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Overweight and Obesity among School-Aged Children of Metropolitan Tehran, Iran

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Abstract: To investigate the prevalence of overweight and obesity based on Body Mass Index (BMI) values among children in Tehran. Cross-sectional survey of a randomized sample of school aged children in Tehran. A total of 3104 boys and girls in 3 aged groups with mean age 6, 8 and 10 years. The data consisted of parents-reported measures of height and weight that were obtained from questionnaires, and then BMI [weight (kg) / height (m)²] was calculated. The prevalence of overweight and obesity was higher than expected as related to recent Centers for Diseases Control and Prevention (CDC) growth charts in comparison to a recent International Obesity Task Force (IOTF) approach. These differences were higher among Iranian girls than boys. While obesity prevalence might not be important as a definition of IOTF and CDC, but rapid increases of obesity in recent years are potentially dangerous. International authorities should accelerate the efforts regarding construction a global BMI reference data, based on obesity definition in developing countries.

Key words: Overweight, obesity, less developed countries, BMI, growth charts

Introduction

Obesity among children is a problem in both developed and less developed countries around the world (Martorell *et al.*, 2000). Obesity in childhood might lead to life threatening chronic diseases (Freedman *et al.*, 1999) and to negative psychological consequences (Davison and Birch, 2001). Moreover, 77% of obese children (BMI>95th) reported obese (BMI>30) as adults. (Freedman *et al.*, 2001)

Iran has experienced a rapid "nutrition transition" characterized by decreases in physical activity and increases in energy intake (Dorosty *et al.*, 2002) lead to a rapid overweight, since 1990s. (Dorosty *et al.*, 2002; Ayatollahi and Carpenter, 1993; Janghorbani and Parvin, 1998; Mirmiran *et al.*, 2002; Kelishadi *et al.*, 2003) However, few studies assessed children overweight and obesity in the country (Dorosty *et al.*, 2002; Hosseini *et al.*, 1999) and in some studies the number of children was only fifty. (Mirmiran *et al.*, 2002)

The purpose of the present study was to estimate the prevalence of overweight and obesity among school aged children of metropolitan Tehran. The paper compares differences in prevalence associated with choice of International Obesity Task Force (IOTF) approach (Cole *et al.*, 2000) and Centers for Diseases Control and Prevention (CDC) growth charts (Kuczmarski *et al.*, 2000).

Materials and Methods

The sampling technique used in the present study was a cluster random sampling. A multistage procedure was followed and a representative sample of urban school

Table 1: Summary of sample characteristics

Age group	Gender	Number	Percent
6 years old	Boys	465	44.9
	Girls	571	55.1
Total sample		1036	100.0
8 years old	Boys	506	44.3
	Girls	635	55.7
Total sample		1141	100.0
10 years old	Boys	411	44.3
	Girls	516	55.7
Total sample		927	100.0

children in metropolitan Tehran was procedure. The procedure of this study was approved by Research Council of Endocrine Research Center of Shaheed Beheshti University of Medical Sciences. Informed written consent was obtained from each person who agreed to participate in the study

The selection of the sample was based on the distribution of the total population. The parents completed a questionnaire, which included questions about weight, height, gender and age of their children.

4.1% of collected questionnaires were characterized as uncompleted, unreadable, or misreported and were excluded from analysis. The final sample consisted of 3104 students, 1382 boys and 1722 girls (Table 1). All types of schools were included: private and public.

It was requested to the parents to report the standard measurement of weight and height (Mary *et al.*, 2001) that takes by professional health helpers at the school entry season of the beginning of the academy year.

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Table 2: Percentage of school aged children classified as overweight or obese according to the cutoff values by IOTF and the 85th and 95th percentiles in CDC growth charts

	Overweight % (n)		Obese % (n)	
	IOTF	CDC	IOTF	CDC
According to gender and age				
Boys				
Age (\pm SD)				
6.0 y olds (6.3 \pm 1)	17.2 (80)	28.4 (132)	4.7 (22)	11.2 (52)
8.0 y olds (8.2 \pm 1)	14.3 (91)	23.1 (117)	3.2 (16)	4.7 (24)
10.0 y olds (10.1 \pm 1)	16.8 (69)	12.4 (51)	0.7 (3)	4.4 (18)
Total	16.1 (80)	21.3 (100)	2.8 (13.6)	6.7(31.3)
Girls				
Age (\pm SD)				
6.0 y olds (6.2 \pm 1)	12.6 (72)	12.6 (72)	0.5 (3)	6.8 (39)
8.0 y olds (8.1 \pm 1)	29.6 (188)	29.6 (188)	4.3 (27)	9.9 (63)
10.0 y olds (10.2 \pm 1)	15.7 (81)	20.9 (108)	0 (0)	11.0 (57)
Total	19.3 (113.6)	21.0 (122.6)	1.6 (10)	9.2 (52)

To ensure confidentiality, participants' names were not recorded on the questionnaires.

Distribution of questionnaires took place in the schools. Administrators were five voluntary professional teams who had at least 3 years experience in nutrition projects.

Measurements: Parents reported data of the weight, height, gender and age of the children were used. BMI was calculated as weight in kilograms divided by the square of height in meters and it was used for the assessment of overweight and obesity.

Body weight was reported to 0.1 kg and height was reported to 0.1 cm.

Two methods for classification of overweight and obesity were utilized in the study.

The first was according to IOTF (Cole *et al.*, 2000) based on international survey and linked to the widely accepted adult cutoff points for overweight and obesity (BMI of 25 and 30 kg/m², respectively). The second was based on CDC growth charts (Kuczmarski *et al.*, 2000) and the 85th percentile was taken as a cutoff point for overweight whereas 95th was taken for obesity.

Results

BMI values across age and gender were normally distributed. According to the BMI cutoff points of IOTF, 16.1% of all boys and 19.3% of all girls in the study were classified as overweight. Whereas corresponding values for obesity among boys and girls were 2.8% and 1.6%, respectively.

Corresponding values using CDC growth charts were 21.3% of boys and 21.0% of girls for overweight and 6.7% of boys and 9.2% of girls for obese (Table 2).

Discussion

The overall prevalence of overweight and obesity in the representative sample of children aged 6-10 years in

Tehran was 17.7% and 2.2% respectively, according to IOTF and 21.1% and 7.9% according to CDC.

Martorell *et al.* (2000) reported that few data exists on obesity prevalence, based on optimum definition using BMI in children of developing countries. The subjects of the present study were children of urban Tehran, which are representative of urban children living in Iran (Hosseini *et al.*, 1998). The data were collected based on parents-reported method, which its validity had showed. (Wake *et al.*, 2002) The study might have not underreported because of parental education and urbanization. However, it should point out that thinness had not been considered in the present study.

While the optimal definition of children overweight (Cole *et al.*, 2000) and obesity (Reilly, 2002) is arbitrary, in the recent study the reference data was BMI, which Reilly *et al.* (2003) showed that BMI>85th and >95th centiles are not arbitrary and are clinically meaningful.

In comparison to the only BMI reference data for Iranian children conducted by Hosseini *et al.* (1999) at urban Tehran, 35.5% and 22.5% of boys and girls respectively classified as overweight. Whereas corresponding values for obesity among boys and girls were 19% and 16.5%, respectively.

These rapid increases might first be related to the passing of time and secondly because of too few subjects in that study (the total number of subjects was 3301 in that paper) (Hosseini *et al.*, 1999) but the author assumed that it was about 100 children for each age group.

However, due to genetic and environmental differences (Hosseini *et al.*, 1999) the current IOTF and CDC might be misleading for children of Iran. Therefore we need to set standard charts for Iranian children which reflex these differences.

Conclusion: While obesity prevalence might not be

important as a definition of IOTF and CDC, but rapid increases of obesity in recent years are potentially dangerous. This study highlights a need for construction a global BMI reference values based on developing countries. It seems that health authorities should accelerate the efforts regarding inhibiting obesity and overweight. Further studies regarding causes of overweight and obesity and its treatment among children of Tehran also suggest.

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