

Prevalence of Overweight and Obesity in 7 to 18 Year-Old Children in Birjand/ Iran

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Abstract

Objective: The aim of this study was to estimate the prevalence of overweight and obesity in 7 to 18-year-old children in Birjand (east Iran) in 2005-2006. Individuals selected using multistage stratified random sampling.

Methods: This cross-sectional study was performed on 6093 students (2995 boys and 3098 girls) aged 7-18 years in Birjand (2005-2006). Subjects were selected via step-wised random sampling in four districts of the city. Body weight and height were measured directly. Percentiles were calculated for body mass index (BMI). Overweight and obesity was defined based on the 85th and 95th percentiles of body mass index for age and sex, respectively, as proposed by CDC in 2000.

Findings: The overall prevalence rates of overweight and obesity were 4.8% and 1.8%, respectively. Overweight prevalence varied by age from 1.6% to 9.1% in girls and 0.5% to 7.8% in boys, with obesity rate from 0.8% to 2.5% in girls and 0.5% to 3.7% in boys.

Conclusion: According to this study, prevalence rate of overweight and obesity in Birjandi children is lower than that in many other parts of Iran and some neighboring countries.

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Key Words: Obesity; Overweight; Students; Body mass index; Prevalence

Introduction

The prevalence of obesity in children and adolescents is increasing worldwide^[1-2]. In industrialized countries, increased prevalence of obesity among children was also reported

in studies periodically conducted by the Health Center of these countries^[3-5]. Accumulating evidence shows that the epidemic extends to the developing countries as well, in addition to an ongoing problem of under-nutrition in the

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latter^[6-8]. The prevalence of obesity among US children is approximately of 22–30% and has increased at an accelerating rate in the past several years^[9-10].

Obesity in children and adolescents is a serious issue not only because of the health consequences in childhood and adolescence^[11, 12] but also because of the greater risk of obesity in adulthood^[13]. Several methods have been created in order to measure body fat and obesity, during childhood and adolescence. Body mass index (BMI) is the preferred method of expressing body fat percentile of groups. It is widely accepted that a BMI between the 85th and 95th percentiles is defined as overweight, and a BMI greater than the 95th percentile as obesity^[14].

In Birjand, east of Iran, there was limited research on childhood obesity and the present study aims at determining the prevalence of overweight and obesity among children aged 7-18 years, comparing the prevalence of overweight and obesity between males and females and between age groups. Children start school in Iran as soon as they become 6-years old. For 5 years, they go to primary or elementary school (7-11 years old). Then another 3 years are passed as secondary or guidance school (12-14 years old). High school is 4 years (15-18 years old).

Subjects and Methods

The study was carried out at the schools of Birjand. We studied 6093 students (2995 boys and 3098 girls) aged 7-18 years from 2005-2006. Participants were selected through the systematic sampling technique

The measurements of body height and weight were carried out by trained medical students in the morning. Body weight (in kilograms) was measured to the nearest 0.1 kg with an electronic scale (SECA; Germany). Body height was measured to the nearest 0.5 cm as the adolescents stood erect against a vertical wall-mounted scale with heels, buttocks, and occiput in the Frankfort plane

with anthropometric square. The subjects were dressed with light underclothes and wore no shoes throughout the measurements. BMI (kg/m²) was calculated as the ratio of the body weight to the square of body height.

Data were processed and analyzed by the EPSS software version 11.5. Estimations of the prevalence of overweight and obesity were based on CDC in 2000 (in excess of the 85th and 95th percentiles, respectively). The chi-square test, with a significance level of 5% ($P < 0.05$) was used to compare the prevalence rates, taking into consideration gender and age group.

Findings

The sample, representing children aged between 7-18 years, consisted of 6093 subjects (3098 girls, 2995 boys). The overall prevalence of overweight and obesity was 4.8 and 1.8 percent, respectively.

Comparison of overweight and obesity prevalence in primary, secondary and high school children are shown in tables 1-4. Table 5 shows overweight and obesity prevalence in relation to sex. Prevalence of

Table 1: The prevalence of overweight and obesity in primary school (using the CDC BMI reference criteria)

Age (years)	Overweight	Obesity
<7y n=271	9(3.3%)	4(1.5%)
8y - 8y & 11 mo n=364	5(1.4%)	2(0.5%)
9y - 9y & 11 mo n=363	6(1.6%)	5(1.4%)
10y - 10y & 11 mo n=383	6(1.6%)	4(1.1%)
11y - 11y & 11 mo n=415	18(4.3%)	7(1.7%)
All n=1796	44(2.4%)	22(1.2%)

Table 2: The prevalence of overweight and obesity in secondary school (using the CDC BMI reference criteria)

Age (years)	Overweight	Obesity
12y -12y & 11 mo n=683	24(3.5%)	6(0.9%)
13y -13y 11 mo n=667	38(5.7%)	13(1.9%)
14y - 14y & 11 mo n=617	33(5.3%)	11(1.8%)
All n=1967	95(4.8%)	30(1.5%)

overweight and obesity was 5.8%, 1.5%, respectively, among girls and 3.7%, and 2.1% among boys. The prevalence of overweight was highest at 15 years of age among boys and girls (7.8%, 9.1%, respectively). The prevalence of obesity was highest at 18 years of age among boys (3.7%) and at 15 years among girls (2.5%).

Discussion

The purpose of this study was to provide data on the prevalence of overweight and obesity

Table 3: The prevalence of overweight and obesity in high-school (using the CDC BMI reference criteria)

Age (years)	Overweight	Obesity
15y -15y & 11mo n=696	59(8.5%)	21(3%)
16y -16y & 11mo n=641	41(6.4%)	14(2.2%)
17y -17y & 11mo n=581	35(6%)	14(2.4%)
18y -18y & 11mo n=412	19(4.6%)	12(2.9%)
All n=2330	154(6.6%)	61(2.6%)

Table 4: Comparison of prevalence of overweight and obesity in our subjects by type of school

Type of school	Overweight	Obesity
Primary school n=1796	44(2.4%)	22(1.2%)
Mid school n=1967	95(4.8%)	30(1.5%)
High school n=2330	154(6.6%)	61(2.6%)
Total=6093	293(4.8%)	113(1.8%)

$X^2=52.2$; $df=4$; $P<0.001$

among East Iranian children. The results of the present study demonstrated that the overall prevalence of overweight and obesity were 4.8% and 1.8%, respectively.

The prevalence of overweight and obesity among the East Iranian children (7-18 y) was lower than those reported in literature. Birjand, center of South-Khorasan province, is located in the east of Iran and one of the most deprived areas in Iran (Fig 1).

Moayeri reported that the prevalence of overweight and obesity among Tehrani students was 21.1% and 7.8%, respectively^[7]. In Tabriz, west Iran, the prevalence of

**Fig 1:** Map of Iran showing geographic regions and the location of Birjand

Table 5: The prevalence of overweight and obesity in our subjects by gender (using the CDC BMI reference criteria)

Age	Girls			Boys		
	Total	Overweight	Obesity	Total	Overweight	Obesity
7y (n=271)	130	7(5/4%)	1(0/8%)	141	3(2/1%)	2(1/4%)
8y (n=364)	173	4(2/3%)	1(0/6%)	191	1(0/5%)	1(0/5%)
9y (n=363)	187	3(1/6%)	3(1/6%)	176	2(1/1%)	3(1/7%)
10y (n=383)	172	5(2/9%)	1(0/6%)	211	3(1/4%)	1(0/5%)
11y (n=415)	209	13(6/2%)	5(2/4%)	206	2(1%)	5(2/4%)
12y (n=683)	363	16(4/4%)	3(0/8%)	320	3(0/9%)	8(2/5%)
13y (n=667)	332	24(7/2%)	3(0/9%)	335	10(3%)	14(4/2%)
14y (n=617)	368	23(6/2%)	4(1/1%)	249	7(2/8%)	10(4/1%)
15y (n=696)	361	33(9/1%)	9(2/5%)	335	12(3/6%)	26(7/8%)
16y (n=641)	334	23(6/9%)	6(1/8%)	307	8(2/6%)	18(5/8%)
17y (n=581)	273	20(7/3%)	6(2/2%)	308	8(2/6%)	15(4/9%)
18y (n=412)	196	10(5/1%)	4(0/8%)	216	8(3/7%)	9(4/2%)
total	3098	181(5/8%)	46(1/5%)	2995	67(2/1%)	112(3/7%)

overweight and obesity in high-school girls was 11.1% and 3.6%, respectively [15]. In Shiraz, south Iran, the prevalence of overweight and obesity among adolescents (13-18 year-olds) was 11.3% and 2.9%, respectively [16].

The reasons for the lower prevalence of overweight and obesity among our subjects are largely unknown. But its reason may be sought in genetic factors, environmental factors (such as the hot weather), type of diet, extent of physical activity, different definitions of overweight and obesity and low socio-economical status in east Iran.

The prevalence of overweight and obesity among 1253 students in Sana'a City (Yemen) was 6.2%, and 1.8%, respectively. The prevalence of overweight and obesity in 8300 Childhood in central Iraq was 6% and 1.3%, respectively. The results of our study was similar to those of these two reports [17-18]. But other studies in Asia (Thailand, Saudi

Arabia, China), Europe (France, Greece, Spain), Africa (South Africa) and America (Mexico, New York State) reported higher prevalence of overweight and obesity among students [8,10,19, 21-4].

Some countries showed significant gender differences in overweight and obesity prevalence of children. In particular, most of the reports from Asia and Europe (Qatar, Turkey Greece), showed higher rates among boys than among girls [6,21,25]. On the other hand, Saudi Arabia, Tehran and Kuwait demonstrated the opposite trend [7,8,26]. But it was not different by gender in French and Gibraltar [20,27]. We observed higher rates of overweight among adolescent girls but the rates of obesity were higher in boys.

The limitation of our study is that a descriptive study. In our study, we could not prove any causal relationship between obesity and its risk factors. There is no background for us to compare present status

with the past one. We recommend periodic studies in this field especially in this deprived area of Iran.

Conclusion

This is the first study on overweight in Birjandi children. In our study, the overall prevalence rates of overweight and obesity were 4.8% and 1.8%, respectively. Prevalence rate of overweight and obesity in Birjandian children is lower than that in many other parts of Iran and some neighboring countries.

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