

Prevalence of Obesity among Jordanian School-aged Adolescents in Greater Amman

Hani J. Hamad^{1*} Diana Theeb Abu-Hassouneh² Mohammed O. Ibrahim¹ “Mo’ez Al-Islam” E. Faris³
1.Department of Food Science and Nutrition, Faculty of Agriculture, Jerash University, P.O. Box 311, Jerash 26110, Jordan
2.M.Sc. in Public Health, Jordan University of Science and Technology
3.Department of Clinical Nutrition and Dietetics, College of Health Sciences, University of Sharjah, UAE

Abstract

The objective of this study was to estimate the prevalence of obesity among Jordanian school female adolescents in greater Amman. A representative random sample of 501 female adolescents school children, 10 to 17 years of age was recruited from 3 schools from greater Amman. The anthropometric data for adolescents (10-17 years old) were entered and compared to the growth reference curves/charts developed in 2006/2007 by the World Health Organization (WHO) using WHO 2009 AnthroPlus software. After sorting and cleaning of the data, descriptive analysis was conducted to obtain prevalence of obesity, overweight, and thinness. Malnourished children were defined as those with overweight, obese, or thinness. The overall average prevalences of thinness, normal weight, overweight, and obesity were 7.2% , 46.8%, 36.2% and 9.9 % , respectively. Among the thinness category (WAZ <-2 SD) , the highest percentage (16.7%) is for 16-17 age group followed by 14-15 age group (6.7%) while it is 5.3% in 10-11 age group. An overall prevalence of malnutrition characterized by overweight and obesity together among all age groups is 46.1%. As a conclusion, the study showed that more than half (53.3%) of Jordanian school adolescents in greater Amman are malnourished, with a prevalence of overweight, obesity and thinness at the same time, requiring different strategies to control either type. Further research about the dietary habits and lifestyle behaviors of Jordanian adolescents is recommended.

Keywords: Prevalence, Obesity, School-aged children, Adolescents, Greater Amman, Jordan

1. Introduction

Nutrition plays a major role as a determinant of non-communicable diseases (NCDs), including hypertension, coronary heart disease (CHD), stroke, diabetes, and cancer. Obesity is a major risk factor for non-communicable diseases (NCD). The serious problem with obesity is that it has been progressively increasing in USA and worldwide. For example, the rate of adolescent obesity in United States has quadrupled from 5% to 21% during the past 30 years (Ogden et al., 2014). Biswas et al reported in 2017 that “Overweight and obesity are considered as an emerging public health threat in developing countries. According to the World Health Organization (WHO) estimates, in 2013, there were more than 42 million overweight children under 5 years of age worldwide. The overwhelming majority of these children-almost 31 million (73.8%) - were living in developing countries. It is projected that the number of overweight children worldwide will reach 60 million by 2020”

Jordan is witnessing an epidemiological transition characterized by an upward rise in non-communicable diseases. Improvements in standard of living, abundance of foods, influence of mass media, increased frequency of eating fast foods outside home, and increased inactivity due to spending more time sitting watching T.V or using computers or going to school by bus or car, all are factors that may lead to overweight and obesity. The comprehensive socio-economic development of any country needs well-nourished and healthy individuals. One of the important groups in the communities is adolescents. Specifically, the adolescent girls of today are the mothers to be. Their health is of paramount importance for delivering healthy infants who will have a better chance for fewer incidences of morbidity and mortality.

In Jordan, the nutritional evaluation of the adolescents, regarding the prevalence of obesity and under – nutrition, is badly needed at the national level. No such studies are available. Khader et al. (2008c) found a prevalence rate of obesity of 5.6% and of overweight of 19.4 % in Jordanian school children, aged 6-12 years, from the north of Jordan. For Jordanian adolescents, only one study, where the prevalence rate was about 7%, was published on quite a limited sample size of about 200 school children from Zarqa region (Ahmed & Darawsheh, 2002). This study meant to fill a significant and an important gap of information on the nutritional of Jordanian adolescents who are still in the growing period. Greater Amman was chosen instead of the national study so as to facilitate carrying out the study and in addition we believe that the data obtained give reliable results that could represent Jordanians to a good extent. This is because the population of Greater Amman constitutes about 40% of Jordanians and, as importantly, it houses Jordanians from all governorates due to the urban and “capital” drift, where Amman as the capital city is the focus of urban drift. Hence, the objective of this study was to estimate the prevalence of obesity among Jordanian female adolescents in greater Amman.

2. Methodology

2.1 Subjects:

A representative random sample of 501 female adolescents school children, 10 to 17 years of age was studied from 3 schools from greater Amman. Five hundred females were assessed from public schools. These were selected randomly from different locations of governmental schools registered by the Ministry of Education in 2015.

2.2 Sampling design; Selection of schools and school classes:

A stratified two-stage cluster sampling design was applied where greater Amman municipality was divided into 3 strata based on the age group (3 age groups). The schools were selected in the first stage and one class from each selected school was drawn in the second stage. The average number of students in each class was about 32 students. A complete coverage of each cluster (class) drawn in the sample was applied.

2.3 Stratification:

The study population was divided into three strata as shown in table (1)

Table (1): Study Population

Stratum No.	Age (Year)	Sex
1	10- 11	Female
2	12 –14	Female
3	15 – 17	Female

2.4 Sample Allocation and Selection:

The sample was allocated among strata by using proportional allocation method. The primary sampling units in each stratum were drawn by probability proportionate to the number of students in each age group. Thus the design of this study is considered self-weighted.

2.5 Anthropometric measurements:

Heights and weights were measured and recorded for all adolescents. Age as registered in the birth certificate was recorded. The anthropometric data for adolescents (10-17 years old) were entered and compared to the growth reference curves/charts developed in 2006/2007 by the World Health Organization (WHO) using WHO 2009 AnthroPlus software. The main parameter used to assess the nutritional status by anthropometric measurements is body mass index (BMI) for age. The BMI for age cut-off points Z-Scores as indicators of underweight (or Thinness), normal weight, overweight and obesity were used in order to categorize the girls anthropometric status, as given in the table below (Table 2).

Table (2): WHO Categorization of BMI*/Age Z-Scores for the 10-18 Years Age Group

Status	Z-Scores
Thinness (Underweight)	$x < -2 \text{ SD}$
Normal	$-2 \text{ SD} < x < +1 \text{ SD}$
Overweight	$+1 \text{ SD} < x < +2 \text{ SD}$
Obesity	$+2 \text{ SD} < x$

*Body Mass Index (weight in kg divided by squared height in meters, i.e. (BMI= kg/m²)

Source: WHO Child Growth standards for children, 2006; WHO Growth reference,2007

2.6 Statistical Analysis:

The anthropometric measurements data were entered into the SPSS 19 Software. After sorting and cleaning of the data, descriptive analysis was conducted to obtain prevalence of obesity, overweight, and thinness. Malnourished children were defined as those with overweight, obese, or thinness.

3. Results

3.1. Distribution of the sample:

The distribution of the study subjects according to age categories are given in Table 3.1. It can be seen from the data in table that 12-13 and 14-15 age groups have more count numbers than the other two groups.

Table (3): Distribution of the study subjects according to age categories

Age / Years	Count Number (N)	Percentage (%)
10-11	95	18.96
12-13	145	28.94
14-15	165	32.94
16-17	96	19.16
Total	501	100%

3.2. Anthropometric measurements:

The general anthropometric characteristics of adolescents who participated in this study are shown in Table (4). The anthropometric data of 501 adolescent girls were presented in the table according to the age, height, weight, and body mass index (BMI).

Table (4): Average Weight , Height and BMI* of the adolescents

Age (Year)	N	Weight (Kg)		Height (m)		BMI*	
		M±SD	Min-Max	M±SD	Min-Max	M±SD	Min-Max
10-11	95	36.5 ± 6.96	30-43	1.43 ± 0.12	1.29-1.58	21.6 ± 3.45	16-34
12-13	145	41.6 ± 6.86	33-50	1.49 ± 0.12	1.36-1.62	21.4 ± 3.19	16-34
14-15	165	56.5 ± 6.60	36-77	1.55 ± 0.11	1.43-1.67	20.2 ± 2.91	14-28
16-17	96	72.3 ± 6.74	45-100	1.62 ± 0.11	1.51-1.73	20.8 ± 3.43	14-34
Total	501						

(M) = mean ; (SD)= standard deviation

Note: age “up to” means the maximum final age number is included ; e.g. age from 10-11yr (10 up to 11.99yr)

*BMI = Body Mass Index (kg/m²)

3.3. Prevalence of obesity and thinness:

Table (5) and Figure (1) illustrate the prevalence of malnutrition, and BMI-for-age categories (BMI-A) among adolescents aged 10-17 years. The overall average prevalences of thinness, normal weight, overweight, and obesity were 7.2% , 46.8%, 36.2% and 9.9 % , respectively. Among all age groups categories, the 14-15 year group which has the highest percentage of overweight of 57.6 while for other groups, the highest percentages fall in normal weight category. Among the thinness category (WAZ <-2 SD) , the highest percentage (16.7%) is for 16-17 age group followed by 14-15 age group (6.7%) while it is 5.3% in 10-11 age group. The single most striking observation to emerge from the data comparison was that of 0% for both thinness and obese percentages among 12-13 year age group. An overall prevalence of malnutrition characterized by overweight and obesity together among all age groups is 46.1%.

Table (5): Prevalence (%) of thinness, normal weight, overweight, and obesity among adolescents girls Aged 10-17 years

Age / Years	Thinness (%)	Normal (%)	Overweight (%)	Obese (%)
10-11	5.3	47.3	42.1	5.3
12-13	0	65.5	34.5	0
14-15	6.7	24.2	57.6	11.5
16-17	16.7	50	10.4	22.9
Total (%)	7.2	46.8	36.2	9.9

Note: age “up to” means the maximum final age number is included ; e.g. age from 10-11yr (10 up to 11.99yr)

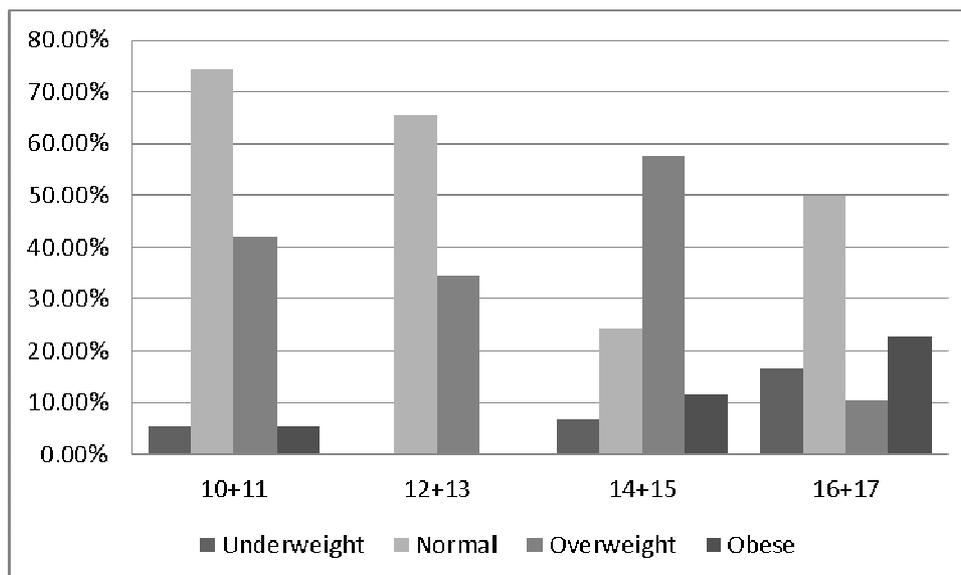


Figure (1): Prevalence (%) of thinness, normal weight, overweight, and obesity among Jordanian adolescents (10-17 years) in greater Amman

4. Discussion

The emergence of obesity as a worldwide phenomenon, now affecting both the poor and the rich countries alike, and both the low and high socioeconomic groups within many countries, is creating a new paradigm for public health interventions (Ruel et al., 1999). Recent researches emphasized that the WHO Child Growth Standards (2006) appear to be more suitable reference for the surveillance of overweight in preschool children (El-Mouzan et al., 2010; Dietitians of Canadian and Canadian Pediatric Society, 2010), school children and adolescents (Dietitians of Canadian and Canadian Pediatric Society, 2010). The data from developed countries indicate that the prevalence of obesity among children increased during the last couple of years. El-Mouzan et al in 2010 summarized some of them. For example, in US, the prevalence of obesity in 1999–2000 was 15.5% among 12- to 19-years old, 15.3% among 6- to 11-years old, and 10.4% among 2- to 5-year-olds. In UK, the prevalence of obesity in 11–15 years old was 25% in 2004. However, in India, consistent low prevalence of overweight (6.67% in 2005) has been reported (El-Mouzan et al., 2010). Other international data from developing countries showed that they are going under nutrition transition are characterized by a wide range of prevalences of malnutrition. Moy et al. reported, in 2004, the observed body mass status of total 3620 Malaysian school children. There were a total of 7.3% of overweight students and 14.8% of underweight students.

In Jordan, no national in-depth study on obesity on all age-groups through the life cycle has been conducted so far. However, published studies are indicative of the grave situation of the high frequency of obesity and its related risk factors that make obesity in Jordanian adults, women in particular, a public health problem. Despite of the differences between adults and adolescents, the anthropometric data of 501 adolescent girls presented in this study seem to be consistent with other research conducted upon adults. In this study, an overall prevalence of malnutrition characterized by overweight and obesity together among all age groups is 46.1%. This finding of the current study is consistent with that of Ajlouni et al (1998) who studied the prevalence of obesity in four semi-urban Jordanian towns in adults aged ≥ 25 years, and observed an alarming high prevalence rate of obesity of 49.8% in females and 32.7% in males. The 1996 Jordan morbidity survey showed an alarming prevalence rate of overweight and obesity of 68% in 2435 individuals, aged 25 years and above (MoH, 1996).

The overall average prevalences of thinness, normal weight, overweight, and obesity were 7.2%, 46.8%, 36.2% and 9.9 %, respectively. These findings are in agreement with the Jordanian Ministry of Health (MoH) national study (conducted In 2007) findings which showed a prevalence rate of overweight of 30.5 % (BMI=25-29 kg/m²) and of obesity of 35.9 % (BMI= \geq 30 kg/m²). The distribution of overweight was 35.9 % in males and 27.5 % in females and obesity in males was 27.8% and in females 42.9 %. In a sample of young adult women (n=233) from Northern Badia of Jordan, Ahmad et al. (2006) observed a prevalence rate of overweight 27.0%; obesity, 6.9% ; and underweight, (BMI< 18.5 kg/m²). In another study, **Khader et al. (2008a)** found that the age-standardized prevalence rate of obesity in a random sample of northern adult Jordanians aged 25 years and over was 28.1 % in men and 53.1% in women.

A possible reason for high prevalence of overweight and obesity is that the developing countries going under nutrition transition, which is characterized by a wide range of prevalences of malnutrition. As reported by

Tang in 2007, Rapid urbanization, increasing reliance on technology, easy access to processed food, increased consumption of high-fat, calorie-dense foods and a more sedentary lifestyle are among the factors causing populations in developing countries to display disease prevalence and trends similar to those seen in developed countries. In recent years, Jordan has experienced rapid industrial development and subsequent economic growth. Consequently, major transitions in the dietary habits and lifestyle of the population which are associated with an increased prevalence of obesity and diet-related chronic diseases have been observed among its population. This study shows that overnutrition continues to be major health problem in urban areas in Jordan. Hence, national programs of physical activities should be proposed to make adolescents aware of the importance of physical exercise in parallel with having well-balanced diets.

In our study, we used both the 2006 WHO Child Growth Standards for Children (birth to five years) and the WHO Growth Reference 2007 (for children and adolescents;5-19 years). The WHO chose to stop weight-for-age charts at age ten years on the basis that it does not distinguish between heights and body mass in an age period, where many children are experiencing their pubertal growth spurt. Pubertal children may appear as having excess weight by weight-for-age when in fact they are just tall. However, the WHO recommends that weight continue to be measured for children beyond ten years-of-age, but solely for the purpose of calculating, plotting and monitoring BMI-for-age (Dietitians of Canadian and Canadian Pediatric Society, 2010). Hence, the data of this study must be interpreted with caution because other methods of anthropometric measures and biochemical assessments of the adolescents, in addition to body weight, height and BMI are more appropriate as indicators of the nutritional status of this age group.

5. Conclusion

In brief, the nutritional evaluation of the Jordanian adolescents, regarding the prevalence of obesity and under – nutrition, is not well-established at the national level. This study fills a gap for an important sector of the population, the well- being of which depends the socio-economic development of Jordan. As a conclusion, the study showed that more than half (53.3%) of Jordanian school adolescents in greater Amman are malnourished, with a prevalence of overweight, obesity and thinness at the same time, requiring different strategies to control either type. In addition, further research about the dietary habits and lifestyle behaviors of Jordanian adolescents is recommended.

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