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A cross-sectional study on prevalence of obesity and its association with dietary habits among college students in Abha, Saudi Arabia

Mana M. Alshahrani¹, Sriram Chandramohan²*

¹King Faisal Medical City, Abha, Kingdom of Saudi Arabia

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*Correspondence:

Dr. Sriram Chandramohan, E-mail: drsrirammd@gmail.com

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ABSTRACT

Background: During the past few years there was a western influence in the kingdom of Saudi Arabia and as a result of it the eating habits among the male college students had rapidly changed which also increased the prevalence rate of overweight and obesity. Therefore the objectives of the study were 1) To determine the prevalence of overweight and obesity in a sample of male college students in Abha, Saudi Arabia. 2) To determine the relationship between the Student's body weight and their eating habits.

Methods: A cross-Sectional study was done among 445 male college students from king Khalid University, Abha Saudi Arabia. Study participants were selected randomly and self-administered questionnaire was used to collect the data. Data was analyzed by using the statistical package for social sciences (SPSS Inc. version 16.) and expressed in percentages.

Results: The study found that 28% and 20 % of students were overweight and obese. Daily intake of snacks and lack of consumption of vegetable and fruits were found to be the common dietary habits among the male college students. Majority of the students were aware about the balanced nutrition and it was positively correlated with the normal body weight.

Conclusions: The current study suggest involvement of college Administration and family members will further reduce the burden of overweight and obesity among college students in the nation.

Keywords: Dietary habits, Obesity, College students, Abha, Saudi Arabia

INTRODUCTION

Obesity is the major public health problem across the world. Obesity is defined as the abnormal and extensive accumulation of fat in the adipose tissue which has a severe adverse effect. The Prevalence of obesity has increased over the last years in both developed and developing countries and it has become a pandemic issue and fifth leading cause of death in the entire world. Healthy diets play a very important role in maintaining a

good physical and mental health and also help to prevent obesity.³ Obesity is a major predisposing factor for type II diabetes, dyslipidemia, hypertension, cardiovascular diseases, metabolic syndrome and certain cancers.⁴⁻⁷ World Health Organization stated approximately there were 400 million adults who were obese in 2005 in which the rates are higher among women.⁸ The prevalence of obesity had increased in the Arabian Gulf region because of the economic rise happened between the year 1970 and 1980 and it was really alarming all the national health authorities.⁹⁻¹³ As a result of westernization and

²Department of Public Health, College of Health Sciences, Saudi Electronic University, Guraiger District, Abha, Kingdom of Saudi Arabia

modernization the dietary habits has changed among the population in the kingdom of Saudi Arabia and it had become the main cause for the sudden rise in the prevalence of overweight and obesity. 14 The world health organization also found that the prevalence of overweight and obesity in males and females between the age group of 18-21 years in the kingdom of Saudi Arabia is 23% and 30% respectively.8 Sudden transitions from school life to the college life changes the dietary pattern among the college students which causes overweight and obesity.15 The previous study done by Rasheed et al reported that the prevalence of either overweight or obesity among the female health college students was 30.6 %. Therefore the current study aims at assessing the prevalence of overweight and obesity among the male college students and any association between their body weight and eating habits.

METHODS

A cross-sectional study was conducted in a King Khalid University Male campus, Abha kingdom of Saudi Arabia during the spring semester of 2016. Four hundred and forty five students were participated in the study. The students were randomly selected from the university register. All the students were Saudi Arabian and the students were informed about the study and the written informed consent was obtained from the students. Students who gave consent were included in the study and those who did not give consent and physically challenged were excluded. Ethical permission was obtained from the research ethics committee, college of medicine, King Khalid University, Abha, Kingdom of Saudi Arabia.

Data collection

A self-reported questionnaire and anthropometric measurements were used to collect the required data. The questionnaire includes eating, drinking and smoking habits of college students, and the anthropometric measurements includes height, weight and Body Mass Index (BMI). The students were informed about the study and were given instructions on how to fill the questionnaire completely.

Anthropometric measurements

Anthropometric measurements were reported according to the standard criteria and procedures. Body weight was measured by using the beam balance scale and Body height was taken by the stadia-meter. Body mass index (BMI) was calculated by using the formula BM= (Kg/m^2) = Body weight (Kg) / Body height (m^2) and the body mass index (BMI) was used to categorize the weight status of the students in our study. According to the National Institutes of Health, adults were classified based on their BMI as Normal (BMI = 18.5-24.9), overweight (BMI = 25-29.9) and obese $(BMI = \ge 30)$.

Data analysis

The data analysis was done by using the statistical package for social sciences (SPSS Inc. version 16). Results were presented as means \pm standard deviations.

RESULTS

Student's characteristics

A total of 445 male students with an average age of 24.2 \pm 5.3 years participated in the current study. The mean height and weight of the students were 77.2 8 \pm 30.27 kg and 170.79 \pm 8.97 cm. The average BMI of the Participants was 26.6 \pm 5.28 (Table 1).

Table 1: Characteristic of participants (means \pm SD).

Variables	Total
Number of students	445
Age (years)	24.2 ± 5.3
Height (cm)	170.79 ± 8.97
Weight (kg)	$77.2\ 8\pm30.27$
BMI (kg/m2	26.6 ± 5.28

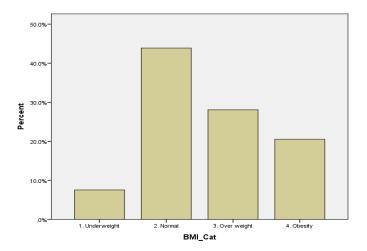


Figure 1: Prevalence of obesity based on body mass index (BMI) categories.

Anthropometry

The measurements of Body Mass Index (BMI) in the study shows around 45% of students are normal weight, 28% of students are overweight and 20% of them are obese. Approximately 7% of the students are underweight.

Eating habits

The study results shows that majority of the students have irregular meals consumption even though around 40 % of the students have their breakfast daily. Most of the students (45.2 %) eat two times meals in a day while one-

fourth of the students eat three times meals. Daily eating of snacks was a routine habit among the study

participants however around 20% of students rarely take snacks. The very important finding in our study is around 34% of students rarely eats vegetables and only 17% of the students have vegetables daily. Dates have been taken by around 30% of the students in a frequency of three or four times in a week. More than one-third of the students

rarely eat fruits but the same proportion of students eat fried foods maximum of four times in a week. Almost half of the students (46.7%) share their food with family three or four times in a week. In addition Majority of the students (69.6%) was aware about the balanced diet and 71% of the students were non-smokers (Table 2).

Table 2: Participants response for eating and smoking habits questionnaire.

Questions Asked	Answer Level	Total (Percentage)	
Q1. Do you take your meals regularly?	a) Always regular	N= 138 (31%)	
Qui a signal surface your surface your surface your	b) Irregular	N= 307 (69%)	
	a) Dailyb) Three or four times per week	N=175(39.33%) N=121(27.19%)	
Q2. Do you take breakfast?	c) Once or twice per week	N = 73(16.4%)	
	d) Rarely	N=76(17.08%)	
	a) One Time	N= 102 (22.92%)	
Q3. How many times do you eat meals except	b) Two Times	N= 201 (45.17%)	
snacks?	c) Thrice	N= 112 (25.17%)	
	d) Four Times	N= 30 (6.74%)	
	a) Daily	N= 160 (35.96%)	
Q4. How often do you take snacks apart	b) Three or four times per week	N= 122 (27.42%)	
from regular meals?	c) Once or twice per week	N= 77 (17.30%)	
	d) Rarely	N= 86 (19.33%)	
A	a) Daily	N= 76 (17.08%)	
Q5. How often do you eat green, red or yellow	b) Three or four times per week	N= 106 (23.82%)	
colored vegetables?	c) Once or twice per week d) Rarely	N= 112 (25.17%) N= 151 (33.93%)	
		` '	
	a) Dailyb) Three or four times per week	N= 80 (17.98%) N= 130 (29.21%)	
Q6. How often do you eat dates?	c) Once or twice per week	N = 130 (29.21%) N = 110 (24.72%)	
	d) Rarely	N=110 (24.72%) N=125 (28.09%)	
	a) Daily	N= 69 (15.51%)	
O7 Harmafton da mon ant firmita?	b) Three or four times per week	N= 105 (23.60%)	
Q7. How often do you eat fruits?	c) Once or twice per week	N= 131 (29.44%)	
	d) Rarely	N= 140 (31.46%)	
	a) Daily	N= 83 (18.65%)	
Q8. How often do you eat fried food?	b) Three or four times per week	N= 138 (31.01%)	
Q • • • • • • • • • • • • • • • • • • •	c) Once or twice per week	N= 135 (30.34%)	
	d) Rarely	N= 89 (20%) N= 108(24.27%)	
	a) Dailyb) Three or four times per week	N= 108(24.27%) N= 208(46.74%)	
Q9. How often do you eat with family?	c) Once or twice per week	N= 65 (14.61%)	
	d) Rarely	N= 64 (14.38%)	
	a) Mainly meat	N= 58 (13.03%)	
O10 What true of food do think	b) Mainly vegetables	N= 75 (16.85%)	
Q10. What type of food do you think you should eat to have a balanced nutrition?	c) Meat, vegetables and other varieties of	N= 292 (65.62%)	
should cat to have a paraneed nutrition?	food.		
	d) Others	N= 20 (4.5%)	
044 70	a) Current smoker	N= 84 (18.88%)	
Q11. Please state your smoking history?	b) Ex-smoker	N= 45 (10.11%)	
	c) Never smoke	N= 316 (71.01%)	

Correlation between anthropometry and eating habits

When correlating the student's anthropometric measurements with their eating habits the study relived that the students having their breakfast daily have a

normal body weight than those students who have their breakfast three or four times a week but though it is not statistically significant. The current study also found that the students who rarely eat fried food were underweight. Majority of the students in the study were aware of the balanced nutrition and a statistically significant correlation (P=0.014) were found between the awareness among the students about the balanced diet and the normal body weight (Table 3).

Table 3: Correlation between BMI categories and eating habits [Total (Percent)].

Questions	Answer	BMI categories				Total (percent)	P
asked	levels	Underweight	Normal	Overweight	Obese		value
Q.1	A.	N=12 (2.7 %)	N=57 (12.8%)	N=41 (9.21%)	N= 28 (6.29%)	N=138 (31%)	0.507
	B.	N=27 (6.07%)	N= 134 (30.11%)	N=81 (18.20%)	N= 65 (14.62%)	N= 307 (69%)	0.507
Q.2	A.	N=12 (2.7%)	N= 72 (16.18%)	N= 50 (11.24%)	N= 41 (9.21%)	N=175(39.33%)	0.329
	B.	N=10 (2.25%)	N= 59 (13.25%)	N= 33 (7.42%)	N= 19 (4.27%)	N=121(27.19%)	
	C.	N= 8 (1.8%)	N= 28 (6.29%)	N= 23 (5.16%)	N= 14 (3.15%)	N= 73(16.4%)	
	D.	N= 12 (2.7%)	N= 32 (7.19%)	N= 15 (3.37%)	N= 17 (3.82%)	N= 76 (17.08%)	
Q.3	A.	N=11 (2.48%)	N= 39 (8.76%)	N= 32 (7.19%)	N= 20 (4.49%)	N= 102 (22.92%)	0.532
	B.	N=15 (3.37%)	N= 98 (22.02%)	N= 49 (11.01%)	N= 39 (8.77%)	N= 201 (45.17%)	
	C.	N= 9 (2.02%)	N= 42 (9.44%)	N= 34 (7.64%)	N= 27 (6.07%)	N= 112 (25.17%)	
	D.	N= 5 (1.12%)	N= 13 (2.92%)	N=8 (1.80%)	N=4 (0.90%)	N= 30 (6.74%)	
	A.	N=16 (3.60%)	N= 64 (14.38%)	N= 38 (8.54%)	N= 42 (9.44%)	N= 160 (35.96%)	0.176
Q.4	В.	N=12 (2.7%)	N= 54 (12.14%)	N= 36 (8.09%)	N= 20 (4.49%)	N= 122 (27.42%)	
	C.	N= 6 (1.35%)	N= 35 (7.87%)	N= 25 (5.61%)	N= 11 (2.47%)	N= 77 (17.30%)	
	D.	N=10 (2.25%)	N= 40 (8.99%)	N= 21 (4.72%)	N= 15 (3.37%)	N= 86 (19.33%)	
	A.	N=11 (2.47%)	N= 33 (7.41%)	N= 18 (4.05%)	N= 14 (3.15%)	N= 76 (17.08%)	0.159
0.5	В.	N= 7 (1.57%)	N= 48 (10.79%)	N= 32 (7.19%)	N= 19 (4.27%)	N= 106 (23.82%)	
Q.5	C.	N=8 (1.80%)	N= 42 (9.44%)	N= 34 (7.64%)	N= 28 (6.29%)	N= 112(25.17%)	
	D.	N=18 (4.04%)	N= 72 (16.18%)	N= 35 (7.87%)	N= 26 (5.84%)	N= 151 (33.93%)	
	A.	N= 5 (1.12%)	N= 40 (8.99%)	N= 14 (3.15%)	N= 21 (4.72%)	N= 80 (17.98%)	0.554
	B.	N= 12 (2.7%)	N= 53 (11.91%)	N= 44 (9.88%)	N= 21 (4.72%)	N= 130 (29.21%)	
Q.6	C.	N= 9 (2.02%)	N= 47 (10.56%)	N= 30 (6.74%)	N= 24 (5.40%)	N= 110 (24.72%)	
	D.	N=15 (3.37%)	N= 52 (11.69%)	N= 33 (7.41%)	N= 25 (5.62%)	N= 125 (28.09%)	
	A.	N= 6 (1.35%)	N= 26 (5.84%)	N= 23 (5.17%)	N= 14 (3.15%)	N= 69 (15.51%)	
	B.	N= 8 (1.80%)	N= 46 (10.34%)	N= 29 (6.52%)	N= 22 (4.94%)	N= 105 (23.60%)	0.563
Q.7	C.	N=10 (2.25%)	N= 51 (11.46%)	N= 42 (9.44%)	N= 28 (6.29%)	N= 131 (29.44%)	
	D.	N=19 (4.27%)	N= 68 (15.28%)	N= 28 (6.29%)	N= 25 (5.62%)	N= 140 (31.46%)	
	A.	N= 9 (2.02%)	N= 35 (7.87%)	N= 20 (4.49%)	N= 19 (4.27%)	N= 83 (18.65%)	
Q.8	B.	N=13 (2.92%)	N= 63 (14.16%)	N= 38 (8.54%)	N= 24 (5.39%)	N= 138 (31.01%)	0.933
	C.	N=10 (2.25%)	N= 59 (13.26%)	N= 34 (7.64%)	N= 32 (7.19%)	N= 135 (30.34%)	
	D.	N=8 (1.80%)	N= 36 (8.09%)	N= 31 (6.96%)	N= 14 (3.15%)	N= 89 (20%)	
Q.9	A.	N= 9 (2.02%)	N= 43 (9.67%)	N= 32 (7.19%)	N= 24 (5.39%)	N= 108 (24.27%)	0.572

	B.	N=18 (4.05%)	N= 92 (20.67%)	N= 54 (12.13%)	N= 44 (9.89%)	N= 208	
	ъ.	11-10 (1.0370)	11- 72 (20.0770)	11-31 (12.1370)	11-11 (5.0570)	(46.74%)	
	C.	N=10 (2.25%)	N= 32 (7.19%)	N= 13 (2.92%)	N= 10 (2.25%)	N= 65 (14.61%)	
	D.	N=4 (0.90%)	N= 26 (5.84%)	N= 23 (5.17%)	N= 11 (2.47%)	N= 64 (14.38%)	
Q.10	A.	N= 13 (2.92%)	N= 18 (4.05%)	N= 13 (2.92%)	N= 14 (3.15%)	N= 58 (13.03%)	0.014*
	B.	N= 7 (1.57%)	N= 27 (6.06%)	N= 23 (5.17%)	N= 18 (4.05%)	N= 75 (16.85%)	
	C.	N= 20 (4.5%)	N= 136 (30.56%)	N= 80 (17.98%)	N= 56 (12.58%)	N= 292 (65.62%)	
	D.	N= 4 (0.90%)	N=10 (2.25%)	N=6 (1.35%)	N=0 (0.0%)	N=20 (4.5%)	
Q.11	A.	N= 10 (2.25%)	N= 45 (10.11%)	N= 18 (4.05%)	N= 11 (2.47%)	N= 84 (18.88%)	0.067
	B.	N=6 (1.35%)	N= 13 (2.92%)	N= 16 (3.60%)	N= 10 (2.25%)	N= 45 (10.11%)	
	C.	N= 31 (6.97%)	N= 135 (30.33%)	N= 84 (18.88%)	N= 66 (14.83%)	N= 316 (71.01%)	

DISCUSSION

The main purpose of this research is to find out the prevalence of obesity and overweight and its association with dietary habits among the male college students in Abha, Kingdom of Saudi Arabia. The current study found almost of half of the students has the normal body weight where as 28% of the students were overweight and around 20% of the study participants were obese. The findings are similar with other studies conducted in other middle east and even in some western countries. A study in Lebanon found the prevalence of overweight and obesity were 37.5% and 12.5% among the male college students. 17 in Kuwait the overweight and obesity prevalence were found to be 32% and 8.9% respectively. Whereas in the United States and United Arab Emirates the prevalence of overweight and obesity were 35% among the college students. 15,23,24

In contrast the prevalence of overweight and obesity among the Iranian male college students were only 7.9 % 25 and it was even low (2.9%) among the Chinese college students. The prevalence rate of obesity in the current study is similar to the studies done by Majeed and Anding et al and it is slightly higher than the study done in Abha by Hakeem et al among the female college students. Different studies across the globe reported various prevalence rate of overweight and obesity and that may be due to the differences in sample size and culture but still all the above described studies reveal that obesity and overweight are the major public health issue across the nation.

Different studies across the globe reported various prevalence rate of overweight and obesity and that may be due to the differences in sample size and culture but still all the above described studies reveal that obesity and overweight are the major public health issue across the nation. The study shows that majority of the students have irregular meals with two times meals in a day. Daily consumption of snacks was common habit among the students in our study and being a staple food dates were taken by the students mostly four times in a week. More students in the study eat fruits rarely but eat fried out

maximum of four times per week. On the other hand majority of the students were aware of balanced diet and non-smokers. The above mentioned habits are more or less similar with the student's habit in Lebanon and china. 17,19

Majority of students in Kingdom of Saudi Arabia (45.17%) and in Lebanon (47.9%) have two times meals in a day whereas Majority of students in china has three times meals in a day. The current study shows that about 35% of the college students in the kingdom of Saudi Arabia eat snacks daily which are lower than in Lebanon where almost 50% of the college students eat snacks daily but in contrast only one tenth of the college students in china eat snacks daily.

The current study shows that majority of the students (65.62%) were aware of the balanced diet and there was a statistically significant association (P= 0.014) between the awareness about the balanced diet and the normal body weight which is also supported by the studies in Lebanon and china. Vegetable consumption was not a common habit among the students in Saudi Arabia whereas students in china and Lebanon eat vegetables and fruits thrice or four times in a week. 17,19 Less consumption or the non-consumption of vegetables and fruits are associated with the risk of various chronic diseases.²⁹ The unique finding in the current study is students who rarely eat fried foods were underweight. This study result does not find any correlation between skipping breakfast and obesity but whereas the study conducted by Smith et al concluded that skipping breakfast is a risk factor for obesity, high cholesterol and Diabetes.³⁰ The major limitation of the study is using a self-administered questionnaire to collect the information which effects estimation of true prevalence because of the recall bias and non-compliance of students in answering the sensitive questions like smoking and dietary habits.

CONCLUSION

The study shows more than one-fourth of the male college students were overweight and obese in Abha, Saudi Arabia. Daily consumption of snacks and non-

consumption of vegetables and fruits were common among male college students in Kingdom of Saudi Arabia. Students who rarely eat fried foods were underweight but it is not statistically significant. Majority of the students were aware about the balanced diet and it was statistically correlated with the normal body weight. The study result shows there is a need for creating awareness not only among the students and also among the family members and university management so that there will be coordinated efforts for reducing the prevalence of overweight and obesity among the college students. This also led a path to promote and encourage health eating at all levels.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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