

# THE PREVALENCE OF OVERWEIGHT AND OBESITY AMONG HIGH SCHOOL MILITARY RECRUITS IN JORDAN (1997-1998)

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## ABSTRACT

**Objective:** To estimate the prevalence of overweight and obesity among high school males with the aim of introducing early measures to increase awareness among the study population.

**Methods:** As part of screening and examination of male military recruits, all subjects at the high school (Tawjihi) who applied for enrollment had their height and weight measured to the nearest 0.5 centimeter (cm), and 1 kilogram (kg), respectively. Body mass index was calculated as weight (kg)/ height<sup>2</sup> (meters).

**Results:** The number of applicants who completed the measurements for height and weight was 6185 students. The total number of applications received during the year 1997-1998 was 9079 (20% of all high school males). Their age ranged between 17- 19 years. They spanned all the governorates of Jordan. According to World Health Organization (WHO) definitions, 19.7% of the sample had a body mass index between 14- 18.9 kg/m<sup>2</sup>, 64% had a BMI of 19- 24.9 kg/m<sup>2</sup>. The prevalence of overweight was 14%, obese 1 (Body mass index of 30-34.9 kg/m<sup>2</sup>) was 2.2%, and obese 2 (35-39.9 kg/m<sup>2</sup>) was 0.1%.

**Conclusion:** Although our study is not representative of the whole adolescent population, it seems that obesity is a common occurrence among this population. Increased awareness about this health hazard is warranted on a nation- wide basis.

**Key words:** Prevalence, Obesity, High School Recruits

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## Introduction

Obesity is a major health problem in both developed and developing countries<sup>(1-4)</sup>. It is assuming an epidemic pattern<sup>(5)</sup> with various deleterious effects on cardiovascular<sup>(6,7)</sup>, respiratory diseases<sup>(8)</sup>, certain forms of cancer and bronchial asthma<sup>(9)</sup>. The fact that obesity is an independent risk factor for many diseases is related to the fact that adipocytes synthesize and secrete several cytokines including tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), interleukin-6 and resistin<sup>(10)</sup>.

Previous studies<sup>(11-13)</sup> showed that half of obese children become adults with an especially high risk of metabolic syndrome<sup>(14-16)</sup>. As all the methods of reducing weight in obese are rarely successful<sup>(17)</sup>, the better method of prevention would be increased awareness of the problem of obesity<sup>(18)</sup> and the identification of child

and adolescent obesity which could lead to early intervention to prevent adult obesity, the metabolic syndrome and cardiovascular risks<sup>(19-22)</sup>. Previous studies in Jordan among school children in military - run schools showed that the prevalence of obesity (body mass index (BMI) > 95% percentile) was 5.7%, and 0.8% in the urban and southern parts of Jordan<sup>(23)</sup>; while in adults the prevalence is much higher.

In this study, we tried to estimate the prevalence of overweight and obesity among high school males with the aim of introducing early awareness about the problem of obesity and improve weight control measures early in life.

## Methods

Each year, males who are in their last year of high

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school (Tawjihi) are invited to submit their applications for consideration to be admitted to Mu'tah University. This study was conducted in the school year 1997- 1998, over a 10- day period during the month of August.

The process of selection included complete physical examination including visual acuity and ear examination. Measurements of weight and height were supervised by a family physician and members of the selection committee, and were recorded to the nearest 1-kilogram and 0.5 centimeters, respectively.

In order to simplify the statistical analysis and data gathering, the participants were divided according to the governorate (according to their fathers' place of birth). The total number of participants of each governorate consists of the urban as well as the rural inhabitants and the participants whose families moved to another governorate later.

All the data were recorded and analyzed on an excel 7 based computer program: Body mass index (BMI) was calculated according to formula (Quetelet) <sup>2</sup>

$$\text{BMI} = \frac{\text{Weight (kilogram)}}{\text{Height}^2 \text{ (meters)}}$$

The definition of various BMI strata was performed using the World Health Organization (WHO), and NHLBI22 criteria as shown in Table I.

## Results

Out of 9079 applicants, a total of 6185 males completed the measurements for weight and height. The age range was between 17-19 years.

Table II shows the number of high school boys during the calendar year 1997-1998 with their representation per governorate. There were 12 governorates in Jordan during that year. The high school children of Amman, which constituted 37.8% of high school children, contributed to 19.8% of our study population, Zarqa's high school children contributed to 4.2%, while Irbid's school children contributed to 29% of our study population.

Table III shows the mean  $\pm$  standard deviation and the distribution of various BMI strata for each governorate. The prevalence of overweight (preobese) for the whole population was 14%, obesity class 1 was 2.2%, and obesity class 2 was 0.1%. The mean  $\pm$  standard deviation for whole population was  $21.8 \pm 3.3$  kilograms/meters square ( $\text{kg}/\text{m}^2$ ) with a mode of  $19.5$  ( $\text{kg}/\text{m}^2$ ), and a median of  $21.2$  ( $\text{kg}/\text{m}^2$ ).

## Discussion

In this study, based on World Health Organization (WHO), and National Heart, Lung, and Blood Institute of United States of America, the prevalence of overweight (Preobese according to WHO criteria) was 14%, obese class 1 category was 2.2%, and obese class 2 was 0.1% among high school males in Jordan. Similar studies in

Saudi Arabia among children aged 17-18 years, reported the prevalence of 15%, and 7.5% for overweight and obesity respectively in 572 boys investigated <sup>(25)</sup>; in another study among Saudi male adolescents in Riyadh, Saudi Arabia, the prevalence of overweight and obesity was 13.8%, 20.5% respectively <sup>(26)</sup>. In Bahrain, 15.6% of secondary school students aged 15- 21 years were either overweight or obese <sup>(27)</sup>. The prevalence of overweight and obesity for the same age and gender is shown in Table IV; most of these studies were extracted from large studies in Arab countries.

The sample size in our study group is large, with 20% of males in the last year of their study taking part in the screening. They were from all governorates of Jordan, but the relative contribution of each governorate to the total and sample size were not uniform as shown in Table II, with certain governorates being represented by lower than their actual population of students as Amman, Aqaba and Zarqa, while other governorates (as Karak, Tafilah, Ma'an and Mafraq) were represented by higher percentage than their actual size. This is related to the fact that the students were grouped according to father's place of birth, and most of the population of Amman, Aqaba, and Zarqa have migrated to these cities from other governorates, so their records will be with their original governorates.

There was no statistical difference between the governorates and all the data were pooled to include all the schoolboys as one group.

A previous study by Majali *et al* <sup>(23)</sup> comparing school children aged 6-17 years in the middle and southern regions of Jordan estimated that 5.8% and 0.3% of school boys aged 17.5 years respectively, had a BMI  $> 97\%$  of predicted. This study is complementary to previous studies in Jordan among adults aged  $> 25$  which showed a mean BMI of  $27.1 \text{ kg}/\text{m}^2$  among adults and a 32.7% of obesity among males with a trend towards increased BMI with age <sup>(28)</sup>; but as the population of Jordan is young (50% below the age of 20 years), and studies from different parts of the world showed that adolescent obesity is highly associated with adult obesity, and all efforts to treat adult obesity are largely unsuccessful, preventive measures should be directed towards the adolescents <sup>(29)</sup>.

Many definitions for overweight and obesity are used <sup>(30-31)</sup>, but the most accepted and applicable is the BMI, as it is easy to perform, easy to calculate and easy to remember.

There are many causes for obesity, including genetic factors related to defective production of leptin, a product of OB gene <sup>(32)</sup>, mutations in the proopiomelanocortin gene sequence, over expression of Agouti protein in the hypothalamus, and other genes that regulate the store of fat <sup>(33)</sup>. However, it is unlikely that genetic factors alone contribute to the great increase in prevalence of obesity worldwide; environmental factors play an important role

including lack of physical activity, and type of food consumed <sup>(34)</sup>.

Among Arabs, the advent of “westernized” life which includes lack of activity <sup>(35-36)</sup>, wide availability of television channels and computers <sup>(37-38)</sup>, reduced family size, higher parent’s education, and a family history of obesity, the prevalence of obesity and overweight is creeping up to levels that are dangerous and warrant attention.

Limitations to our study are that it included only males, we did not study the socioeconomic and demographic variables; but we aimed only to screen a large number of study population (600 students/ day), and the main variable was the governorate. Our sample

may not reflect the whole population of high school children in Jordan, as students who think of themselves being obese would not have submitted their application; nevertheless, it was shown from previous studies that 20% of overweight adolescents did not consider themselves obese <sup>(11)</sup>. Further wider screening programs among different population is needed.

## Conclusion

The problem of overweight and obesity is common in our study population. The need to emphasize the importance of early intervention by education is advised on a nation- wide basis.

**Table I.** Weight classification by Body Mass Index (BMI).

<b>Body mass index (BMI) Kg/m<sup>2</sup></b>	<b>WHO definition stratum*</b>	<b>NHLBI** Definition stratum</b>
< 18.5	Underweight	
18.5- 24.9	Normal range	Normal
25- 29.9	Preobese	Overweight
30- 34.9	Obese class 1	Obese class 1
35- 39.9	Obese class 2	Obese class 2
40	Obese class 3	Obese class 3

\*WHO, World Health Organization.

\*\*NHLBI, National Heart, Lung, and Blood Institute. Adapted from ref. 2.

**Table II.** The distribution of schoolboys according to the governorate and their representation in the study.

<b>Governorate</b>	<b>% of population of Jordan*</b>	<b>% of study group</b>
Aqaba	1.2	0.73
Karak	4.7	9.5
Tafila	1.2	3.4
Ma'an	1.5	3.5
Mafraq	4.4	7.2
Jarash	2.9	4.8
Ajlun	2.3	6.1
Irbid	21.8	29
Madaba	2.6	4.5
Balaqa	6.3	7.6
Zarqa	13.2	4.2
Amman	37.8	19.8

\* Source: Ministry of Education statistics <sup>(24)</sup>

**Table III.** The distribution of weight strata according to the governorate.

Governorate	Number of participants	Mean $\pm$ SD Kg/m <sup>2</sup>	14 – 18.99 Kg/m <sup>2</sup>	19-24.99 Kg/m <sup>2</sup>	25-29.99 Kg/m <sup>2</sup>	30-34.99 Kg/m <sup>2</sup>	> 35 Kg/m <sup>2</sup>
Aqaba	45	22.2 $\pm$ 3.4	17	22	6	-	-
Karak	587	21.6 $\pm$ 3.4	127	376	68	16	-
Tafila	207	21.7 $\pm$ 3.4	45	132	27	3	-
Ma'an	214	21.5 $\pm$ 3.4	53	131	23	7	-
Mafraq	443	21.1 $\pm$ 3.3	130	261	47	5	-
Jarash	299	21.6 $\pm$ 3	54	206	34	5	-
Ajlun	374	21.8 $\pm$ 3.3	72	243	52	6	1
Irbid	1787	22 $\pm$ 3.3	293	1169	282	42	1
Madaba	281	21.8 $\pm$ 3.1	42	198	36	5	-
Balaqa	467	21.6 $\pm$ 3.2	110	263	78	14	2
Zarqa	259	22 $\pm$ 3.4	42	174	37	6	-
Amman	1222	21.8 $\pm$ 3.5	235	777	179	29	2
Whole group	6185	21.8 $\pm$ 3.3	1220	3952	869	138	6

**Table IV.** Prevalence of overweight & obesity among different populations.

The study	Population	Place	Time	Overweight (%)	Obesity (%)
The prevalence of overweight and obesity among high school military recruits in Jordan	6185	Jordan	1997-1998	14	2.3
Baseline population survey data on the prevalence of risk factors for coronary artery disease among Kuwaitis	7609	Kuwait	2001	34.5	23.5
The prevalence of obesity and overweight in 1-18 year-old Saudi children	12071	Saudi Arabia	1994-1998	10.7	6
Obesity among Saudi male adolescent in Riyadh, Saudi Arabia	894	Saudi Arabia	2001-2002	13.8	20.5
Obesity among secondary school students in Bahrain.	417	Bahrain	-----	15.6	-----

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