

## Dietary and Physical Activity Profiles of a Sample of College Students in Jordan

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### ABSTRACT

The aim of this study was to investigate fast food consumption, eating pattern and physical activity habits among a sample of male and female students at the Hashemite University. This study was conducted on a convenient sample of 512 college students (275 males & 237 females) aged 20.8±1.4 year. Students were randomly recruited from different majors at the university in 2005. Anthropometric measurements (height, weight, and fat percent) were taken by a trained dietitian at the nutritional assessment lab. Body mass index (BMI) was calculated. All subjects were asked to complete food frequency questionnaire (FFQ) with questions on physical activity behavior. The results show 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. Although, the time spent in sedentary behaviors is equal in male and female students, physical activity hours were higher in males than in females. Less than 5 % of the students reported daily consumption of fast foods. The majority of students (87%) consume white bread on daily basis and 62 % of the students never consume whole wheat bread. Chicken was the most common type of meat consumed followed by red meat, then fish. The highest frequencies were reported for vegetables and fruits in both male and female students. High percentage (40 %) reported that they never consumed whole milk, whereas 54 % consume soft drinks on daily basis. Tea followed by black and American coffee was the predominant hot beverages. Beef and chicken burgers, chicken shawerma, falafel sandwich and rice were consumed significantly ( $P < 0.05$ ) more by males while consumption of fresh vegetables was significantly ( $P < 0.05$ ) higher in females. It is recommended to further investigate the eating habits of college students in Jordan and think of intervention to improve such habits.

**Keywords:** Dietary Profile, Physical Activity Profile, Anthropometric Measurements, Food Frequency Questionnaire, Fast Food Consumption.

### 1. INTRODUCTION

The trend of fast food consumption among college

students is increasing. 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, and the influence of mass media. (Pie-Lin, 2004; Story et al., 2002). It has been demonstrated that diet quality (i.e. lower intake of fruits, vegetables and milk decreases, and higher intake of fast foods and soft

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Received on 11/10/2007 and Accepted for Publication on 23/1/2008.

drinks) declines from childhood to adolescence (Story et al., 2002). 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.

Most of the fast foods provide more than 50% of the calories from fat and more than 13% from saturated fat (Mahna et al., 2004; Paeratakul et al., 2003). A study conducted by Ebbeling et al., (2004) indicated that a single fast food meal might provide about 62% of an individual daily energy requirement. Several dietary factors inherent to fast food may cause excessive weight gain. These factors include massive portion size, high energy density, palatability, high content of saturated and trans-fats, high glycemic load, and low content of fiber (Ebbeling et al., 2002). Therefore, fast food consumption is a predominant risk factor for overweight and obesity in college students, who depend mainly on fast food on their daily basis, especially if they are physically inactive (Bowman and Vineyard, 2004; Prentice and Jebb, 2003).

Eating a nutritious breakfast may help control body weight (Ortega et al., 1996) due to a decrease in fat intake and reduced impulsive snacking (Schlundt et al., 1992; Chao and Vanderkooy, 1989). Unfortunately, breakfast consumption has declined significantly between 1965-1991 for both children and adolescents (Siega-Riz et al., 1998). Individuals' breakfast eating has been identified as an important factor in nutrition, especially during growth (Keski-Rahkonen et al., 2003). Consuming breakfast regularly is also an important contributor to a healthy lifestyle and health status. Many studies have shown significant relationship between skipping breakfast and stress, catching cold, chronic disease and high BMI of adolescent (Kumar et al., 2004; Keski-Rahkonen et al., 2003; Smith, 2003; Berkey et al., 2003). Sedentary lifestyle and unlimited food consumption have been implicated in marked increase in obesity prevalence (Nelson et al., 2006; Nicklas et al., 2001). It has been reported that eating regular meals, avoiding snacking,

drinking water instead of calorie containing beverages, reducing fat intake below 30% of energy intake, cutting down television watching to less than 1 hour/day and being more active may decrease the prevalence of obesity (Glenny et al., 1997). Television watching with other sedentary behaviors (videotape, playing computer games, and talking on the telephone) may contribute to obesity in comparison with more physical active behaviors as well as setting the occasion for eating (Waller et al., 2003; Dietz and Gortmarker, 1985).

The aim of this study was to investigate fast foods consumption and daily eating habits of the Hashemite University students. Additionally, sedentary behaviors and physical activity hours were determined in both male and female student at the university.

## 2. METHODS

### Sample

Participants were recruited from the Hashemite University in the summer of 2005. Five hundred twelve students (275 males and 237 females) were randomly selected. The students aged  $20.8 \pm 1.4$  years and were from freshman, sophomore, junior, and senior levels and all majors in the university.

### Measurements and Food Frequency Questionnaire (FFQ)

All measurements were taken by a trained dietitian in the nutritional assessment laboratory, Department of Clinical Nutrition and Dietetics. The measured anthropometric parameters included height, weight, and fat percent. Stature was measured using stadiometer (to the nearest  $\pm 0.5$  cm). Subjects were asked to stand erectly against vertical surface of the stadiometer (Lee and Nieman, 2003). Body weight was measured using a calibrated scale (to the nearest  $\pm 0.1$  kg) after asking subjects to take off shoes and to stand erectly. The results were reported to the nearest  $\pm 0.1$  kg (Lee and Nieman, 2003). Finally, fat percent and amount of fat in the body (in kg) were measured using fat monitor Omron 300<sup>®</sup>

(OMRON, Matoukasa Co. LTD, Japan) (Lintsi et al., 2004). Height, weight, age and gender were entered and the subjects were asked to grasp the monitor tightly. Then the fat percent and fat mass were taken. Fat percent was considered normal if it was between 15-25% for males and 24-32% for females. Body mass index was calculated as weight (kg)/height (m)<sup>2</sup>. Students were classified as underweight if their BMI was <18.5, normal if it was 18.5-24.9, overweight if it was 25-29.9, and obese if their BMI was greater than 30 (Lee and Nieman, 2003).

Food intake pattern was assessed by adopting selected parts from the Third National Health and Nutrition Examination Survey Food Frequency Questionnaire (Lee and Nieman, 2003). Food items were grouped into 8 groups including fast foods, starches, legumes, sweets, junk foods (foods with low content of protein, vitamins and minerals and high content of energy), vegetables, fruits, meats and beverages.

Participants were asked to complete a general questionnaire and FFQ in the presence of a trained dietitian. The general questionnaire was designed to collect data concerning sedentary and physical activity behaviors. The respondent rate for the study was about 93.9%.

#### Data Analysis

Data were analyzed using SPSS program (Statistical Package for Social Sciences, version 12.0). The values of height, weight, BMI and fat percent were represented as mean  $\pm$  SD. Continuous data were analyzed using t-test to compare male to female outcomes. Categorical variables using percentages and proportions were analyzed using Chi-square. Statistical significance was reported at  $P < 0.05$  level (Heath, 1995).

### 3. RESULTS

The mean values of height, weight and fat percentage were, as expected, significantly different when male students compared to females as shown in Table (1). No significant difference in BMI was identified between

males and females. Most of the students fell in the normal category (BMI: 18.5-24.9).

However, Table (2) illustrates that there was no significant difference between the percentage of male and female students regarding the BMI categories. In other words, 30.2 % of male and 19.1 % of female students were overweight while 6.6 % of male and 5.3 % of female students were obese. Table 2 shows the body fat percentages in male and female students. It is clear that the body fat content is within the normal range for both male and female students.

Breakfast was the main meal that both males and females students used to skip. The difference between females and males in skipping dinner meal was significant ( $P \leq 0.05$ ). About 43% of female students never consumed their dinner, while only 11% of male students used to miss this meal.

Table 4 shows that about 61% of male and 66% of female students who consume breakfast on daily basis were within the normal BMI, while 24 and 28% of male and female students respectively fell in the overweight category. Additionally, less than 25% of both male and female students who used to eat their dinner daily had a BMI higher than 25, while about 17 and 33% of male students who miss their dinner were in the overweight and obese BMI (range of  $> 25$ ), respectively.

Regarding the sedentary behaviors and physical activity, even though there was a significant difference between male and female students in computer using hours ( $P = 0.008$ ), games playing hours ( $P = 0.004$ ) and studying hours ( $P < 0.001$ ), total time spent in sedentary behaviors was equal (14 hours) in both of them. However, physical activity hours was found to be significantly higher ( $P < 0.001$ ) in males as compared to female students.

Regarding fast food consumption, it was surprising that consumption of fast foods including burgers, scallops and other types of sandwiches was lower than expected as shown in Table 6. Less than 5 % of the students stated

that they consume fast foods on daily basis.

It has been found that white bread is the staple food for the students. The majority of students (87%) consumed white bread on daily basis and that 62 % of them never consumed whole bread (Table 7). Rice was the second starchy food consumed on daily basis by the students (36%) followed by potatoes (14%). With respect to pulses consumption, 73% and 50 % of the students consumed chickpeas and beans more than once weekly, respectively. The highest frequencies were reported for vegetables (35 % reported daily intake of fresh vegetables and 39 % reported daily intake of cooked vegetables) and fruits (50 % reported daily consumption). More than half of the participants (68 %) reported daily sugar consumption. As indicated in Table (7), the intake of corn chips on daily basis was reported by 40 % of the participants.

The results of meat consumption showed that chicken was the most common type of meat consumed (40% eat chicken 2-3 times weekly) followed by beef and mutton (28% eat them 2-3 times weekly). Fish consumption was not reported as frequent as chicken and red meat. Thirty nine percentage of the students reported fish consumption once monthly. The majority of the students (70%) reported eggs consumption "at least once weekly", whereas 19 % of the students consume eggs on daily basis (Table 8).

Regarding beverages consumption (Table 9), 40 % of the students stated that they never consumed whole milk, whereas 54 % consumed soft drinks on daily basis. Tea followed by black and American coffee was the predominant hot beverages.

#### 4. DISCUSSION

The rate of overweight was 30.5% and 19.1% in males and females, respectively, while obesity rate was about 6.7 % and 5.3 % in males and females, respectively. This is in agreement with DOS report (DOS, 2002) on the whole Jordanian population and with

Ahmad et al (2006) in their study on young adult females (20-25 Years) from Northern Badia of Jordan.

Rate of obesity and overweight in this study was higher than what has been documented in Iran among high-school girl (Gargari et al., 2004), however, the incidence was lower than those in Arabian Peninsula (Al-Mahroos and Al-Roomi, 1999). In Iran, the prevalence rate of overweight and obesity among high-school girls (aged 14-20 years) is about 10.1% and 3.9 % of the students, respectively. However, in the Arabian Peninsula, the prevalence of obesity was reported to range between 16-25 % in men and 17-43 % in women. A study of Al-Rukban (2003) showed that prevalence rate of overweight among adolescent males was about 13.8 % and obesity rate was 20.5 % in Saudi Arabia.

In regard to breakfast consumption, the study findings indicated that 63% of female students and 55% of male students usually have their breakfast regularly. Twenty four percentages of male students who used to skip their breakfast were overweight and 12% were obese. However, only 19% of male students who had breakfast on daily basis were overweight and 13% were obese. The same trend could be noticed in female students; about 28% and 8% of female students who used to skip their breakfast were classified as overweight and obese students, respectively, whereas about 10% and 2% of those who ate their breakfast regularly were overweight and obese, respectively. This is in agreement with many studies that demonstrated that being male, overweight or obese (high BMI) and physically inactive is associated with breakfast skipping (Yang et al., 2006; Keski-Rahkonen et al., 2003; Schlundt et al., 1992; Chao and Vanderkooy, 1989). Total time spent in sedentary behaviors was similar in both male and female students; male and female students used to spend 6.4 and 6.1 hours/day, respectively, in sedentary behaviors including study time. However, computer use and game playing hours were higher in males than in females whereas studying hours were higher in female than in male

students. The physical activity hours in males were higher than in females. The same results were shown by Brodersen et al. (2006) who demonstrated that hours spent in television watching and computer/videogames playing were higher in adolescent males than in females. Additionally, it has been reported that more men were practicing physical activity and exercise than women and they spent more time in television watching/videos and using the computer (Buckworth and Nigg, 2004).

Chicken shawerma, burgers, French fries, and falafel sandwich were the most commonly consumed fast food. Several studies demonstrate the increasing trend in fast food consumption in different countries (Bell and Swinburn, 2004; Yannakoulia et al., 2004; Colic et al., 2003; French et al., 2000). However, the present study shows a low consumption of fast food among the college students on daily basis. This could be attributed to many reasons including the availability of other traditional foods, and the location of the university which is close to many residence areas. A small percentage of the students live in dorms and away from their parents' residences. Additionally, this could explain the low percentage of obesity among those students. Nonetheless, the profile of food frequency for those students shows the consumption of refined carbohydrate (on daily basis) rather than the whole-grain carbohydrate. This could be attributed to the feeling of unpalatable taste for the whole-grain bread as well as the misconception that whole grain consumption is only beneficial for diseased individuals. However, meals high in refined carbohydrate and added sugar may cause high glycemic index and glycemic load. High glycemic load meals may lead to a physiologic response that promote energy intake in the short term (Ludwig, 2002). Chickpea was the most consumed legume on weekly basis. This is because Hummus is a main weekend-breakfast dish of most Jordanian families. Those results are in agreement with Barszcz and Kolarzyk (2003) who found that secondary school pupils consume too small amount of pulse crops and whole-

grain bread.

Chicken followed by beef and mutton meats are consumed more than fish on daily or weekly basis. This is consistent with which has been declared by WHO, MoH and MoA (2006). They reported that poultry intake was found to be higher than that of meat and fish. The reason behind that is the rise in cost of purchasing fresh fish compared with other types of meat in Jordan.

About 30-35% of the students consume fresh and cooked vegetables once daily, while 50% of them consume fresh fruits on daily basis. Fruits and vegetables consumption is better among young Jordanians than in western countries. In a study conducted in Guam, 75.3% of high school students reported consumption of fruits and vegetables less than once per day (LeonGuerrero and Workman, 2002). Low intake of fruits and vegetables was reported among children in Australia (Bell and Swinburn, 2004); adolescents in the American States (Story et al., 2002); as well as adults and elderly people (Satia et al., 2004) in North Carolina.

The results of the food frequency questionnaire indicate that 40 and 27% of students consumed corn chips and potato chips, respectively on daily basis. Most of the students consumed different types of chips as a substitute for sandwiches and meals. Tea was the most consumed beverage on daily basis followed by soft drinks, black coffee and American coffee. On the other hand, whole milk was the least consumed drink on daily basis. The American Academy of Pediatrics Committee on School Health (2004) reported that potential health problems associated with high intake of sweetened drinks including overweight or obesity attributable to additional calories in the diet; displacement of milk consumption, resulting in calcium deficiency with an attendant risk of osteoporosis, fractures and dental caries and potential enamel erosion. In addition, large increases in total energy from salty snacks, soft drinks and fruit drinks associated with large decreases in energy from low- and medium-fat milk were illustrated in many studies (Nielsen et al., 2002;

Bowman, 2002). Usually, the increase in soft drinks consumption is usually associated with a decrease in milk ingestion. Nielsen and Popkin (2004) demonstrated that for all age groups, sweetened beverage consumption increased and milk consumption decreased. Overall, energy intake from sweetened beverages increased 135% and was reduced by 38% from milk, with a 278 total calorie increase.

In conclusion, even though the rate of overweight and obesity as well as fast food consumption of the present investigation on collage students in Jordan are less than what has been reported in many other countries, universities should implement programs to increase student awareness of healthy weight management methods as well as the importance of physical activity combined with a healthy diet.

**Table (1): Anthropometric measurements of male and female college students (N=512).**

Anthropometric measurements	Males	Females	P value**
	Mean ± SD	Mean ± SD	
Height (cm)	173.2±7.9	159.9±5.9	< 0.001
Weight (kg)	71.3 ±16.3	58.2±14.5	< 0.001
BMI (kg/m <sup>2</sup> )*	23.7±4.6	22.9±6.5	NS
Fat percentage (%)	17.6±1.4	23.6±6.3	< 0.001

\* BMI: body mass index.

\*\* The difference is significant at p <0.05.

**Table (2): BMI\* distribution for male and female college students (N=512).**

BMI categories	Males (%)	Females (%)	P value**
Underweight	8.7	8.5	NS
Normal	53.8	66.7	NS
Overweight	30.8	19.4	NS
Obesity	6.7	5.4	NS

\*BMI: body mass index.

\*\* NS: No significant difference could be detected between male and female students.

**Table (3): Percentages of meal consumption among male and female college students (N=512).**

Response	Breakfast		Lunch		Dinner *	
	M	F	M	F	M	F
Yes	55.0	62.5	88.3	92.0	80.0	43.8
No	28.3	29.5	10.0	5.4	11.2	42.7
Sometimes	16.7	8.0	1.7	2.7	8.8	13.5

\* The difference is significant at P <0.05.

**Table (4): Percentages of BMI categories among male and female college students according to meal consumption (N=512).**

BMI category	Gender	Breakfast (%)			Lunch (%)			Dinner (%) *		
		Yes	No	Sometimes	Yes	No	Sometimes	Yes	No	Sometimes
Underweight	M	6.5	11.8	0	9.8	0	0	10.9	0	0
	F	22.4	16.1	37.5	20.4	20.0	66.7	25.5	19.2	18.2
Normal	M	61.2	52.9	66.7	60.8	50.0	0	65.2	50.0	20.0
	F	65.7	48.1	62.5	65.3	60.0	33.3	63.8	54.6	63.6
Overweight	M	19.4	23.5	11.1	15.7	50.0	0	17.4	16.7	40.0
	F	10.4	27.6	0	13.3	0	0	8.5	19.8	18.2
Obesity	M	12.9	11.8	22.2	13.7	0	100	6.6	33.2	40.0
	F	1.5	8.2	0	1.0	20.0	0	2.1	6.5	0

\* The difference between male and female students is highly significant at P <0.05

**Table (5): Daily time expended in sedentary behaviors and physical activity for male and female students (N=512).**

Daily time of behavior	Gender	Mean ±SD	P-Value*
TV Watching hours	M	2.24±1.64	NS**
	F	2.46±1.78	
Computer using hours	M	2.37±1.93	0.008
	F	1.50±1.24	
Games playing hours	M	0.65±0.14	0.004
	F	0.17±0.05	
Studying hours	M	1.17±1.31	0.001
	F	2.01±1.20	
Sleeping hours	M	7.48±1.66	NS
	F	7.82±1.74	
Physical activity hours	M	2.27±1.62	0.001
	F	0.97±0.81	

\* The difference is significant at P <0.05.

\*\* NS: No significant difference could be detected between male and female students.

**Table (6): Consumption frequency of fast food by the study sample expressed in % of consumers.**

Food item	Gender	Daily	2-3 times weekly	Once weekly	2-3 monthly	Once monthly	Once yearly	Never
<b>Burger*</b>	M	8	16	26	18	13	10	9
	F	2	14	14	11	22	10	28
<b>Scallop Sandwich</b>	M	4	17	13	15	20	13	18
	F	2	9	15	13	26	6	30
<b>Sausage Sandwich</b>	M	2	4	6	9	17	13	50
	F	1	0	8	2	10	12	67
<b>Chicken Shawerma*</b>	M	2	13	20	19	26	8	11
	F	0	6	19	11	27	9	29
<b>Beef Shawerma</b>	M	1	8	11	14	29	9	29
	F	1	2	8	10	22	10	48
<b>Fried Potatoes Sandwich</b>	M	11	28	31	14	6	5	6
	F	13	15	30	13	18	3	8
<b>College Hot Meal</b>	M	7	6	5	6	12	16	49
	F	4	5	3	1	3	4	78
<b>White Cheese Sandwich</b>	M	13	23	18	12	14	8	13
	F	12	17	15	12	16	8	20
<b>Labanah Sandwich</b>	M	13	26	21	13	13	4	10
	F	25	15	17	15	6	4	17
<b>Falafel Sandwich*</b>	M	17	29	21	12	9	2	11
	F	10	14	30	9	14	3	21

\* The difference between male and female students is significant at  $P < 0.05$ .



Table (7): Consumption frequency of different foods by the study sample expressed in % of consumers.

Food item	Gender	Daily	2-3 times weekly	Once weekly	2-3 monthly	Once monthly	Once yearly	Never
Whole Bread	M	6	3	6	2	10	9	65
	F	9	4	1	3	5	18	59
White Bread	M	89	3	1	2	1	1	3
	F	85	7	0	2	2	0	4
Rice*	M	47	34	13	6	1	0	0
	F	24	34	30	7	2	3	0
Cooked Chickpea	M	8	29	41	10	8	2	3
	F	7	16	43	16	11	2	6
Beans	M	7	21	30	14	10	4	15
	F	1	11	25	15	18	5	24
Peas	M	2	8	9	27	32	8	15
	F	0	5	11	15	41	7	21
Fresh Vegetables*	M	32	38	13	1	6	1	8
	F	46	19	11	10	6	1	8
Cooked Vegetables	M	35	33	14	7	5	0	7
	F	35	20	17	10	8	3	6
Whole Fruit	M	46	32	11	4	3	0	4
	F	55	19	11	6	8	0	1
Sugar	M	71	9	2	2	2	1	12
	F	64	1	5	2	5	0	13
Chocolate	M	53	14	11	9	8	0	5
	F	47	20	11	9	9	1	3
Ice cream	M	22	17	19	13	13	6	9
	F	26	18	23	8	15	5	4
Corn Chips	M	42	24	15	3	5	2	8
	F	38	33	18	3	1	0	7
Potatoes Chips	M	27	21	20	5	12	1	14
	F	26	23	28	3	8	0	11
Nuts	M	10	23	21	19	15	3	9
	F	4	18	21	14	27	3	12

\* The difference between male and female students is significant at  $P < 0.05$ .

**Table (8): Consumption frequency of meat, chicken fish and egg by the study sample expressed in % of consumers.**

Food item	Gender	Daily	2-3 times weekly	Once weekly	2-3 monthly	Once monthly	Once yearly	Never
Red Meat	M	5	34	23	11	13	1	14
	F	4	21	21	13	10	5	25
Chicken	M	14	41	29	11	2	1	2
	F	8	39	29	13	1	3	6
Fish	M	1	5	20	15	42	8	10
	F	1	1	20	21	35	10	11
Egg	M	22	28	25	11	6	2	6
	F	14	23	24	11	12	1	13

- Chi-Square is not significant at  $P < 0.05$ .

**Table (9): Consumption frequency of different beverages by the study sample expressed in % of consumers.**

Food item	Gender	Daily	2-3 times weekly	Once weekly	2-3 monthly	Once monthly	Once yearly	Never
Whole Milk	M	15	12	15	9	13	6	31
	F	7	12	7	5	14	7	49
Skim Milk	M	7	0	2	3	9	7	71
	F	7	3	0	1	8	4	76
Soft Drinks	M	57	23	9	1	6	0	5
	F	50	16	18	7	2	1	7
Tea	M	71	10	6	1	3	1	8
	F	59	16	5	2	5	1	10
American Coffee	M	50	15	9	4	2	3	17
	F	38	15	10	4	8	3	22
Turkish Coffee	M	45	21	12	7	9	2	3
	F	34	23	14	9	8	3	9
Artificial Juice	M	21	34	10	11	5	2	17
	F	26	24	12	10	12	3	12
Fresh Fruit Juice	M	20	19	23	19	10	1	8
	F	13	22	28	8	14	7	9

- Chi-Square is not significant at  $P < 0.05$ .

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512				
20.8± 1.4			( 237 275)	
			( )	
%6.6		%19	%30	
( %30	%28)	%30		%5.3
	%44	%80		
			%5	
	%62			%87
%54		%40		

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2008/1/23                      2007/10/11