



## Obesity; Prevalence and Associated Factors among Al Baha University Students: An Observational and Cross-Sectional Study

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### ABSTRACT

**Background:** Nowadays, the prevalence of overweight and obesity in Arabic countries was found to be greater than before among young people especially university students. Morbid dietary patterns including high intake of fast foods and meals missing especially breakfast have been suggested as major risk factors for the development of obesity. **Objective:** The study aimed to estimate the prevalence of overweight and obesity among students from the Albaha University, Saudi Arabia, and to analyse their eating habits. **Materials and Methods:** The study was an institutional cross-sectional survey carried out at Albaha University from March 2020 to September 2020. Data were collected using an interview questionnaire among 209 students (53.1% males and 46.9% females) aged 18-23 years chosen randomly. **Results:** The results showed that half of the participants (51.7%; n=108) had a Body Mass Index (BMI) within the normal range, 23.8% (n=50) were overweight, 17.8% (n=21) were obese and only 6.7% (n=14) were underweight according to their calculated BMI. A higher prevalence of overweight and obesity (34.5%) was found among male students compared with female students (24.9%). Furthermore, the prevalence of overweight and obesity was higher among respondents aged 18-20 years (41.8%). There were significant differences ( $p < 0.05$ ) between sexes in weight and height in the younger group. Half of the students (54.5%) reported irregular meal patterns and high fast food consumption. Two thirds (62.5%) of our respondents were found to practice varieties of sports regularly and actively. The prevalence of low physical activity was significantly higher among females compared to males. There were significant differences between males and females in physical activity ( $p < 0.05$ ). Moreover, 71.4% of our respondents never smoked; in contrast, 28.6% of them were active smokers. Collectively, there were significant differences between males and females in physical activity and smoking ( $p < 0.05$ ). **Conclusions:** The prevalence of obesity and overweight were moderately high among Albaha University students and were found to be due to several factors correlated to students' eating habits and practices. Intervention programs should be followed among university students to advocate regular breakfast intake and accepting healthy food choices and lifestyles.

**Keywords:** Cross-Sectional study, University students, Obesity, Overweight, Saudi Arabia

### INTRODUCTION

Obesity and overweight were defined as abnormal or excessive fat accumulation that may harm health with a complex multifactorial [1-3]. Obesity has become a life-threatening and prevalent public health problem, gained an epidemic percentage in both developing and developed countries and ranked as the fifth leading cause of death worldwide, and it is expected that obesity and overweight by 2030, will affect almost 573 million and 1.35 billion adults respectively [4-8].

Obesity is a rising concern in many nations in the Middle East. In the countries of the Gulf Cooperation Council (GCC), approximately a third of adults are currently obese and diabetes and other weight-related diseases are becoming serious

public health issues. While there are several causes for this, including sedentary lifestyles and heavy consumption of fried and fatty foods, beverages play a large role. In addition to the high consumption of sugary beverages, several other factors have combined to produce the region's high obesity rates. The first is the harsh climate, which dampens outdoor sports and even walking around outside. Another is the economic structure of many of the countries. Oil wealth has enabled most of the native population to work at physically undemanding jobs, while foreigners dominate industries like construction. A final issue is a diet, as the traditional cuisine of these countries tends to be high in calories and fat, even before elements of Western culture like fast food started making inroads [4,9,10]. Unhealthy dietary habits in terms of skipping meals, irregular meal times, increase consumption of fast food, soft drink, and occasionally snack in between meals are commonly reported among young adults [11,12]. Western dietary lifestyles, together with a sedentary lifestyle, are potential contributors to the prevalence and rapid increase in the incidence of obesity in Saudi Arabia. Obesity is related to many health problems and diseases, such as diabetes, heart disease, stroke, and certain types of cancer. Additionally, obesity is the leading preventable cause of preventable death.

University students are at risk to suffer from dietetic illness, immobility, and increasing habits of smoking. Bad behaviour changes are critical in protecting and improvement of student health. This study aimed to estimate the prevalence of overweight and obesity among students from the Albaha University, Saudi Arabia, and to analyses their eating habits.

## MATERIALS AND METHODS

### Setting

An institutional cross-sectional survey was carried out from March 2020 to September 2020. All participants recruited were among students of Albaha University a total of 209 students aged  $\geq 18$  years joined from Alaqiq male and Bahr female Campus had participated in our study. We exclude those who were underweight and having chronic illnesses.

### Sample Size and Sampling

Our study population consists of Albaha University male and female students who were randomly select, we adopt the method of multistage stratified sampling to get a representative sample from different faculties. Firstly, university students were stratified by faculties, within each faculty a simple random sample was used to ensure that each faculty was adequately represented. The minimum sample size was determined within  $\pm 0.05$  of the total students with a 95% confidence level. The total sample size was composed of 111 males and 98 females from different faculties (i.e. faculty of Medicine, Arts and Social Science, Engineering, and Faculty of Business and Commerce; including students of all study levels).

### Data Collection

The data collection tool was used in form of questionnaires. The questionnaire is composed of three main sections. The first one was designed to collect some basic information (demographic) about the respondents, including sex, age, faculty, education level, and type of education. The second section which the main questionnaire consisted of questions developed to assess students' information on anthropometric measurements, dietary consumption habits, and physical activity. The third section included general questions regarding academic stress and sleep quality.

The survey is based on a self-administered questionnaire that is completed by respondents. A modified WHO STEP-wise survey questionnaire including the Global Physical Activity Questionnaire was adopted to collect data from the study respondents about lifestyle factors which included socio-demographic data, anthropometric measurement, dietary practices, level of physical activities, and general questions. A letter clarifying the aims, assurance of confidentiality, and specification of the date, time, and place to fill in the questionnaire was provided to the selected students by their class monitors. Those who collect data and their assistants for data collection were trained before. In addition, the students who were willing to participate were guaranteed their right to discontinue the study at any time and for any purpose. If a student had any query related to the questions, the data collectors conveyed an explanation.

### Anthropometric Measurements

Anthropometric measurements were self-reported. Body Mass Index (BMI) calculation was based upon the BMI chart as suggested by the World Health Organization (WHO), it was considered by dividing the body weight by height in

meters squared ( $\text{kg}/\text{m}^2$ ) and the results were categorized into four groups:  $\leq 18.4 \text{ kg}/\text{m}^2$ ,  $18.5\text{-}24.9 \text{ kg}/\text{m}^2$ ,  $25.0\text{-}29.9 \text{ kg}/\text{m}^2$ , and  $\geq 30 \text{ kg}/\text{m}^2$  categorized as underweight, normal weight, overweight and obese respectively [13]. Waist circumference (midway between the last rib bone and the iliac bone by using a waist circumference tape) findings were categorized as follows:  $>94 \text{ cm}$  for males and  $>80 \text{ cm}$  for females had increased risk of metabolic complications and  $>102 \text{ cm}$  for male and  $>88 \text{ cm}$  for female had greatly increased risk of metabolic complication. All dimensions were taken by considering the standard methods of anthropometric measurement [14,15].

### Data Analysis

Data entry and analysis were performed utilizing Microsoft Excel™ (2013) and the Statistical Package for the Social Sciences (SPSS), Version 24. Basic descriptive statistics were run for all variables (including socio-demographic characteristics) to establish means and standard deviations for variables measured on continuous scales, and frequencies and percentages for categorically measured variables. Correlation analysis was conducted to examine the association between findings of BMI of the study participants about eating behaviors and the chi-squared test and the z-test were used to compare the prevalence rate according to age and sex ;  $p < 0.05$  was considered statistically significant.

## RESULTS

A total of 250 questionnaires were administered among Albaha University students both male and female students, 209 questionnaires were completed by respondents and included in the analysis, with a respondent rate of 83.6%. Our study sample constitutes students from three fields of study: medical field students (88; 42.1%), health-related students (72; 34.4%), and non-health-related students (49; 23.5%). About half of the respondents 111 (53.1%) were males with a mean age of 20.6 years, and 98 (46.9%) were female with a mean age of 20.7 years. The majority of the respondents (148; 70.8%) were aged 18-23years. The average was  $70.46 \pm 16.15 \text{ kg}$  and  $167.9 \pm 10.41 \text{ cm}$ , respectively. The mean height was  $176.91 \pm 10.41 \text{ cm}$  for male students and  $162.91 \pm 10.41 \text{ cm}$  for females. The demographic characteristics of study participants and their anthropometric were shown in Table 1 and Table 2. There are significant differences concerning mean age, weight, and height ( $p < 0.001$ ), while no significant differences were identified regarding the type of current residence and living conditions either alone or with family or friends, ( $p = 0.117$ ) and BMI ( $p = 0.232$ ) among our study participants.

**Table 1 Demographic characteristic of study participants**

Variable	Total N=209	Field of study of students			p-value
		Medical	Health-related	Non-health related	
		N=88	N=72	N=49	
<b>Gender</b>					
Male	111 (53.1)	54 (48.6)	39 (35.1)	18 (16.3)	0.001
Female	98 (46.9)	34 (34.7)	33 (33.7)	31 (31.6)	
<b>Age group (years)</b>					
18-20	70 (33.5)	27 (38.6)	26 (37.1)	17 (24.3)	0.003
21-23	78 (37.3)	35 (44.9)	27 (34.6)	16 (20.5)	
24-26	40 (19.1)	18 (45.0)	12 (30.0)	10 (25.0)	
More than 26	21 (10.1)	8 (38.1)	7 (33.3)	6 (28.6)	
<b>Form of living</b>					
Lives alone	95 (45.5)	39 (41.1)	35 (36.8)	21 (22.1)	0.0001
Lives with family	105 (50.2)	46 (43.8)	36 (34.3)	23 (21.9)	
Other forms of living	9 (4.3)	3 (33.3)	1 (11.1)	5 (55.6)	
<b>Academic Level</b>					
Preparatory to third year	101 (48.3)	59 (67.0)	39 (35.1)	18 (16.3)	0.005
fourth to internship (final) year	108 (51.7)	29 (33.0)	33 (33.7)	31 (31.6)	

Table 2 Anthropometric measurements among study participants

Item	Mean $\pm$ SD		p-value
	Male	Female	
Age (years)	20.5 $\pm$ 1.59	20.7 $\pm$ 1.59	0.001
Weight (kg)	73.46 $\pm$ 16.15	59.96 $\pm$ 16.15	0.001
Height (cm)	176.91 $\pm$ 10.41	162.91 $\pm$ 10.41	0.001
BMI	24.84 $\pm$ 10.35	22.84 $\pm$ 6.35	0.152
WC in cm	81.4 9.3	74.6 8.1	0.001

### Anthropometric Measurements among Study Participants

Based on BMI classification, the mean BMI was  $24.84 \pm 10.35$  (kg/m<sup>2</sup>) for male students and  $22.84 \pm 6.35$  (kg/m<sup>2</sup>) for females. Half of the participants (51.7%; n=108) had a BMI within the normal range, 23.8% (n=50) were overweight, 17.8% (n=21) were obese and only 6.7% (n=14) were underweight according to their calculated BMI values as shown in Figure 1. A higher prevalence of overweight and obesity was found among health and non-health-related students (66.6%) compared with medical students (22.6%). A higher prevalence of overweight and obesity (34.5%) was found among male students compared with female students (24.9%) Furthermore, the prevalence of overweight and obesity was higher among respondents aged 18-20 years (41.8%). There were significant differences ( $p < 0.05$ ) between sexes in weight and height in the younger group as shown in Figure 1.

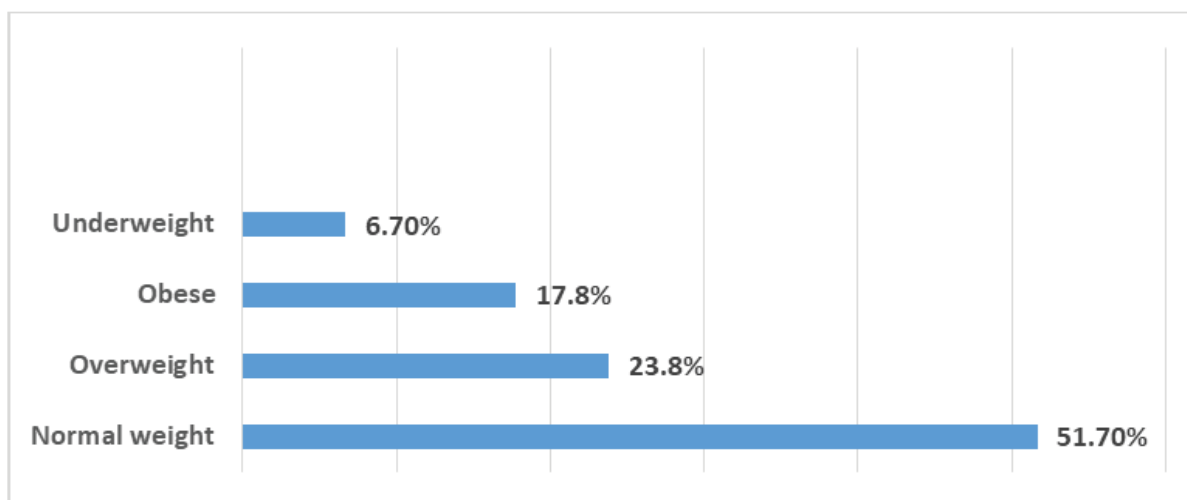


Figure 1 Anthropometric measurements among study participants

### Prevalence of Overweight and Obesity

The overall prevalence of overweight and obesity among our study participants was 41.6% (23.8% overweight and 17.8% obesity). About the field of study, a higher prevalence of overweight or obesity was found among non-health-related students (37.7%) compared with health-related students (28.9%) and medical students (22.6%).

### Physical Activity and Smoking among Study Participants

Table 3 showed that about two-thirds (62.5%) of our respondents were found to practice varieties of sports regularly and actively, while 27.5 % of them practice sports occasionally and 10% of them tried to practice sports at a low level. The prevalence of low physical activity was significantly higher among females compared to males. There were significant differences between males and females in physical activity ( $p < 0.05$ ). Moreover, 71.4% of our respondents never smoked; in contrast, 28.6% of them were active smokers. Collectively, there were significant differences between males and females in physical activity and smoking ( $p < 0.05$ ).

Table 3 Physical activity and smoking among university students by gender

Items					p-value
Physical activity		Male	Female	Total	0.018
Do you practice any kind of sports	Yes	69.10%	55.90%	(131) 62.5%	
	No	30.90%	44.10%	(78) 37.5%	
Smoking					0.000
Never smoke		Yes	51.30%	91.40%	149 (71.4%)
Currently smoking		No	48.70%	8.60%	60 (28.6%)

### Dietary Habits among Study Participants

Table 4 showed the meal practice of our study university students which revealed that irregular meals intake was reported among 54.5% of respondents, most of the respondents (91.8%) revealed taking their breakfast regularly while only 4.3% of them had one meal per day. In addition, 44.2% used to take snacks each day and 22.6% take snacks once or twice per week. Male students show significant differences regarding meal patterns from female students ( $p < 0.05$ ) as a higher percentage of female students take their meals irregularly compare to male students (71.4% vs. 39.6%). Male students take fewer snacks daily (40.5% of males compared to 65.3% of females).

Table 4 Meal pattern of university students by gender

Questions	Sex				Total (n =209)		p-value
	Male (n=111)		Female (n=98)		No.	%	
	No.	%	No.	%			
<b>Do you take your meals regularly?</b>							
Always regular	67	60.4	28	38.8	95	45.5	0.003
Irregular	44	39.6	70	71.4	114	54.5	
<b>Do you take breakfast?</b>							
Daily	6	5.4	3	3.1	9	4.3	0.754
Three or four times per week	68	61.2	60	61.2	128	61.2	
Once or twice per week	32	28.8	32	32.6	64	30.6	
Rarely	4	3.6	4	4.1	8	3.8	
<b>How often do you take snacks?</b>							
Daily	45	40.5	64	65.3	109	52.2	0.034
Three or four times per week	26	23.5	14	14.3	40	19.1	
Once or twice per week	31	27.9	14	14.3	45	21.5	
Rarely	9	8.1	6	6.1	15	7.2	

Figure 2 shows that among our university students (25.1%) of the participants used to take vegetables once daily, 21.4% consumed vegetables 3-4 times/week. A total of 57% of the students reported daily or 3-4 times per week intake of fruits. Also, the percentage of students who rarely eat vegetables and fruits were 29.1% and 18.3% respectively. There were no gender differences for both vegetable and fruits consumption ( $p=0.196$ ,  $p=0.339$ ).

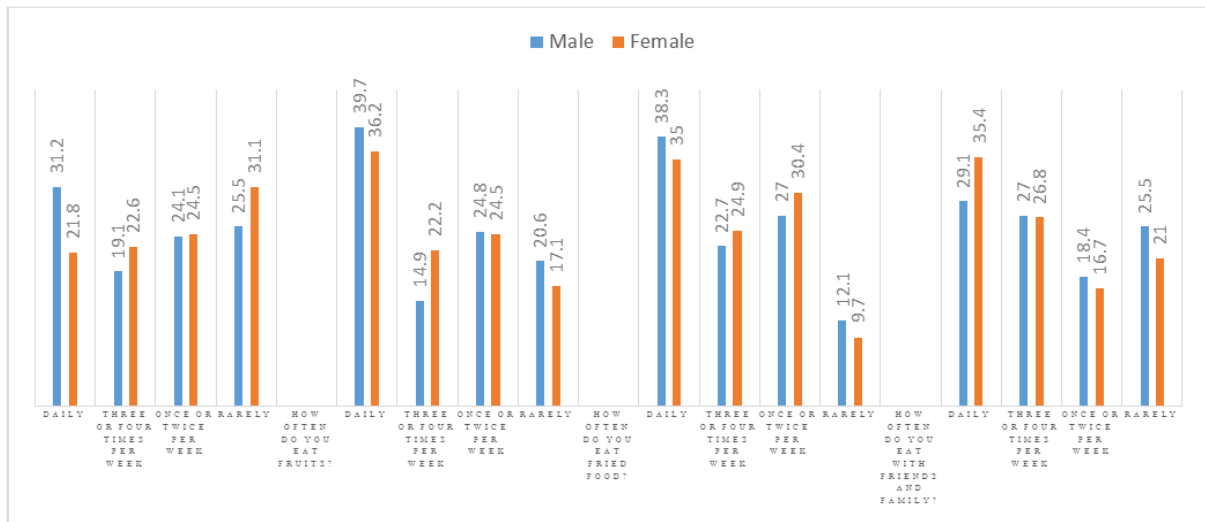


Figure 2 Additional food consumption among study participants

DISCUSSION

Overweight and obesity have been recognized as a worldwide health problem, affecting both developed and developing countries [16-18]. Our study aimed to evaluate the prevalence of obesity and investigate its associations with socio-demographic and eating habits among Albaha University students. Our study sample constitutes students from three fields of study: medical field students (88; 42.1%), health-related students (72; 34.4%), and non-health-related students (49; 23.5%). About half of the respondents 111 (53.1%) were males with a mean age of 20.6 years, and 98 (46.9%) were females with a mean age of 20.7 years. Our study finding reveals that half of the participants (51.7%; n=108) had a BMI within the normal range, 23.8% (n=50) were overweight, 17.8% (n=21) were obese and only 6.7% (n=14) were underweight according to their calculated BMI values. These results were similar to previous studies among Saudi conducted by Ali Al Shehri, et al., Al-Saeed WY, et al., Mohsen A.F. El-Hazmi [19-21].

University students change their life patterns and get unhealthy eating habits. This transition begins in school and university and may remain later in life [22]. Almost half of the students in this study (54.5%) report irregular meals; this finding was the same as reported in other studies among Saudi students such as from Qassim University (64.3%) and Abha (69.0%) at the same time, our finding was lower than reported data for Chinese (83.6%) [23-25]. Lebanese (61.4%) and Malaysian medical students (57.6%) educational programs are required to modify these unhealthy behaviours among students studying at Saudi Arabia universities [26,27].

Breakfast by far was the most important meal of the day, regarding this most of our study participants (91.8%) take their breakfast regularly and only 8.2% of them had taken it rarely or used to skip it [28,29]. Breakfast skipping was found in about 15% of Saudi students from Jeddah, Saudi adolescents from Abha, and 10% of young males and 19% of females in the United Arab Emirates. Our finding was slightly higher than that reported in Lebanon (31.8%) and studies from Malaysia which revealed a rising pattern toward daily breakfast eating among female youth in Pahang (52.6%) [30,31]. Frequently reported causes for skipping breakfast were lack of time, sleep too long, lack of appetite, hating eating early in the morning, fears about excess body weight, living alone, and lack of family control.

Our study finds that 44.2% of the participants use to take snacks each day and 22.6% take snakes once or twice per week. Male students show significant differences regarding meal patterns from female students as a higher percentage of female students take their meals irregularly compare to male students (71.4 % vs. 39.6%). Male students take fewer snacks daily (40.5% of males compared to 65.3% of females). These findings were the same as previous studies that consumed snacks regularly from various other countries, such as Syrian (53%), Lebanese (53.20%), and Malaysian (42.4%) students. Regular eating of snacks is a routine among young people [26,32,33].

This study shows that among our university students (25.1%) of the participants used to take vegetables once daily, 21.4% consumed vegetables 3-4 times/week. A total of 57% of the students reported daily or 3-4 times per week intake

of fruits. Also, the percentage of students who rarely eat vegetables and fruits were 29.1% and 18.3% respectively. Similar studies as Alzahrani SH; Al-Otaibi HH revealed the same proportions but higher proportions were reported in Abha; Saudi Arabia [34-36].

### Limitations

The population of the study being recruited from only one university is a limitation of this study.

### CONCLUSION

The study found a high prevalence of overweight and obesity among male students at Albaha University students and was found to be due to several factors correlated to students' eating habits and practices. Intervention programs should be followed among university students to advocate regular breakfast intake and accepting healthy food choices and a healthy lifestyle such as physical exercise, good sleeping patterns, and no bad habits or addiction.

### DECLARATIONS

#### Acknowledgement

We would like to thank Al Baha University male and female students who accepted to take part in this study.

#### Informed Consent

Informed consent was obtained from all students participating in the study.

#### Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

#### Author Contributions

All authors made significant contributions to all parts of the research such as idea and design; data collection, analysis and interpretation; article revision and final approval; and contracted to be responsible for all parts of the work.

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