

PREVALENCE OF OVERWEIGHT AND OBESITY IN ADOLESCENTS IN BIRJAND

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Abstract

INTRODUCTION: This population-based study was conducted to assess the prevalence of overweight and obesity in high schools in the city of Birjand in Khorasan Province, Eastern Iran.

METHODS: In this descriptive study, we attempted to determine the prevalence of overweight and obesity in Iranian adolescents attending high school in Birjand in 2005. A sample of 2230 high school students (1115 boys and 1115 girls) aged 15-18 years was selected via stepwise random sampling in four districts of Birjand. Overweight and obesity were defined based on the 85th and 95th percentiles of BMI for age, respectively, as proposed by the Center for Disease Control (CDC) in 2000.

RESULTS: The overall prevalence of overweight and obesity was 6.1% and 2.3%, respectively. The prevalence of overweight was 5% in boys and 7.1% in girls. The prevalence of obesity was 2.8% and 1.8% in boys and girls, respectively.

CONCLUSIONS: The prevalence rate of overweight and obesity in high schools in the city of Birjand is lower than figures reported by studies conducted elsewhere in Iran and other countries.

Key Words: Prevalence, overweight, obesity, adolescents.

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Introduction

Obesity has become a growing concern due to its high prevalence and association with morbidity.¹⁻³ Childhood and adolescent obesity have been identified as risk factors for obesity in adulthood and are linked to increased adult morbidity through predisposing to a variety of conditions such as insulin resistance, lipoprotein abnormalities, diabetes mellitus type II, cardiovascular disease, deep vein thrombosis, and elevated blood pressure.⁴⁻⁶ Serdula found a risk for adult obesity at least twice as high in obese children as in non-obese ones; approximately one-third of preschool children and 50% of school-age children become obese adults.⁷ In contrast to studies involving children and adults, relatively little information is available about the effect of racial differences on weight in adolescents.⁸ However, it has recently been shown that the prevalence of adolescent obesity is increasing not only in developed countries, but also in some developing countries in which malnutrition used to be the major nutritional disorder.⁹⁻¹² Obesity may be defined as excessive accumulation of adipose tissue in the body. Several methods have been developed to measure body fat, including densitometry, ultrasonography,

computed tomography, magnetic resonance, assessment of body potassium content, levels of creatinine, and total body water content. These methods are not widely available and are usually expensive and time-consuming and require qualified personnel. BMI is the preferred method of expressing body fat percentile of groups in childhood and adolescence.

BMI between the 85th and 95th percentiles is widely accepted as the definition of overweight, and BMI greater than the 95th percentile, as obesity.^{13,14}

The present study aimed to determine the prevalence of overweight and obesity in adolescents, and compare the prevalence of overweight and obesity between males and females and between the age groups.

Materials and methods

This study was carried out in high schools of Birjand. A total of 2250 students (1115 boys and 1115 girls) aged 15-18 years were studied.

The participants were selected with the systematic sampling technique, using a list based on which the students were categorized into grades and each grade was organized in alphabetical order.

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Whenever an individual refused to participate in the study, the subsequent student on the list was called. The measurements of body height and weight were carried out by two 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 adolescents were dressed in light underclothing and no shoes throughout the measurements.

BMI was calculated as the ratio of body weight in kilograms to the square of body height in meters (kg/m^2). Data were processed and analyzed with EPSS software version 11.5.

Descriptive statistical analysis of BMI, weight and height was performed. Estimations of the prevalence of overweight and obesity were based on definitions of the Center for Disease Control (CDC) in 2000 (in excess of the 85th and 95th percentiles, respectively).

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.

Results

The sample, representing adolescents aged between 15 and 18 years, consisted of 2230 subjects (1115 girls and 1115 boys). The prevalence of overweight and obesity in relation to the age of adolescents is shown in Table 1. Table 2 shows the prevalence of overweight and obesity in relation to sex. The prevalence of overweight and obesity was found to be

7.1% and 1.8%, respectively in adolescent girls, and 5% and 2.8%, respectively in adolescent boys.

Discussion

The purpose of this study was to provide data on the prevalence of overweight and obesity in adolescents in Birjand. The results demonstrated the overall prevalence of overweight and obesity to be 6.1% and 2.1%, respectively.

Moayeri reported the prevalence of overweight and obesity in students in Tehran to be 21.1% and 7.8%, respectively.¹⁵ The prevalence of overweight and obesity in high school girls was 11.1% and 3.6%, respectively in the city of Tabriz, Western Iran.¹⁶

The prevalence of overweight and obesity was 11.3% and 2.9%, respectively in 13-18-year-old adolescents in the city of Shiraz, Central Iran.¹⁷

The reason for the lower prevalence of overweight and obesity in Birjand adolescents is largely unknown, but diet and undernutrition generally linked to low socioeconomic status in Eastern Iran may be held to account.

The prevalence of obesity in children and adolescents in Europe increased gradually when traced towards east and south. Dutch, Belgian and Swedish adolescents are slimmer than Middle and Eastern European adolescent populations.^{18,19} On the other hand, a higher prevalence of overweight and obesity is seen in Hungarian, Austrian, and Croatian adolescents.¹⁹⁻²¹

Bellizzi et al.²² compared the prevalence of overweight and obesity in 15-year-old boys and girls in different Asian and European countries.

TABLE 1. The prevalence of overweight and obesity in subjects by age (using CDC BMI reference criteria)

<i>Normal</i>	<i>Obese</i>	<i>Overweight</i>	<i>Age (years)</i>
637 (91.5%)	14(2%)	45(6.5%)	15, N=696
586 (91.4%)	14(2.2%)	41(6.4%)	16, N=641
532 (91.6%)	14(2.4%)	35(6%)	17, N=581
289 (92.6%)	9(2.9%)	14(4.5%)	18, N=312
2044 (91.6%)	51(2.3%)	135(6.1%)	All, N=2230

TABLE 2. The prevalence of overweight and obesity in subject by gender

<i>Sex</i>	<i>Overweight</i>	<i>Obese</i>	<i>Normal weight</i>
girl	79(7.1%)	31(1.8%)	1016(91.1%)
boy	56(5%)	20(2.8%)	1028(92.9%)
total	135(6.1%)	51(2.3%)	2044(91.6%)
$\chi^2 = 6.36$	df=2	P=0.04	

Among these populations, the total prevalence of overweight (obesity and overweight) in boys ranged from 5.8% (in the Netherlands) to 30.5% (in Taiwan), and in girls from 6.3% (in Hong Kong) to 21.1% (in Taiwan). In Asia, a higher prevalence of obesity was found in Taipei and Saudi Arabian adolescents.^{23,24}

Some countries showed significant gender differences in the prevalence of overweight and obesity in adolescents. In particular, most of the studies performed in Asia and Europe (Taiwan, Finland and Austria) showed higher prevalence rates in adolescent boys than girls.^{19,20,23} Saudi Arabian and Brazilian adolescents demonstrated an opposite trend.^{22,25} In our study, higher rates of overweight were observed in adolescent girls but the rates of obesity were higher in boys.

The obesity epidemic in adolescents is troubling, not because of cosmetic issues, but because of tremendous public health implications.

Roughly 60% of overweight 5-10-year-olds are reported to have one associated biochemical or clinical cardiovascular risk factor such as elevated blood pressure, hyperlipidemia, and increased insulin levels; 25% have two or more risk factors.²⁶ Research findings suggest that the risk factors observed in childhood often become chronic diseases in adulthood. Approximately 80% of obese adults have diabetes, hypertension, coronary artery disease, gallbladder disease, osteoarthritis, high blood cholesterol, or obesity-related cancers.²⁶

Although it is commonly assumed that high-fat diets and overeating are the primary causes of obesity, recent findings demonstrate that mean energy intake and fat consumption in industrialized countries have declined substantially, while obesity rates have increased.²⁷ Changes in the amount of daily physical activity may account, at least in part, for this apparent discrepancy.

Indeed, many attribute the epidemic rise in obesity prevalence to increasingly sedentary lifestyles.

For many children, leisure time activities are more sedentary, with television watching, video games, and internet browsing. Furthermore, less energy is spent in activities of daily living and at work.²⁷ In Iran, Kelishadi et al. evaluated the physical activity of the children and adolescents of Isfahan in 1994 and 2001. They reported that physical activity levels showed no significant improvement during the previous seven years (1994-2001). The rate of regular morning exercise was declining in high schools. During these years, some parents had agreed to their children's

participation in sports activities outside school hours, but disagreement to such activities showed an increasing trend. About 60% of students watched television more than 4 hours daily and only 10% of parents showed any objection to this behavior.²⁷

The health status of children and adolescents in Iran has improved in many areas, as evidenced by lower rates of communicable diseases and declines in nutrient deficiency diseases of the past; however, rapid westernization and lifestyle changes have made them prone to chronic diseases later in life.

Achieving better health through improved diet and increased physical activity is bound to decrease the prevalence of chronic diseases.²⁹

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