Current Research Journal of Biological Sciences 4(5): 557-562, 2012
ISSN: 2041-0778

Submitted: May 15, 2012 Accepted: June 15, 2012 Published: September 20, 2012

Nutritional Status among a Sample of Saudi College Students

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Abstract: Nutritional habits and health behaviors have been a major concern for public health, especially among vulnerable groups such as teenage and college students. This study aims to assess nutritional status of a sample of Saudi college students and their dietary behaviors. A multi-stage sample was obtained from a private college in the north-western region of the Kingdom of Saudi Arabia (KSA). Descriptive statistics was used to assess the frequency of some nutritional habits and their correlation to Body Mass Index (BMI). The results show that overweight and obese subjects represented 22.6 and 11.6% of the students respectively, compared to 13.7% for underweight subjects. Twenty five percent of male and 20.3% of female students were overweight while 16.7% of male and 6.7% of female students were obese. There was a statistical significant difference between males and females in relation to the mean weight and height ($p<0.001$) and BMI ($p<0.05$). Approximately 15.7% of the subjects skip their breakfast daily. Both males (50%) and females (45.9%) used to eat their meals irregularly. More than 58% of the students stated that they consume fast foods, the proportion of females was more (64.9%) than the males (51.4%) and the difference was statistically significant ($p<0.05$). A relatively small percentage (21.2%) of students reported not eating burgers and a majority of respondents 61% preferred regular size burgers. However, the tendency to eat large size burgers was more pronounced among males than females ($p<0.05$). A regular portion size of potato chips was preferred by 61% of the students, among them 24.3% were females and 11.1% were males ($p<0.01$). There was a wide range of preferences for consumption of different foods among participants. Females showed a higher rate in the consumption of sweets and chocolates on daily basis (28.4 and 29.7%, respectively) compared to males (18.1 and 16.6%, respectively) ($p<0.05$). Males were more prone to consume red meat ($p<0.05$) and fish ($p<0.05$) than females. It is recommended to further investigate the eating habits of college students in KSA and propose interventions to improve such habits.

Keywords: BMI, KSA, nutritional status, obesity, students

INTRODUCTION

The prevalence of overweight and obesity has increased in the last three decades in many countries (Al-Nuaim *et al*., 1996; El-Qudah, 2008; Al-Isa, 1995; Almajwal *et al.*, 2008). Health consequences of overweight and obesity include pulmonary, orthopedic, gastroenterological, neurologic, endocrine problems, as well as cardiovascular problems (Bodur *et al.*, 2010). It is also well-cited in the literature that obese individuals are more prone to psychosocial problems such as self-dislike, decreased self-esteem, increased level of loneliness, sadness and nervousness (Story *et al*., 2002).

Obesity is considered worldwide as the disease of the twenty-first century. It is becoming a common condition in the Eastern Mediterranean Region too (El-Hazmi and Warsy, 2000). Surveys from Saudi Arabia, the United Arab Emirates, Jordan, Egypt and Kuwait draw an alarming picture of prevalent obesity, which in turn could be an indicator for an increase in the occurrence of other chronic diseases in the region (Al-Nuaim *et al*., 1996; Al-Isa, 1995; Almajwal *et al.*, 2008; Ajlouni *et al.*, 1998).

The trend of fast food consumption among college students is increasing. This may be attributed to many factors (Pei-Lin, 2004; Story *et al*., 2002). It has been demonstrated that diet quality (i.e., lower intake of fruits, vegetables and milk and higher intake of fast foods and soft drinks) declines from childhood to adolescence (Story *et al*., 2002; Tayyem *et al*., 2008). Fast foods have been always of a great interest for nutritionists and health professionals as they tend to be low in iron, calcium, riboflavin, vitamin A and vitamin C.

Eating a nutritious breakfast regularly is an important contributor to a healthy lifestyle and health

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status. Many studies have shown significant relationship between skipping breakfast and stress, catching cold, chronic disease and high BMI among adolescents (Keski-Rahkonen *et al*., 2003; Kumar *et al*., 2004; Berkey *et al*., 2003; Smith, 2003).

In particular, university students living away from home develop unfavorable eating habits, showing a rapid change of the traditional diet in an undesirable direction and lifestyle modification towards globalized behaviors (El-Qudah, 2008; Nasreddine *et al*., 2005; Popkin *et al*., 2005). Studies have shown that the trend of fast food consumption among college students is increasing (Bodur *et al*., 2010; Tayyem *et al*., 2008; Musaiger *et al*., 2011). This may be attributed to many factors including: being with friends, being away from home for many hours, studying pressure, availability of fast foods and the limited choices of other foods in the universities, in addition to the influence of mass media (Pei-Lin, 2004).

Studies among students in USA (Story *et al*., 2002) and in different European countries (Rolland-Cachera *et al*., 2000) indicate that the food choices of adolescents are not consistent with the dietary guidelines and food intake tends to be low in fruit, vegetables and calcium-rich foods and high in fat. With regard to the Arabian Gulf countries, poor dietary habits such as skipping breakfast, a low intake of milk, fruits and vegetables and a high intake of carbonated beverages, sweets and fast food were reported by several studies on school children (Qotba and Al-Isa, 2007; Bin Zaal *et al*., 2009; Washi and Ageib, 2010; El-Hazmi and Warsy, 2001; Musaiger *et al*., 2011). In general, studies in the Arabian Gulf countries have reported a high consumption of foods rich in fats and calories among most communities leading to increased risk of obesity and its co-morbidities (Musaiger, 2004).

The aim of this study was to investigate fast food consumption, eating patterns and physical activity habits among a sample of male and female students attending a 5-year bachelor program at a college for health sciences in the north western city of Tabuk, Saudi Arabia.

MATERIALS AND METHODS

In the present study, a cross-sectional nutritional survey was carried out on a representative multi-stage sample of healthy undergraduate university male and female students at one of the colleges for health sciences in Tabuk, Saudi Arabia.

This study was carried out to determine (BMI), dietary habits and lifestyle behaviors among college students. The survey was conducted from February to April 2012. Approval to implement the stud y protocol was obtained from the Human Research Committee at AL-Ghad International Colleges for Health Sciences. Initially, 157 registered students were selected to participate in the study, but only 146 were recruited (response rate was 93%). The students (72 males and 74 females) were randomly selected using multi-stage random sampling techniques first, the sample was stratified by level and major, then one class (cluster) was randomly selected from each stratum. A self-administered questionnaire was used to collect the research data. All subjects were asked to complete the Food Frequency Questionnaire (FFQ) with questions on dietary habits. A self reported height and weight were used to calculate BMI (BMI = weight (kg)/height $(m)^2$). Students were classified as underweight if their BMI was <18.5, normal if it was between 18.5 and 24.9, overweight if it was 25-29.9 and obese if their BMI was greater than 30 (Lee and Nieman, 2003).

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 15.0 (Chicago, IL, USA). Data are presented as means±S.D. Students' t-test was used for determination of the level of significance of difference between males and females. Differences were considered statistically significant at ($p<0.05$).

RESULTS

The sample consists of 146 students (74 females and 72 males). Table 1 represents anthropometric measurements of the study participants. There was a statistical significant difference between males and females in relation to the mean weight and height ($p<0.001$) and BMI ($p<0.05$).

Table 2 illustrates that there was a significant difference between the percentage of male and female students regarding underweight and obesity categories of the BMI ($p<0.05$). Most of the students fell in the normal category (BMI 18.5-24.9). Overweight and obese subjects represented 22.6 and 11.6% of the

Table 1: Weight, height and BMI * of the participants by gender

Variables	Total (n = 146) Mean±S.D	Male (n = 72) Mean±S.D	Female (n = 74) Mean±S.D	p-value
Weight (kg)	64.4±18.1	72.3±20.3	56.8±11.3	< 0.001
Height (cm)	163±9.1	169.8±6.7	157.5±6.7	< 0.001
BMI (kg/m^2)	23.8±5.3	24.8±6.1	22.9±4.4	0.037

*: BMI: body mass index

Table 2: BMI distribution for male and female college students

BMI categories	Total (n = 146) # (%)	Male (n = 72) # (%)	Female (n = 74) # (%)	p-value*
Underweight (<18.5)	20 (13.7)	7 (9.7)	13 (17.6)	0.022
Normal (18.5-24.9)	76 (52.1)	35 (48.6)	41 (55.4)	0.145
Overweight (25-29.9)	33 (22.6)	18 (25.0)	15 (20.3)	0.138
Obesity (≥30)	17 (11.6)	12 (16.7)	5 (6.7)	0.032

*: The difference between male and female students is significant at $p<0.05$

Table 3: Characteristics of the participants

Variables	Total (n = 146) # (%)	Male (n = 72) # (%)	Female (n = 74) # (%)
Marital status			
Single	129 (88.4)	65 (90.2)	64 (86.5)
Married	17 (11.6)	7 (9.8)	10 (13.5)
Family income*			
Low (<4.000SAR)	38 (26.0)	18 (25.0)	20 (27.0)
Moderate (4.000-10.000SAR)	62 (42.5)	30 (41.7)	32 (43.2)
High (>10.000SAR)	46 (31.5)	24 (33.3)	22 (29.8)
Intake of multivitamin supplements**			
Yes	14 (9.6)	4 (5.6)	10 (13.5)
No	94 (64.4)	55 (73.3)	39 (52.7)
Sometimes	38 (26.0)	13 (18.1)	25 (33.8)
Regular physical activity**			
Yes	12 (8.2)	8 (11.1)	4 (5.4)
No	65 (44.5)	29 (40.3)	36 (48.6)
Sometimes	69 (47.3)	35 (48.6)	34 (46.0)

*: (1US$ = 3.75 SAR; Saudi Riyal); **: The difference is significant at p<0.05

Table 4: Food consumption and snacking patterns of students

Food and snacking pattern	Total (n = 146) # (%)	Male (n = 72) # (%)	Female (n = 74) # (%)
Number of daily meals intake			
One	8 (5.5)	3 (4.2)	5 (6.8)
Two	71 (48.6)	36 (50.0)	35 (47.3)
Three	52 (35.6)	26 (36.1)	26 (35.1)
Four and more	15 (10.3)	7 (9.7)	8 (10.8)
Eating breakfast			
Yes	54 (37.0)	29 (40.3)	25 (33.8)
No	23 (15.7)	11 (15.3)	12 (16.2)
Sometimes	69 (47.3)	32 (44.4)	37 (50.0)
Eating meals regularly			
Yes	23 (15.7)	12 (16.7)	11 (14.9)
No	70 (48.0)	36 (50.0)	34 (45.9)
Sometimes	53 (36.3)	24 (33.3)	29 (39.2)
Main meal			
Breakfast	31 (21.2)	16 (22.2)	15 (20.3)
Lunch	65 (44.5)	31 (43.1)	34 (45.9)
Dinner	50 (34.3)	25 (34.7)	25 (33.8)
Snacking between meals*			
Yes	76 (52.0)	39 (54.2)	37 (50.0)
No	14 (9.6)	12 (16.7)	2 (2.7)
Sometimes	56 (38.4)	21 (29.1)	35 (47.3)
Eating fast food*			
Yes	85 (58.2)	37 (51.4)	48 (64.9)
No	15 (10.3)	13 (18.1)	2 (2.7)
Sometimes	46 (31.5)	22 (30.5)	24 (32.4)
Preferred source of food*			
Animal	16 (11.0)	12 (16.7)	4 (5.4)
Plant	15 (10.3)	5 (6.9)	10 (13.5)
No difference	115 (78.8)	55 (76.4)	60 (81.1)
Size of burger preferred*			
Don't eat	31 (21.2)	19 (26.4)	12 (16.2)
Regular	95 (65.1)	39 (54.2)	56 (75.7)
Large	20 (13.7)	14 (19.4)	6 (8.1)
Size of chips preferred*			
Don't eat	31 (21.2)	28 (38.9)	3 (4.1)
Regular	89 (61.0)	36 (50.0)	53 (71.6)
Large	26 (17.8)	8 (11.1)	18 (24.3)

*: The difference is significant at p<0.05

students respectively, compared to 13.7% in the underweight category. Twenty five percent of males and 20.3% of females were overweight while 16.7% of male and 6.7% of female students were obese.

Table 3 represents the background characteristics of the study sample. (88.4%) of the whole sample were single. Most of the sample 74%, had moderate to high family income per month. About 10% of the students take multivitamin supplements, the proportion of females was more than double 13.5% the males 5.6% and the difference between the two groups was statistically significant (p<0.05). Similarly, the

Table 5: Consumption frequency of different foods by the study sample expressed in % of consumers

Frequency of eating different food/week	Gender	Daily	2-3 times	4-6 times	Rarely or not
Intake of sweets*	M	13 (18.1%)	33 (45.8%)	9 (12.5%)	17 (23.6)
	F	21 (28.4%)	39 (52.7%)	12 (16.2%)	2 (2.7%)
Intake of chocolates*	M	12 (16.6%)	30 (41.7%)	11 (15.3%)	19 (26.4)
	F	22 (29.7%)	37 (50.0%)	13 (17.6%)	2 (2.7%)
Fruits	M	14 (19.4%)	37 (51.4%)	15 (20.8%)	6 (8.4%)
	F	13 (17.6%)	32 (43.2%)	13 (17.6%)	16 (21.6%)
Vegetables/salad	M	21 (29.2%)	30 (41.7%)	14 (19.4%)	7 (9.7%)
	F	17 (23.0%)	35 (47.3%)	10 (13.5%)	12 (16.2%)
Milk and dairy products	M	26 (36.1%)	30 (41.7)	7 (9.7%)	9 (12.5%)
	F	28 (37.8%)	29 (39.2%)	9 (12.2%)	8 (10.8%)
Red meat *	M	8 (11.1%)	39 (54.2%)	15 (20.8%)	10 (13.9%)
	F	4 (5.4%)	32 (43.2%)	17 (23.0%)	21 (28.4%)
Fish	M	6 (8.3%)	29 (40.3%)	13 (18.1%)	24 (33.3%)
	F	3 (4.1%)	35 (47.3%)	16 (21.6%)	20 (27.0%)
Chicken*	M	37 (51.4%)	25 (34.7%)	9 (12.5%)	1 (1.4%)
	F	24 (32.4%)	30 (40.5%)	13 (17.6%)	7 (9.5%)
Lentil/beans	M	10 (13.9%)	30 (41.7%)	14 (19.4%)	18 (25.0%)
	F	11 (14.9%)	34 (45.9%)	16 (21.6%)	13 (17.6%)

*: The difference between male and female students is significant at $p<0.05$

proportion of males who practice regular physical activity was more than double 11.1% than the females 5.4% and the difference was statistically significant ($p<0.05$).

Food consumption and snacking patterns of students are shown in Table 4. There was no significant difference between genders in terms of frequency of eating meals and snacks per day. About 15.7% of students ate meals regularly, while 48% rarely did so. Regarding fast food consumption, more than 58% of the students stated that they consume fast foods, the proportion of females was more 64.9% than the males 51.4% and the difference was statistically significant ($p<0.05$). In general, males were more likely to eat snacks between meals than females, the proportion of males who prefer animal food sources was more than triple 16.7% than the females 5.4% and the difference was statistically significant ($p<0.05$). A relatively small 21.2% of students reported that they do not eat burgers at all. Yet, the majority of respondents 61% preferred regular size burgers. However, the tendency to eat large size burgers was more pronounced among males than females ($p<0.05$). A regular portion size of potato chips was preferred by 61% of the students, among them 71.6% were females and 50% were males ($p<0.01$).

As shown in Table 5, there was a wide range of preferences for consumption of different foods among participants. Females showed a higher rate in the consumption of sweets and chocolates on daily basis (28.4 and 29.7%, respectively) compared to males (18.1 and 16.6%, respectively) ($p<0.05$). Males were more prone to consume red meat ($p<0.05$) and fish ($p<0.05$) than females.

DISCUSSION

According to World Health Organization report (WHO, 1998), there are more than 250 million obese adults and about 1.1 billion overweight people worldwide Environmental and behavioral changes brought about by economic development, modernization and urbanization has been linked to the rise in global obesity. The variation in prevalence of obesity epidemic in various races and communities of the world may be attributed to heredity, age, sex, diet, eating patterns, life style and/or behavior (Epstein and Higgins, 1992).

The current data demonstrated that more than half of the students were above the normal body weight. Overweight students represented 22.6% of the sample whereas, 11.6% were obese. These findings were consistent with the results of similar studies in other Middle East and some Western countries. In KSA, Al-Rethaiaa *et al*. (2010), found that 21.8% of the students were overweight and 15.7% were obese. In Lebanon, the prevalence of overweight and obesity among male college students was 37.5 and 12.5%, respectively (Yahia *et al*., 2008). In Kuwait the corresponding percentages were 32 and 8.9% (Al-Isa, 1999), while in the United States and the United Arab Emirates overweight and obese accounted for about 35% of the male college students (Huang *et al*., 2003; Lowry *et al*., 2000; Musaiger *et al*., 2003).

Al-Rethaiaa *et al.* (2010) reported that the most common eating habits encountered among Saudi students were eating with family, having two meals per day including breakfast, together with frequent snacks and fried food consumption. Vegetables and fruits, except dates, were not frequently consumed by most students.

The results of our study showed that most of the students have irregular meals with two main meals per day. The majority of the students eat sweets and chocolates 6 times/week in maximum. As well, only about half of the students eat vegetables, fruits and milk and dairy products on a daily basis. These habits need to be corrected using educational programs to promote healthy eating habits in KSA.

In the present study we found that about 15.7% of students ate meals regularly, while 48% rarely did so. More than 58% of the students stated that they consume fast foods. These were in agreement with some researchers (Musaiger *et al.*, 2011) who explained that skipping breakfast was significantly greater in females 62.8% compared to males 37.2%.

In another study, Tayyem *et al*. (2008), found that about 30% of male and 19.0% of female students were overweight while 6.6% of male and 5.3% of female students were obese. No significant differences were detected between male and female students regarding obesity or overweight. Approximately 30% of the subjects, both males 28% and females 30% skip their breakfast daily. While 80% of male students used to take their dinner daily, 44% only of female students consume dinner on daily basis. Less than 5% of the students reported daily consumption of fast foods.

Considerable changes in food consumption patterns have occurred over the past 30 years in the East Mediterranean Region (EMR). Analysis of the data collected from some countries on dietary consumption trends demonstrates a rapid rise in food energy availability and consumption, beyond requirement (Musaiger, 2002).

CONCLUSION

It is concluded from this study that the prevalence of overweight and obesity among males is high. The results indicate that many students had bad food habits. This may be due to lack of nutritional awareness among the populations .Therefore, it would be useful to adopt educational programs of dietary consumption and physical activity promotion.

ACKNOWLEDGMENT

The researchers are very grateful to the students who participated in the study and to the administration of Al-Ghad Colleges for Health Sciences who supported this study.

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