely to be overweight than children in families with high income (32).

The current study showed that 71.5% of them were not sharing family members in their meals and 35.7% had snacks as their main pattern of eating. Absence of family meals is associated with lower fruit and vegetable consumption as well as consumption of more fried food and carbonated beverages (31). A Canadian study showed that children who ate supper together with their family 3 or more times a week were at decreased risk of obesity (33). AL Qauhiz study showed that 41.2% of participants skipped breakfast. Snacking was reported by 98.9% of university students (27). There are a variety of environmental factors that may be contributing to obesity such as increased consumption of soft drinks and intake of fast food (34). Soft drink intake has been associated with the epidemic of obesity (35). It has been found that children who consume these drinks have a higher energy intake and are more likely to become overweight in the present study, a high percentage 82.7% and 73.1% of the students were consuming fast foods 1-6 times per week and drinking soft drinks ≥ 7 times per week, respectively. AL Qauhiz study in KSA showed junk foods were the main items in snacking, coffee, aerated beverages, chocolate, pastry and potato chips were all consumed in abundance, in addition, majority of students ate till fullness (27).

A high proportion of university students in the present study were consuming fast foods which contain a high amount of calories and saturated fats. This finding was similar to a study of food consumption pattern in Iran which revealed that the contribution of saturated fatty acids to dietary energy exceeded the recommended limits (36). The present study suggested that regular fruits and vegetables consumption by students was unsatisfactory. This is in agreement with a study conducted in New Orleans, USA among

high school students, showed that the consumption levels of adolescents with regard to fruits and vegetables were low (37).

A study in KSA showed that consumption of fruits and vegetables was reported by less than 10% of female university students, in a Chinese study that showed a 2.9% prevalence of overweight and obesity among university students, consumption of vegetables and fruit twice per day was reported among 80% of the university students (38). Numerous studies have shown that sedentary behaviors like watching TV and playing computer games are associated with increased prevalence of obesity (39). Children and adolescents who watch more than 2 hours/day of TV or play video games are at risk of being obese (40). In the current study, eating while watching the television was reported by 46.9% of the university students, and 31.1%, 42.6%, and 26.2% of the students who was eating while watching television were overweight, normal weight, and underweight., respectively with a statistical significant association ($P < 0.001$).

In the current study, family history of obesity was the only factor that was found to be independently and significantly associated with obesity (OR= 1.381, 95% CI=1.41-2.266). Children and adolescents who have parents that are obese are more likely to also be obese (40). Similar results were obtained from a study conducted in Washington State (USA) where parental obesity more than doubles the risk of adult obesity among both obese and non-obese children aged 10 years (41). Moreover, another study showed that maternal obesity was the most significant predictor of childhood obesity (OR=3.62) (42).

CONCLUSION

The results of the present study demonstrated a high prevalence of obesity as estimated by both BMI and WHR. Unhealthy dietary habits like consumption of fast food, soft drinks, multiple snacks, low fruit and vegetable consumption, as well as eating while watching TV were reported in high percentage among female nursing students. Family history of obesity was the only predicting factor for the occurrence of obesity as measured by BMI. From the results of the present study, it is recommended to have intervention programs to raise the awareness of adolescents about obesity and its comorbidity and to encourage them to adopt healthy dietary behavior. Screening for obesity should be performed by family physicians during their routine daily activity. This is best achieved by integrating obesity prevention and control program within the current Primary health care services.

ACKNOWLEDGMENT

The author deeply extends his appreciation to Bashayer Al-Awam and Farah El Habash for their dedicated effort in data collection.

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Table 1: Socio-demographic characteristics of female nursing students

Characters	Nursing students (n=260)	
	No.	%
1-Academic Year:		
▪ First year	34	13.0
▪ Second year	100	38.5
▪ Third year	126	48.5
2-Nationality:		
▪ Saudi	252	96.9
▪ Non-Saudi	8	3.1
3-Marital Status:		
▪ Single	166	63.8
▪ Married	92	35.4
▪ Divorced	2	0.8
4-Age in Years:		
▪ 18-<20 years	92	35.4
▪ 20-<22 years	150	57.7
▪ ≥22 years	18	6.9
5-Father's Education:		
▪ Illiterate or read and write	32	12.3
▪ Primary & Preparatory	108	41.5
▪ Secondary & Diploma	60	23.1
▪ University& Higher studies	60	23.1
6-Mother's Education:		
▪ Illiterate or read and write	46	17.7
▪ Primary & Preparatory	140	53.8
▪ Secondary & Diploma	48	18.5
▪ University& Higher studies	26	10.0
7-Family Income in Saudi Riyals (S.R.):		
▪ < 5000 S.R	46	17.7
▪ 5000-<10000 S.R.	130	50.0
▪ ≥ 10000 S.R.	84	32.3
8-Housing:		
▪ Apartment	180	69.2
▪ Villa	44	16.9
▪ Villa with garden	36	13.9

Table 2: Nutritional habits of female nursing students

Characters	Nursing students (n=260)	
	No.	%
1-Sharing family members in meals		
▪ Yes	74	28.5
▪ No	186	71.5
2-Eating while watching television		
▪ Yes	122	46.9
▪ No	138	53.1
3-Eating while using the computer or mobile:		
▪ Yes	30	11.5
▪ No	178	68.5
▪ Sometimes	52	20.0
4-Pattern of eating per day:		
▪ Regular Meals	140	53.9
▪ Skip Meals	27	10.4
▪ Snacks	93	35.7
5-Fast food consumption per week:		
▪ Don't consume	30	11.5
▪ 1-6 times	215	82.7
▪ ≥ 7 times	15	5.8
6-Soft drinks consumption per week		
▪ Don't consume	26	10.0
▪ 1-6 times	44	16.9
▪ ≥ 7 times	190	73.1
7-Types of fats used for family cooking:		
▪ Unsaturated	121	46.5
▪ Saturated	14	5.4
▪ Combined	60	23.1
▪ Don't know	65	25.0
8-Fruits consumption per week:		
▪ Don't consume	25	9.6
▪ 1-6 times	135	51.9
▪ ≥ 7 times	100	38.5
9-Vegetables consumption per week:		
▪ Don't consume	26	10.0
▪ 1-6 times	143	55.0
▪ ≥ 7 times	91	35.0
10-Dairy product consumption per week:		
▪ Don't consume	30	11.5
▪ 1-6 times	135	51.9
▪ ≥ 7 times	95	36.6

Table 3: Physical measurements and weight perception of female nursing students

Measurements	Nursing students (n=260)	
	No.	%
1-Body Mass Index (BMI):		
▪ Underweight (<18.5)	50	19.2
▪ Normal weight (18.5-24.99)	134	51.5
▪ Overweight (25-29.99)	60	23.1
▪ Obese (30-34.99)	10	3.8
▪ Severe obese (≥ 35)	6	2.3
2-Body Mass Index (BMI):		
▪ Underweight (<18.5)	50	19.2
▪ Normal weight (18.5-24.99)	134	51.5
▪ Overweight (≥ 25)	76	29.2
3-Waist-to-Hip Ratio:		
▪ Acceptable (<0.8)	174	66.9
▪ Unacceptable (>0.8)	86	33.1

Table 4: Association between socio-demographic characters and BMI of female nursing students

Variables	Body Mass Index								χ^2 -Test (P Value)
	Underweight		Normal Weight		Overweight		Total		
	No.	%	No.	%	No.	%	No.	%	
1-Age in Years:									
▪ 18-<20 years	24	26.1	50	54.3	18	19.6	92	100.0	15.75 (0.015)
▪ 20-<22 years	26	17.3	76	50.7	48	32.0	150	100.0	
▪ ≥22 years	0	0.0	8	44.4	10	55.6	18	100.0	
2-Father's Education:									
▪ Illiterate or read and write	2	6.2	22	68.8	8	25.0	32	100.0	13.60 (0.034)
▪ Primary & Preparatory	16	14.8	52	48.1	40	37.0	108	100.0	
▪ Secondary & Diploma	17	28.3	29	48.3	14	23.2	60	100.0	
▪ University & Higher studies	15	20.0	31	51.7	14	23.2	60	100.0	
3-Mother's Education:									
▪ Illiterate or read and write	2	4.3	28	60.9	16	34.8	46	100.0	13.20 (0.040)
▪ Primary & Preparatory	32	22.9	66	47.1	42	30.0	140	100.0	
▪ Secondary & Diploma	8	16.7	30	62.5	10	20.8	48	100.0	
▪ University & Higher studies	8	30.8	10	38.5	8	30.8	26	100.0	

Table 5: Association between nutritional Habits and BMI of study subjects

Variables	Body Mass Index								χ^2 -Test (P Value)
	Underweight		Normal weight		Overweight		Total		
	No.	%	No.	%	No.	%	No.	%	
1-Eating while watching Television:									
▪ Yes	32	26.2	52	42.6	38	31.1	122	100.0	9.67 (0.008)
▪ No	18	13.0	82	59.4	38	27.5	138	100.0	
2-Fats used in cooking:									
▪ Unsaturated	32	26.4	51	42.1	38	31.4	121	100.0	13.48 (0.036)
▪ Saturated	4	28.6	6	42.9	4	28.6	14	100.0	
▪ Mixed	7	11.7	38	63.3	15	25.0	60	100.0	
▪ Don't know	7	10.8	39	60.0	19	29.2	65	100.0	

Table 6: Association between body mass index and waist hip ratio among study subjects

BMI	Waist-to-Hip Ratio				Total		χ^2 -Test (P Value)
	Unacceptable		Acceptable				
	No.	%	No.	%	No.	%	
Underweight	2	4.0	48	96.0	50	100.0	116.66 (P =0.000)
Normal Weight	22	16.4	112	83.6	134	100.0	
Overweight	62	81.6	14	18.4	76	100.0	

Table 7: Logistic regression analysis of significant factors predicting obesity by BMI among female nursing students

Variables	B coefficient	S.E. of B	P- Value	O.R.	95 % Confidence interval of O.R.	
					Lower	Upper
Family history of obesity	0.323	0.121	0.008	1.381	1.41	2.266
Constant	0.433	3.017	-	-	-	-
Model $X^2 = 25.835$, $P < 0.05$						