



# Evaluation of the change in the prevalence of childhood obesity in ten schools in the province of Isparta

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## Summary

**Aim:** To determine the prevalence of childhood overweight and obesity of elementary and high school-aged children, and to assess the change over time by comparing with the previous study.

**Material and Method:** A total of 5716 subjects [a mean age  $11.1 \pm 3.1$  years (5.9-19.7); 2454 girls (42.9%) and 3262 boys (57.1%)] from 7 primary and 3 high schools which were a previous study have been done at these schools 4 years ago, were randomly enrolled into the study. The study was approved by the ethics committee (10.06.2008-04/1)

**Results:** The prevalences of overweight and obesity were determined as 11% and 12.5%, respectively. In girls; the prevalence of overweight was 10.4% and obesity was 11.2%. In boys; the prevalence of overweight was 11.4% and obesity was 13.4%.

**Conclusions:** Four years before the prevalences of overweight and obesity were determined as 12.2% and 11.6%; in the current study; the prevalence of overweight subjects has decreased, however; obesity prevalence has increased in over time. (*Turk Arch Ped* 2013; 48: 152-155)

**Key words:** Childhood obesity, gender, Isparta, overweight, prevalence

## Introduction

Obesity shows a marked increase in the first year of life, in the 5-6<sup>th</sup> years and in the adolescence in children. 1/3 of obese children and 80% of obese adolescents stay obese when they reach adulthood (1). In addition, it is known that 30% of obese adults were also obese during childhood (2). The weight lost in the adulthood is regained excluding 5% of the obese people (3). Therefore, early treatment of the patients diagnosed in the childhood decreases future obesity or treatment resistance with a high rate.

It has been reported that the prevalence of childhood obesity is 10-fold higher compared to 1970s. According to the 1976-1980 and 2003-2006 data of the National Health and Nutrition Examination Survey (NHANES), the prevalence of obesity increased from 5% to 12.4% in children aged 2-5 years, from 6.5% to 17% in children aged 6-11 years and from 5% to 17.6% in children aged 12-19 years (4,5). Although limited number of studies

about obesity have been conducted in our country, it has been reported that the prevalence of childhood obesity has increased from 6-7% to 15-16% in the last 20 years (2). It has been reported that obesity is observed with high rates (10-15%) in school-aged children and adolescents in large cities (6). Cinaz et al. (1) reported the prevalence of obesity in Turkey to be 13.8% in the study they conducted with 12 600 children aged 6-14 years.

If childhood obesity is not treated until adulthood, it leads to life-threatening diseases which are more difficult to treat. Therefore, studies are being conducted to determine the prevalence of obesity in many countries. While it is observed more frequently in lower social layers in developed countries, it is mostly observed in the moderate and upper layers in developing countries (7,8). Mainly, the media, The Ministry of Health and the Ministry of Education pursue their efforts of raising the awareness of public to decrease obesity. It is hoped that these efforts

will contribute to the decrease in the prevalence of obesity. In this context, it was aimed to determine the prevalence of overweight and obesity in school-aged children in our region and make a comparison with the study performed 4 years ago in the same region.

## Material and Method

This study was performed between December 2008 and January 2009 after obtaining approval from the ethics committee (10.06.2008-04/13). This study was conducted in accordance with the guidelines of Helsinki Declaration. The mothers and/or fathers of all the children included in the study were informed about the study and written consent was obtained from all of them.

Our study was conducted after obtaining approval from the Ministry of Education Isparta Provincial Directorate to perform a study again in 7 elementary schools and 3 high schools which had been selected randomly 4 years ago and in which a study of obesity was performed in the province of Isparta. The heights of a total of 5 716 students were measured as naked and standing with the heels combined and the head, feet, back and hip touching the wall leaning to the wall using the Harpendin Stadiometer from the top of the head to the sole as meters. All patients were weighed using 100-gram sensitive SECA (767 model) digital scale as standing on the scale with both feet stepping on the scale fully in kilograms and the scale was reset after each measurement.

The index which is found by dividing the weight measured to the height in meters squared is assessed

according to the tables prepared for the children of each country. If the calculated value is above the 95th percentile, it is considered obesity. In a study in which the specificity and sensitivity of body mass index (BMI) were investigated and 95% was considered as cut-off, the sensitivity was found to be 88% and the specificity was found to be 94% (9). Using the height and weight measurements the BMIs were calculated with the following Formula:  $(\text{Weight [kg]} / \text{Height}^2 [\text{m}^2])$ . The Centers for Disease Control-CDC 2000 considers BMI percentiles as the base for childhood and adolescence and defines the range of %85-95 as overweight and above 95% as obesity (4,5,10,11). We used the percentile curves determined for the Turkish children and considered a BMI of <5% as lean, a BMI of 5-85% as normal, a BMI of 85-95% as overweight and a BMI of >95% as obese (12).

Individuals who had a chronic disease which might cause obesity, who had a history of drug usage, who were found to have endocrinological pathology or who were thought to have obesity due to a syndrome and who were exposed to any factor which could lead to insulin release were excluded from the study.

### Statistical Analyses

While assessing the results obtained in the study SPSS 15.0 (Statistical Package for Social Sciences Inc., Chicago, IL) program was used for statistical analyses. Chi-square test was used to compare the study data. A p value of <0.05 was considered significant.

## Results

2 454 (42.9%) of 5 716 students included in the study were female and 3 262 (57.1%) were male. The mean age was  $11.1 \pm 3.1$  (5.9-19.7) years. The mean body mass index was calculated to be  $18.6 \pm 3.5$  (11.8-37.5).

The BMI percentile distribution of the students according to age groups is given in Table 1. No statistically significant difference was found between age groups and BMI. Totally, the prevalence of overweight was found to be 11.0% and the prevalence of obesity was found to be 12.5%.

	BMI (%)	Age	
		5.9-10.9 year	>11.0 year
Female	<5	47 (3.8%)	47 (1.7%)
	5-84	1131 (74.6%)	699 (73.4%)
	85-94	125 (10.4%)	131 (11.4%)
	≥95	118 (11.2%)	156 (13.4%)
	Total	1421 (100%)	1033 (100%)
Male	<5	19 (1.3%)	38 (2.1%)
	5-84	1086 (75.6%)	1309 (71.7%)
	85-94	156 (10.9%)	216 (11.8%)
	≥95	175 (12.2%)	263 (14.4%)
	Total	1436 (100%)	1826 (100%)

BMI: Body mass index

BMI (%)	Female	Male
<5	94 (3.8%)	57 (1.7%)
5-84	1830 (74.6%)	2395 (73.4%)
85-94	256 (10.4%)	372 (11.4%)
≥95	274 (11.2%)	438 (13.4%)
Total	2454 (100%)	3262 (100%)

In girls, the prevalence of overweight was found to be 10.4% and the prevalence of obesity was found to be 11.2%. In boys, the prevalence of overweight was found to be 11.4% and the prevalence of obesity was found to be 13.4% (Tablo 2). Although the prevalences of overweight and obesity were higher in boys compared to girls, the difference was not statistically significant.

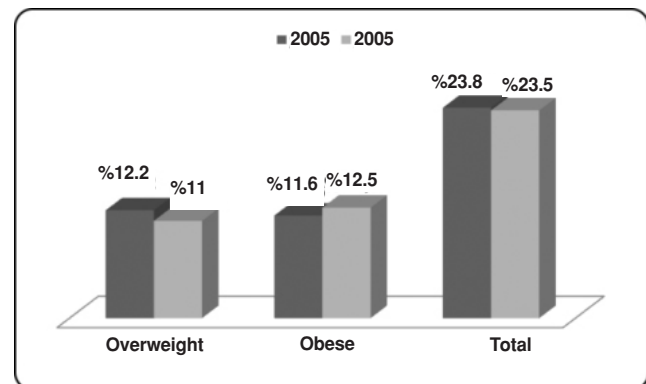
## Discussion

In recent years, the prevalence of childhood overweight and obesity has gradually increased. In the 2005-2006 data of the National Health and Nutrition Examination Survey, BMI was found to be  $\geq 85\%$  in 30.1% of the children aged 2-19 years and  $\geq 95\%$  in 10.9% in USA (5). In our study, the prevalence of overweight was found to be lower compared to USA (30.1% vs 11.0%), while the prevalence of obesity was found to be higher (10.9% vs 12.5%). In some other countries, overweight is found with a high rate, while obesity is observed with a lower rate. This result shows that children who gain weight rapidly are diagnosed early and the necessary follow-up is done to prevent obesity in developed countries. The fact that the rate of overweight was 11.0% and the rate of obesity was 12.5% in the students in Isparta shows the significance of determining the state of overweight at an early period. Thus, it is thought that the incidence of obesity will be reduced with early determination of overweight in Isparta province. In addition, rapid weight gain which is recognized by the parents in the early period should be given importance before obesity develops in children of this age group and assistance should be received from pediatric endocrinology outpatient clinics, when necessary.

In our study, the rate of overweight was found to be 10.4% and the rate of obesity was found to be 11.2% in girls, while the same rates were found to be 11.4% and 13.4% in boys, respectively. Although no statistically significant difference was found between the two genders in this age group in terms of overweight and obesity, they were observed more frequently in the male gender. In some countries, however, they are observed more frequently in girls. For example, the prevalence of overweight was found to be 17.2% in girls and 11.6% in boys in Austria in 2006 in children aged 7-11 years (13). However, in some countries, obesity is observed more frequently in the male gender as in our country. In a study performed by Mavrakanas et al. (14) in Greece in 2009, the prevalence of obesity was found to be 21.1% in girls aged 4-10 years and 23.7% in boys. In our country, overweight was found with a rate of 13.4% in girls and with a rate of 9.2% in boys and obesity was found with a rate of 10.7% in girls and with a rate of 15.1% in boys in a study performed by Arı et al. (15) in Muğla in 1482 children aged 7-15 years. In a study performed in 473 children aged 11-15 years in Konya in 2007, overweight was found with

a rate of 8.0% in prepubertal children and with a rate of 10.4% in postpubertal children and obesity was found with a rate of 3.1% in prepubertal children and with a rate of 9.1% in postpubertal children (16). In a comparative study performed in Japan in 2001 and 2007, obesity increased by 2-8% in both girls and boys (17). In Isparta where we conducted our study, Tola HT et al. (18) found the frequency of overweight and obesity with a rate of 12.2% and 11.6%, respectively in a study which was performed in the same schools 4 years before us. In the same study, 9% of the girls and 14% of the boys were found to be obese. In our current study which was performed in the same region, almost in the same age group and with the same number of subjects with similar socioeconomical structure, the rate of overweight was found to be 11.0% and the rate of obesity was found to be 12.5% and the frequency of obesity was found to be 11.2% in girls and 13.4% in boys. In studies performed both in our region and in other regions of our country, the rate of obesity was found to be higher in the male gender. The finding that obesity is observed more frequently in boys in our country may be explained by the fact that we are a male-predominant population and girls are forced to do housework with a higher rate compared to boys and thus they are more active compared to boys.

While the total incidence of overweight and obesity was 23.8% in 2005, it was found to be 23.5% in 2009 when our study was performed (Figure 1). While overweight was found to be decreased in total compared to four years ago, the rate of obesity was found to be increased. In contrast to other countries, no marked increase was found in the total frequency of overweight and obesity in the last four years and a small amount of reduction was found. We think that this was achieved with precautions including more emphasis on obesity in Isparta province in recent years, heightened awareness of the community by way of the media and internet, opening of many parks and fitness centers by the municipality, frequent emphasis on



**Figure 1. Change in the frequencies of overweight and obesity 4 years apart**

the harms of obesity by healthcare providers and teachers and elimination of foods which lead to weight gain in school canteens.

Obesity is not only an esthetic disorder, but also a clinical problem which affects all organs and systems. It is a predisposing factor for many diseases and a risk factor which increases the morbidity and mortality rate. Obesity is a chronic disease which can develop at any age. Since the complications which may develop are related with the duration of obesity, diagnosis and treatment of overweight at an early age is very important. Considering that obesity can start from the childhood and continue in the adulthood, the duration of obesity is substantially long and the possibility of complications is increased. Therefore, precautions should not only be taken in healthcare centers, but also in provinces by municipality council decisions and families should be informed about the importance of obesity.

**Conflict of interest: None declared.**

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