ERZURUM'DA İLKOKUL ÇAĞI ÇOCUKLARDA OBEZİTE

OBESITY AMONG PRIMARY SCHOOL CHILDREN IN ERZURUM

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Özet

Vücut kitle indeksi (BMI) boya göre ağırlığı değerlendirir ve çocuğun vücudunun şeklini gösterir. Bu çalışmada yaşları 7-12 yıl arasında değişen 3143 ilkokul öğrencisi obezite prevalansını belirlemek üzere vücut kitle indeksi (BMI) ile değerlendirildi. Erkek/kız oranı 1.03 idi. Daha önce oluşturulan Türk çocukları standardına göre obezite prevalansı (BMI>95 persentil) tüm çocuklarda %2.58 erkeklerde %2.07 ve kızlarda %3.10 idi. Obez olmayanlara göre obez çocuklar daha fazla oranda obez anne ve/veya babaya sahipti. BMI obezitenin değerlendirilmesinde rutin olarak kullanılmaktadır. Bölgesel farklılıklar nedeniyle bir ilimiz için BMI standartı oluşturduk. 5,50 ve 95 persentil eğrileri kız ve erkek çocuklar için ayrı ayrı oluşturuldu.

Anahtar kelimeler: *Şişmanlık, Vücut kitle indeksi, Çocuk, Risk faktörleri*

Summary

Body mass index (BMI) indicates the relation between weight and height and reflects the shape of a child. In this study 3143 primary school children aged 7-12 years were assessed by using BMI. The male/female ratio was 1.03. The obesity prevalence (body mass index > 95th percentile) was 2.58% for all children, 2.07% for males and 3.10% for females in this population. Children with obese mothers and/or fathers had more tendency to be obese than children of nonobese ones. BMI is routinely used in assessment of obesity. Because of regional differences we constituted standard for BMI in school children in our city. From measurements of children centile charts were constructed for BMI from the data of height and weight. Centile lines the 5th, 50th, and 95th centiles were plotted for boys and girls separately.

Key words: *Obesity, Body mass index, Children, Risk factor*

Table 1. *Familial Obesity in Obese and Nonobese Children*

	obese children		nonobese children		
	no	%	no	%	p
maternal and paternal obesity	5	6.2	42	1.4	<0.001
paternal obesity	5	6.2	85	2.8	<0.05
maternal obesity	12	14.8	199	6.5	<0.01
parental nonobesity	59	72.8	2736	89.3	>0.05
at least one obese sibling	24	29.7	572	18.7	<0.05
nonobese sibling	56	69.1	2451	80.0	>0.05
no sibling	1	1.2	39	1.3	>0.05
total	81	100.0	3062	100.0	

Introduction

Obesity is an excess of body fat but the fatness of a population forms a continuous spectrum from undernutrition, through "normal" fatness, to gross obesity (1). The adult physician's view is that obesity should be considered a chronic disease, is a definite hazard to health, and is one of the most important medical and public health problems (2). In the past, pediatricians have shown little interest in childhood obesity because it was thought to be a temporary phase and bore no relation to adult obesity with its associated mortality and morbidity (3). Obesity among children is increasingly recognized as a significant nutritional disorder that is linked to orthopedic problems, hypertension, and psychosocial difficulties (4-6). There are many possible methods for measuring body fat. The body mass index (BMI) [weight in kg / (height in m)^2], is widely used to define obesity clinically and epidemiologically and is a better indicator of shape than weight alone. We determined the prevalence of obesity assessed by using BMI in Erzurum. Because of regional differences we constituted standard for BMI in school children in our city. From measurements of children centile charts were plotted for boys and girls separately.

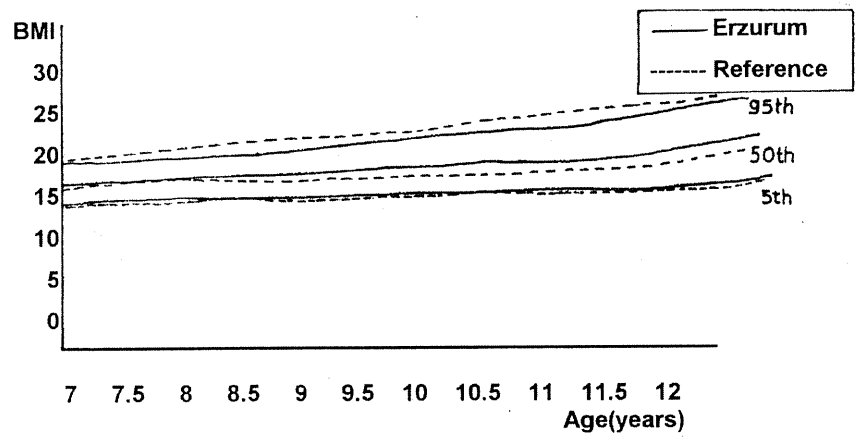
Materials and Methods

This cross-sectional study was performed on 3143 primary school children (1546 F, and 1597 M) equally distributed from 7 to 12 years of age in Erzurum. Since only healthy children were considered for our study, children with chronic diseases, neurological disorders, congenital malformations and students whose ages were doubtful, were excluded. The ages of the children (chronological age) were calculated by using birth date and measurement date. Height and weight measurements were taken using the same standard portable equipment by two consultant pediatrician. The students' height was measured in centimeters to the nearest 0.1 cm while standing barefoot. Children were weighted in light clothing without shoes, and weight was measured to the nearest 0.1 kg. From original data, the BMI (Quetelet) for an individual is defined as $y = w / h^2$, where w and h are the individual's weight (in kg) and height (in m) respectively. We defined obesity among the children as BMI above the 95th percentile, underweight as BMI below the 5th percentile based on the reference population (7). Obesity among the mothers and fathers was defined as BMI above the 95th percentile of adult in the reference population (7).

Table 2. *Distribution of Fathers' Educational Level in Obese and Nonobese Children*

	obese children		nonobese children		
educational level	no	%	no	%	p
none	2	2.4	187	6.1	>0.05
primary school	23	28.4	1036	33.8	>0.05
secondary school	28	34.6	1182	38.6	>0.05
high school	28	34.6	657	21.5	<0.01
total	81	100.0	3062	100.0	

Figure 1. *BMI Centile Curves for Girls Comparing Erzurum with Reference Population*



The parents' educational levels and jobs were used as a marker for the socioeconomic status of the families. Although it was not trusty, children's birth weights were learned from parents' history. To establish local urban standards for children living in Erzurum between seven and twelve years of age we constituted standard for BMI. The centile charts were plotted for boys and girls separately. For each age and sex group, the 5th, 50th and 95th percentile values were obtained. Data was evaluated by percentage and tested for the difference between two population proportions. A regression analysis was used to obtain centile curves for both sex.

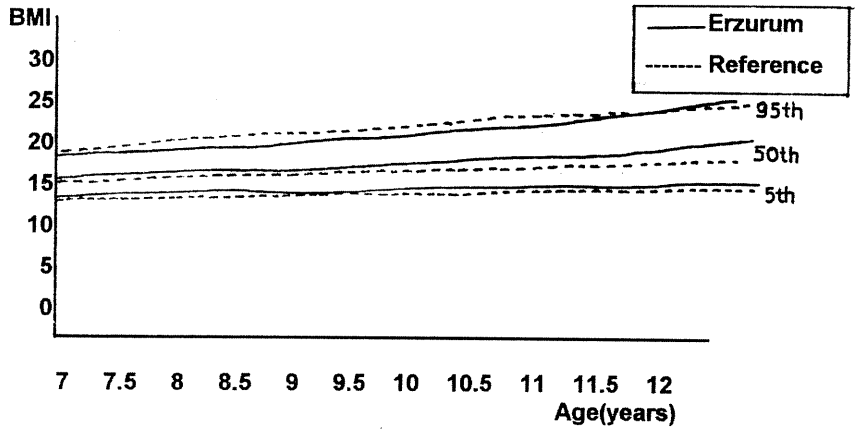
Results

In this study 3143 primary school children aged 7-12 years were assessed by using BMI. Of all students, 1597 (50.8 %) were males and 1546 (49.2 %) were females. The male/female ratio was 1.03. The obesity prevalence (body mass index > 95th percentile) was 2.58 % for all children, 2.07% for males and 3.10% for females in this population regarding to the previously cited Turkish standards. Obesity prevalences for mothers and fathers were 2.86 % and 6.68 %,respectively. On the other hand 4.68 % of the children were underweight (4.41 % for M, 4.94% for F). Obese children were more likely to have an obese mother and / or father and the least one obese sibling than nonobese children (Table 1). The association between the parents' educational level and obesity was showed in Table 2 and 3. No association between obesity and the age of child was found. Family size affected obesity prevalence. Prevalence of obesity decreased with increasing number of family member ($p<0.01$). A birth weight was determined in 296 of 3143 children. Prevalence of obesity increased with a birth weight above 4000 g ($p<0.05$). Because of regional differences, we tried to perform BMI centile curves. Centile lines for the 5th, 50th, and 95th centiles were plotted for boys and girls separately, and compared with the using reference population (Figs 1 and 2). BMI curves from this study had a similar shape to the others. However, there was a marked difference in the centiles.

Table 3. *Distribution of Mathers' Educational Level in Obese and Nonobese Children*

	obese children		nonobese children		
educational level	no	%	no	%	p
none	12	14.8	774	25.3	<0.05
primary school	35	43.2	1287	42.0	>0.05
secondary school	27	33.3	845	27.5	>0.05
high school	7	8.7	156	5.2	<0.01
total	81	100.0	3062	100.0	

Figure 2. *BMI Centile Curves for Boys Comparing Erzurum with Reference Population*



While the lower centiles of the BMI distribution in this study are larger than the corresponding centiles at all ages, the upper centiles of the BMI distribution are noticeably lower at all ages, most particularly for the girls, than other centiles.

Discussion

Changes in relative fatness with age are paralleled by changes in fat cell size and /or fat cell number. In the newborn, adipocytes are small but increase in size during the first year as fat is stored (9). Fat cell number increases gradually with linear growth in normal children. But when fat storage is excessive, fat cells increase until a certain size is reached, when further adipocytes or their precursors are recruited to store fat (1). Excessive fat storage at any age can lead to recruitment of adipocytes and excessive fat cell number. The adiposity "rebound" of the prepubertal years is associated with accelerated fat deposition. If the rebound starts early (i.e. before 6 years), prolonged fattening may lead to an excessive fat cell number and explain why early rebound is particularly associated with the risk of persistent obesity (1). The obesity prevalence was 2.58 % in schoolchildren in Erzurum. Gallaher et al (10) found prevalence of obesity among Mescalero Preschool children as 19.5 %. The obesity prevalence was determined to be as 2.9 % for adolescents, 2.8 % for males and 3.3 % for females, by Alp et al (11) in Erzurum, as 4.7 % by Giray et al (12). Prevalence was higher in females than in males in our study and this finding was similar to literature knowledge (11-14). The other hand we found that 4.68 % of the children were underweight and 2.86% of fathers, 6.68% of mothers were obese. In Gallaher et al's (10) study, 1 % of the children were underweight and 61 mothers (23%) were obese. In our study the underweight prevalence was higher than the obesity prevalence. This result was though that the underweight was more important problem than obesity in Erzurum. We observed that the obesity of both mother and father, only mother, only father and also at least one sibling, have an important relation with the obesity of childhood ($p<0.001$, $p<0.01$, $p<0.05$, $p<0.05$ respectively). Previous studies have identified risk factors for obesity among other populations of children, including familial obesity (15,16), high birth weight (17,18), low or high socioeconomic status (15,16,19,20), and small family size (21). Studies have shown that obese women tend to have children of higher birth weight, and that children with high birth weight are more likely to remain taller and heavier than children of lower birth weight (18), which could explain this finding. The Ten State Nutrition Survey showed a direct association between socioeconomic status and the prevalence of obesity among preschool children (15). Other studies found the opposite-that obesity was inversely related to socioeconomic status (16,19). Because prevalence of obesity in our study was lower than using reference population, we performed BMI

centile curves for our population. The shape of the BMI curves is very similar to the using reference data. However, the upper centiles of the BMI distribution were lower than the corresponding centiles. This finding reflect that our children are lighter for their height. By producing appropriate standard for our population we are able to identify children at the extremes of body fatness. Charting BMI as part of continuing child health surveillance may identify at an early age children who are likely to become obese adults. By tracking the pattern of variation in BMI over a long period, the French study has shown that the age of BMI rebound relates to obesity in adulthood (22). Rebound is the age when an individual's BMI curve is at its nadir. White et al (23) demonstrate adiposity rebound at between 5 and 7 years. Interventions are needed that focus on preventing obesity during childhood to avoid the long-term consequences of obesity. School children may be a desirable target population because they have regular contact with the medical system. The strong association between child and parental obesity, especially maternal obesity, interventions targeted at the family rather than just the child may be most effective. Further studies are needed to identify other potential risk factors for obesity to develop effective prevention strategies.

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