Food Consumption Patterns and Prevalence of Obesity in an Adult Population in Amman, Jordan

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Abstract: Nutrition scientists generally believe that healthy diets are the ones with most diverse diets. The nutrients essential for meeting nutritional requirements are not all usually found in a single food item; they are however present in a diet composed of a number of foods. Overweight and obesity are major public health problems in various communities of the world. They are no longer just a concern for developed countries, but is also becoming an increasing problem in many developing countries, including Jordan. The aim of the present study, was to assess the food consumption pattern and to estimate the prevalence of overweight and obesity in an adult population in Amman, Jordan. A self- reported questionnaire was administrated to 544 participants (274 males and 270 females), ranging in age from 19-70 years. Participants were asked to record their intake of all food items for 3 days including weekend. The mean serving intake from each food group per day was compared to the Food Guide Pyramid. Body Mass Index (BMI) was used for the assessment of overweight and obesity. Our results showed that 31% of the total sample were over weight and 12% were obese. The prevalence of over weight was higher in males than females (37% and 24% respectively), while the prevalence of obesity was higher in females than males (21% and 4% respectively). Evaluation of dietary intake shows that males consume more servings /d than females from all food groups. On average the participants reported eating 6.4 servings/d of cereal group, 1.8 servings/d of milk, 1.8 servings/d of vegetables, 0.45 servings /d of fruits and 2.6 servings/d of meat group. Habits involving regular eating patterns and vegetable intake were reported and represent practices that ought to be encouraged. The life style practices were compared by gender. The majority of the present sample (74.2 %) reported taking meals irregularly, with 72.2% eating meals 2 times per day; there were no gender differences. However, a significant gender difference was found in the response relating to breakfast intake, with 12.8% of males and 8.9% of females reporting eating breakfast daily (p < 0.0006). A total of 47.9% of subjects reported the consumption of colored vegetables such as spinach and carrots, and 31.7% of subjects reported eating fruit daily. Female students tend to eat more fruit than males (p < 0.0001). This study showed that about 48% of the total sample were either over weight or obese. Through dietary assessment it was observed that participants consume less than recommended from approximately all food groups. Therefore, it would be useful to adopt educational programs of dietary consumption and physical activity promotion.

Key word: Obesity, Overweight, BMI, Food consumption, Food Guide Pyramid, Jordan

INTRODUCTION

Overweight and obesity are major public health problems and the most common nutritional disorders (Yanowski and Yanowski**,** 2002 **;** Stene *et al.,* 2001; Martinez-Ros *et al.,* 2001). Both overall and abdominal obesity are associated with noncommunicable chronic diseases such as type 2 diabetes, cardiovascular and cerebrovascular diseases, digestive disorders, and cancer (Bjorntorp**,** 1988;   Manson *et al.,*   1995). Furthermore, obesity is a major independent risk factor for the development of hypertension, type 2 diabetes, and dyslipidemia (Jia, 2002). The exact causes of obesity remain to be fully elucidated, but lack of physical activity and excessive energy intake are known to be major determinants.(Hill and Peters, 1998 ; Weinsier *et al.,* 1998) As populations become more urbanized, and as lifestyles shift towards reduced physical activity and increased food consumption, the prevalence of obesity is expected to rise.

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Several anthropometric measures have been used to assess abnormal body fat distribution, including body mass index (BMI; weight in kilograms divided by thesquare of height in meters), waist circumference' (WC) and waist-to-hip ratio (WHR). The World Health Organization (WHO) defines overweight as BMI more than 25 kg / m^2, obesity as BMI more than 30 kg / m^2, and central adiposity as WC more than 94 cm for men and more than 80 cm for women, and WHR of more than 0.90 in men and more than 0.85 in women (WHO,1999). However, such recommendations are derived mainly from data obtained in Western populations. In Asian populations, morbidity and mortality appear to occur at lower BMI and smaller WC values, with an increasing number of studies showing that the current cut-off points may need to be lowered for non-Caucasian ethnic groups (Kanazawa *et al.,* 2002; Deurenberg-Yap *et al.,* 1999).

Obesity is considered as the disease of the twenty-first century (Rossner, 2002). In the United States, obesity was not considered as an issue of interest in the mid-1980s, but since then, it has become more common: and in 2003-2004, approximately 32.2 percent of the US adult population were obese (Ogden, 2006). Almost one third of adult Canadians are at increased risk of disability, disease, and premature death due to obesity (Birmingham *et al.,* 1999). Obesity is relatively common in Europe, especially in southern and eastern countries, and studies from repeated surveys suggest that the prevalence of obesity has been increasing recent years (Seidell, 1995 ; Rossner, 2002). Obesity is becoming a common condition in the Eastern Mediterranean Region too. Surveys from the United Arab Emirates, Saudi Arabia, 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 (El-Hazmi.and Warsy, 2000; Al-Nuaim *et al.,* 1996; Ajlouni *et al.,* 1998; Herman *et al.,* 1995; Al-Isa*.,* 1995). Although the urbanization trend has been documented in the region, along with its impact on morbidity and mortality profiles, (Khosh-Chashm, 1998; Alwan, A.,1998) population based data on the consumption, physical activity and smoking, are insufficient. The objective of this study was to assess the food consumption pattern of the adult population living in Amman,and the prevalence of obesity in this area.

MATERIALS AND METHODS

Sample Characteristics and Design:

This cross-sectional study was conducted on a sample of 544 Jordanian adults (274 males and 270 females), ranging in age from 19-70 years. All subjects resided in Amman city, Jordan. Data were collected by trained students from Applied Science University during Feb. – May, 2005. Participants were administered a self-reported questionnaire. The questionnaire consisted of questions regarding eating habits. Self-reported height and weight were used to calculate Body Mass Index (BMI) (kg/m2) and it was used for the assessment of overweight and obesity. The level of significance was set at p- value 0.05 or less. Education was classified into three levels: Low (illiteracy), medium (1-12 years of formal schooling and high (> 12 years of formal schooling).

Data Collection and Analysis:

Dietary intake data was obtained using 3-Day Food records. Subjects kept a food diary of their self-selected foods and beverages for three consecutive days (one weekend day and two weekdays) prior to each assessment day. The number of daily servings of food groups were calculated directly from the subject's three-day food records, then the mean serving intake   was compared to those recommended by the Food Guide Pyramid (FGP).

Statistical Analysis:

The statistical software package SPSS 10.0 was used for the analysis of data. In this study, parametric variables were analyzed using the Student's *t*-test. Chi-square analyses were conducted for non-parametric variables. All analyses were two-tailed, and a 'p' value less than 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Table 1 shows personal information of the sample. Of the 544 persons who responded to the   study slightly more than half were men. Among the respondents 90.8% reported incomes in the moderate or high income levels. More than half of the sample were with higher education (70.9 %) and about half of men and women were married (50.0% and 44.0 % respectively).

Table 1: Demographic characteristics of the sample

Personal information	Males n = 274		Females n = 270		Total n =544	
Marital Status	No.	%	No.	%	No.	%
Single	135	49.3	139	51.0	274	50.0
Married	147	50.0	120	44.0	257	47.0
Widower &						
Divorced	2	0.7	11	5.0	13	3.0
Educational Level						
University	192	70.1	194	71.9	386	70.9
High School	77	28.1	66	24.4	143	26.3
Illiterate	5	1.8	10	3.7	15	2.8
Occupation						
Student	65	23.7	99	36.6	164	30.1
Public and Private Sector Employee	187	68.2	75	27.8	262	48.2
Don't Work	22	8.1	96	35.6	118	21.7
Income Level per month *						
Low (< 200 JD)	16	5.8	34	12.6	50	9.2
Moderate (200-500JD)	119	43.4	114	42.2	233	42.8
High (>500 JD)	139	50.7	122	25.2	261	48.0

* (1$ = 0.7 JD ;Jordanian Dinar)

Table 2 shows the mean number of servings consumed from each of the food five groups of bread-grains, vegetables, fruits, meats, their substitutions and dairy foods, according to the USDA'S Food Guide Pyramid. Evaluation of dietary intake shows that males consume more servings /d than females from all food groups. The average consumption of the whole sample from vegetable and fruit groups were less than recommended (1.8 seving/d and 0.45 seving/ d, respectively).

Table 2 : Average food intake according to FGP. (serving / day) (based on 3- day food Record)

Food group	Males n=274	Females n=270	Total. n=544
Bread, rice and pasta	7.1	5.6	6.4
Milk and dairy product	2.1	1.6	1.8
Vegetables	2.1	1.6	1.8
Fruit	0.5	0.4	0.45
Meat, poultry and fish	3.9	1.9	2.6

The results of this study indicated that the majority of the participants (48.0%) were of normal weight (48.2% of males compared to 47.8% of females) as indicated in Table 3. Based on BMI classification, the prevalence of overweight was more common among males compared to females (36.9% and 24.1 % respectively), while the prevalence of obesity was higher among females compared to males 21.1% and 3.6%, respectively). In contrast, 11.3% males were underweight as compared to 7.0% females.

Table 3 : Body Mass Index Classifications among the participants by gender

BMI	Males n= 274		Females n= 270		Total n= 544	
	No.	%	No.	%	No	%
Under weight (<18.5)	31	11.3	19	7.0	50	9.2
Normal (18.5-24.9)	132	48.2	129	47.8	261	48.0
Over weight(25-29.9)	101	36.9	65	24.1	166	30.5
Obese (≥ 30)	10	3.6	57	21.1	67	12.3

The life style practices were compared by gender. The majority of participants (73.0 %) reported taking meals irregularly, with 79.8% eating meals 2 times per day; there were no gender differences (Table 4). However, a significant gender difference was found in the response relating to breakfast intake, with 12.8% of males and 8.9% of females reporting eating breakfast regularly (p < 0.0006). The present sample demonstrated high consumption of vegetable and fruits. A total of 47.9% of the sample reported the consumption of colored vegetables such as spinach and carrots, (51.8 % females vs. 44.2% males), and 31.7% of subjects reported eating fruit daily. Females tend to eat more fruit than males (p < 0.0001).

Table 4: Lifestyle practices by gender

Questions	Levels	Total		Males		Females		PValue
		N	%	N	%	N	%	
Do you take your mealsregularly?	Always regular	147	27.0	79	28.8	68	25.2	n.s.
	Irregular	397	73.0	195	71.2	202	74.8	
Do you take breakfast?	Daily	59	10.8	35	12.8	24	8.9	p<0.0006
	Three or four times per week	399	73.3	180	65.7	219	81.1	
	Once or twice per Week	39	7.2	26	9.5	13	4.8	
	rarely	47	8.7	33	12	14	5.2	
How many times do you eat meals ?	One time	77	14.2	41	15.0	36	13.3	n.s.
	Two times	385	70.8	190	69.3	195	72.2	
	Three times	52	9.5	31	11.3	21	7.8	
	Four times	30	5.5	12	4.4	18	6.7	
How often do you eat green, red or yellow colored vegetables?	Daily	261	47.9	121	44.2	140	51.8	n.s.
	Three or four times per week	205	37.7	109	39.8	96	35.6	
	Once or twice per Week	70	12.9	38	13.9	32	11.9	
	rarely	8	1.5	6	2.1	2	0.7	
How often do you eat fruits?	Daily	172	31.7	72	26.3	100	37.0	p<0.0001
	Three or four times per week	84	15.4	20	7.3	64	23.7	
	Once or twice per Week	146	26.8	70	25.5	76	28.1	
	rarely	142	26.1	112	40.9	30	11.2	

The life style practices were compared by gender. Significant differences between sexes were determined by Chi-square analyses (p<0.05

The results revealed that (47.0%) of the studied sample were married and the percentage was higher in men (50.0%) compared with women (44.o%). More than 70% of women in this study have high level of education. These results are similar to that were found in the Jordan population and family health survey (DOS,2003). This survey indicated that older women were less likely to have had education than younger women; almost 20% of women aged 45-49 have had no education, while less than 2% of the women between the ages of 15 and 29 had no education.

Overnutrition and it's associated risks of chronic diseases including Coronary Heart Disease (CHD), diabetes and hypertension are perceived as a developed country problem However, there is now increasing evidence that the problems of over-nutrition are growing rapidly in all parts of the world, even in countries where hunger remains endemic. The current study showed that 42.8% of the whole sample (40.5% and 45.2% for men and women respectively) were either overweight or obese. These results are in agreement with other studies in Jordan as well as other regional countries. Among Jordanian adults the overall prevalence of obesity was 49.7%; 32.7% in males and 59.8% in females (Ajlouni *et al.,* 1998; DOS,2003) indicates that, the mean BMI of women in Jordan is 26.6, higher than the normal BMI range of 18.5- 24.9. Forty-one percent of women fall in the normal BMI category. Five percent of women fall below the cut off of 18.5, indicating that the level of chronic energy deficiency is relatively low in Jordan. However, an alarming proportion of women – more than half (54%)- have a BMI of over 25, and thus can be considered overweight or obese. In general, very young women are more likely than other women to suffer from chronic energy deficiency. Mean BMI is higher in women in the oldest age group (45-49 years old). Older women and women with no education or elementary education are also more likely to have overweight or obese (Birmingham *et al.,* 1999 ; Seidell, 1995 ; El-Hazmi.and Warsy, 2000 ; Al-Nuaim *et al.,* 1996 ; Ajlouni *et al.,* 1998). Furthermore, The national behavioral risk factor survey in Jordan conducted in 2004 indicated increase in the prevalence of obesity among Jordanian adults to 19.5% in 2004, a 52.3% increase from the 2002 prevalence of 12.8%. In 2004, approximately 55.0% of adult respondents (52.3% of men and 57.1% of women) were categorized as either overweight or obese (CDC, 2006). Similar findings of prevalence of obesity among adults were reported in recent studies.In a study conducted among 989 medical students (527 men, 462 women) from the University of Crete reported that approximately 40% male students and 23% female students had BMI> 25kg/ m2

(Bertsias *et al.,* 2003). In addition, among Saudi Arabian adults aged 18 to 74 years 51.5% of the men and 65.4% of the women were obese (Binhemd *et al.,* 1991). High prevalence rate of overweight and obesity was also reported in a study conducted in the United Arab Emirates, a cross-sectional survey conducted among 300 male students reported that the prevalence rate of obesity was 35.7% in males and this figure was higher than the rate in females (Musaiger *et al.,* 2003).

Results obtained from this study indicated the low consumption of fruits and vegetables. These foods are considered good sources of dietary fibers, vitamins and minerals. The average consumption of the whole sample from vegetable and fruit groups were less than recommended (1.8 seving/d and 0.45 seving /d, respectively) as shown in table 2. Similar results were obtained by the Multiethnic Cohort study, which was comprised of 92887 men and 113834 women with a mean age of 60 years for both sexes (Nothlings *et al.,* 2006 **).**In this study, the daily consumption of food groups was calculated as FGP servings and the mean daily serving intake of the following food groups were Grain 8.8,Vegetables 4.7,Fruit 3.3,Dairy products 1.3 and meat 4.2 for men and grains 7.3,vegetables 4.8,fruit 3.8,dairy products 1.3 and meat 4.1 for women.The Food Guide Pyramids were developed by using nutrient profiles for the 5 major nutrient-bearing food groups (fruit, vegetable, dairy, grain, and meat and bean) and their subgroups. (Xiang *et al.,* 2006 ; Yahia *et al.,* 2008). The Healthy people 2010 objectives include a focus on nutrition and obesity prevention. In this study, data analyses of sampls' eating habits revealed that the majority of participants eat meals irregularly and eat breakfast daily or three to four times per week. 70.8% of the participants eat meals two times per day. There was no significant gender difference in the frequency of meal intake in the studied sample. In a dietary survey of young Japanese subjects revealed a low rate of individuals engaged in regular eating patterns. The skipping of breakfast has been associated with lower nutritional status and the risk of cardiovascular diseases (Sakata *et al.,* 2001). It has also been reported that less adequate breakfast habits may contribute to the appearance and further development of obesity (Ortega *et al.,* 1996). Therefore the importance of regular eating patterns cannot be overemphasized in nutritional education. Eating habits and dietary intakes are changing rapidly in the developing world. Substantial increase in the intakes of fats, sugars and salt have led to imbalanced nutrition and overnutrition. Food consumption pattern is considered from the most factors that lead to chronic diseases. High intake of fat and cholesterol foods leads to Cardio Vascular Disease(CVD), while foods rich in complex carbohydrates, dietary fibers, fruits and vegetables may prevent diabetes, CVD and some types of cancer. A recent study conducted among college students reported that increased knowledge of dietary guidance, *Dietary Guidelines for Americans 2005*, appeared to be positively related to more healthy eating patterns thus the better eaters had a higher level of knowledge about nutrition (Kolodinsky *et al.,* 2007). Therefore, developing nutrition education programs that promote healthy eating habits for adults should be encouraged.

Conclusions:

It is concluded from this study that the prevelance of overweihht and obesity among males and females is high. There are significant differences between men and women regarding food consumption pattern. The Jordanian consumption of foods, which is considered important to prevent chronic diseases such as fresh fruits and vegetables, is relatively low. This may be due to lack of nutritional awareness among the populations, so educational programs which encourage increase consumption of fruits and vegetables is recommended for a good health. Furthermore, public demand for health and nutritional information should be taken into consideration when implementing strategies aimed at improving the nutritional well-being of individuals.

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