

Anthropometric survey of preschool children in Jahrom, 2011-12

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Abstract

Introduction:

Anthropometrical surveys are used extensively to evaluate the growth of children as a strong tool for evaluation of the growth and nutritional status of children in various populations. This study was conducted on preschool children in Jahrom to evaluate the prevalence of underweight, stunting, wasting and obesity among them.

Material and Method:

In this cross-sectional study, 984 children referring to health assessment center were evaluated. Sampling in this study was based on census and all the children studied. At baseline, the percentile and Z-Score of who wasting, stunting, underweight, overweight and obese school children were determined.

Results:

984 infants (51.5boys) were enrolled in the study. Analysis of data through standard percentile and Z-Score showed wasting in 1.8%, 1.2%, Stunting 3.8%, 1.5%, underweight 2.4%, 1.2% , overweight 13.3%, 6.5% and obesity 10.9%, 9.7% of children.

Conclusion:

Comparison of the results of this study with other studies performed in Iran revealed that prevalence of underweight, wasting and stunting is not height. However, the high prevalence of overweight and obesity should be taken into account by authorities. Serious overview of children's nutritional program and recommending the appropriate pattern of nutrition for this group seem to be necessary.

Keywords: Anthropometry, Children, Preschool

Introduction

Growth assessment of children is considered as a sensitive indicator of health and socioeconomic development of communities (1). Growth and its factors are influenced by genetic and environmental factors and what is more influential in this case is environmental factors and particularly nutrition, infection

control and lifestyle. As growth is a biological characteristic particularly in childhood to puberty, growth failure is a major symptom of diseases and nutritional problems in this period (2).

Growth impairment is usually accompanied by other nutritional deficiencies such as vitamin A, iron and zinc deficiency which exacerbate the

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effects of malnutrition especially during fetal growth and the first three years of life (3-4) In children with malnutrition in addition to physical growth retardation, mental disorders, academic failure and reduced work efficiency are very common. However, these children can achieve age-appropriate mental and physical ability in next stages of life (5-6).

Currently, at least a third of children in developing countries suffer from growth disorders. Assessment of malnutrition in children under 5 years in developing countries shows that 180 million children are underweight for age, weight-for-height index in 50 million children was less than standard, that is, they were thin. About 215 million children suffer from the lack of height-for-age (7) The prevalence of short stature due to nutrition in developing countries reaches between 10% and 50% (8). It is predicted that the prevalence of short stature due to nutrition in children living in developing countries will reduce from 29.8 % in 2000 to 16.3% in 2020 (9). In developing countries, malnutrition caused by lack of nutrition besides receiving too much or imbalanced nutrition has endangered various sectors of the population, such that these countries are at a nutritional transition.

In other words, while these countries are still involved in solving nutritional problems and have not overcome them, they have faced problems caused by overeating, overweight, obesity and associated diseases (10). In 1998, WHO announced obesity as an epidemic public health threat in developing countries and in recent years, most of the developing countries are experiencing obesity in their children (11-12).

In addition, the prevalence of overweight and obesity causes decreased work efficiency and performance in children and it gives the risk of suffering from chronic diseases including hypertension, glucose intolerance, elevated insulin, cardiovascular complications, neurological complications, atherosclerosis of cerebral

arteries and social and psychological problems such as anxiety, less educational level, depression and laziness (13). According to WHO estimations, in 2020, chronic diseases will be the cause of three-quarters of deaths in developing countries (12).

According to Nationwide Child Nutrition Status report and weight-for-age criterion, 10.9 % of all under-five children (11.9% boys and 9.7 % girls) had moderate or severe malnutrition. The prevalence of short stature due to nutrition has been reported as 15.4%, 16.8 % and 13.9 % in children, in boys and in girls, respectively (14).

Investigations of anthropometric indices of Iranian under-five children from 2000 to 2002 showed that 13.1% had short stature for age and 7.6% had low weight for age. The prevalence of thinness was calculated as 4.5% and the prevalence of overweight and obesity was 5.2% (15).

Micronutrients national survey in 2001 showed that 9.6% of girls and 13.5% of 6-year-old boys suffered from short stature and 11% of girls and 7.7% of 6-year-old boys were underweight (16). In Italy, Mafys et al. studied 2150 children of 2-to 6-year-old, reported the prevalence of overweight and obesity as 16.6% and 8%, respectively (17). In a study in UAE in 1998-1999 academic year, by studying 1190 elementary school students, the prevalence of overweight and obesity was reported as 24.6% and 12.8%, respectively for boys and 24.1% and 10% for girls (18). In Mozaffari et al. study, the prevalence of overweight and obesity among children between 6 to 12 years old from Tehran was 3.3% and 7.7%, respectively (19).

Given the importance of evaluating children's growth as a sensitive indicator of the health and the consequences of childhood obesity and the lack of research on the prevalence of underweight, short stature, thinness, overweight and obesity in the age group 6 to 7 years old in Jahrom, this study was conducted to determine their prevalence.

Materials and Methods

This cross-sectional study was conducted out on all 984 children entering elementary school in 2011 in Jahrom who attended health assessment center.

Anthropometric data included height, weight and age that were completed and collected by two trained individuals. Child weight was measured with Seca digital scale (precision of 10 g) in a standing position, without shoes and with the least clothing.

Height was measured in all children while they were standing without shoes with a non-elastic tape (precision 1 cm) mounted on the wall so that the hips, back, shoulders and heels touched the wall and the child looked straight ahead. BMI was calculated by dividing the weight (kg) by the square of height (m²).

Based on z-score indices of underweight, short stature and thinness were considered

less than 2 standard deviations (SD) from weight-for-age, height-for-age and BMI-for-age, and overweight was considered between 1 and 2 SDs from the mean and obesity was considered greater than 2 SDs from the mean according to the WHO standard.

Based on percentile index as defined by the WHO, being below the third percentile of weight-for-age and height-for-age, respectively were defined as underweight and short stature. Moreover, less than 3 percentile was considered as thin, 3 to 85 percentile was normal weight and 85 to 97 percentile was overweight and a percentile equal to or above that was obese (20). Descriptive statistics were mean and standard deviation to describe the data and the chi-square test to compare the prevalence of underweight, short stature, overweight and obesity among boys and girls. Significance level was set at 5%.

Table 1: Mean and SD of anthropometric indexes deviation in 984 students under study

	Total (n=984)	Boy (n=477)	Girl (n=507)
Age (year)	6.3±0.49	6.3±0.51	6.4±0.47
Weight (kg)	22.6±4.2	23.2±4.2	22.12±4
Height (cm)	118.0±5.3	119.07±5.2	116.94±5.1
BMI	16.2±2.1	16.26±2.1	16.14±2.1

Results

In this study, 984 children at the beginning of elementary school were studied including 49.2% (477 cases) boys and

The z-score comparison of anthropometric indices with reference values based on WHO showed that based on weight-for-age index, 1.2 % of children (1% of boys and 1.4% of girls) were underweight. Based on height-for-age, 1.5% of children

50.8% (507 cases) girls. Table 1 shows the mean and SD of age, weight, height and BMI between boy and girl students.

(boys 1.5%, girls 1.6 %) were short stature (Table 2). According to BMI-for-age, 1.2% of children (boys 1.7 %, girls 0.8%) were thin, 14.1% of children (15.9% boys, 12.4% girls) were overweight and 9.7 % of children (boys 11.1% and girls 8.5%) were obese (table 3).

Table 2: Distribution of weight and age in girls and boys based on Z-score index

BMI	Sex	<-2 SD	-2 SD to +2 SD	>2 SD
		Number (%)	Number (%)	Number (%)
Weight for age	Boy	5(1.0)	455 (95.4)	17(3.6)
	Girl	7(1.4)	493(97.2)	7(1.4)
Height for age	Boy	7(1.5)	469(98.3)	1(0.2)
	Girl	8(1.6)	499(98.4)	0(1.0)

Table 3: Distribution of BMI in girls and boys based on Z-score index

BMI	sex	<-2 SD	-2 SD to +1 SD	+1 SD to +2 SD	+1 SD to +2 SD	+2 SD to +3 SD	3SD >
		Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
BMI	boy	8(1.8)	340(71.3)	76(15.9)	76(15.9)	30(6.3)	23(4.8)
	girl	4(0.8)	397(78.3)	63(12.4)	63(12.4)	34(6.7)	9(1.8)

Moreover, comparison of the percentiles of anthropometric indices with reference values based on the WHO showed that based on weight-for-age index, 1.8% of children (boys 1.7% and girls 2%) suffered from underweight and based on height-for-age, 3.8% of children (boys 3.1 %, 4.5%)

suffered from short stature (Table 4). According to BMI-for-age, 2.4% of children (boys, girls 1.8%) were thin, 13.3% of children (boys 14.3%, girls 12.4%) were overweight and 10.9% of children (boys 12.8%, girls 9.3 %) were obese (table 5).

Table 4: Distribution of weight and height in girls and boys based on percentile index

BMI	Sex	Below 3 percentile	3 to 97 percentile	Above 97 percentile
		Number (%)	Number (%)	Number (%)
Weight for age	Boy	8(1.7)	410(86.0)	59(12.4)
	Girl	10(2.0)	463(91.3)	34(6.7)
Height for age	Boy	15(3.1)	436(91.4)	26(5.5)
	Girl	23(4.5)	475(93.7)	9(1.8)

Table 5: Distribution of BMI in girls and boys according to percentile index

BMI	sex	Below 3 percentile	3 to 85 percentile	85 to 97 percentile	Above 97 percentile
		Number (%)	Number (%)	Number (%)	Number (%)
BMI	Boy	15(3.1)	333(69.8)	68(14.3)	61(12.8)
	Girl	9(1.8)	388(76.5)	63(12.4)	47(9.3)

Discussion

This study aimed to estimate the prevalence of underweight, short stature, thinness, overweight and obesity among children entering school in Jahrom. The results of this study as the first study conducted in this regard in Jahrom, showed that based on percentile and standard z-scores of WHO, 1.8% and 1.2% of children suffered from low weight, respectively and 3.8% and 1.5% of children suffered from short stature for age and 2.4% and 1.2% of children suffered from thinness and 13.3% and 6.5% of children suffered from overweight and 10.9% and 3.2% are obese.

Growth pattern of elementary school students of Kermanshah compared with

standard charts of National Center for Health Statistics in America (NCHS) show that 10.8% of students suffer from short stature and 8.7% suffer from low weight and 13.3% and 10.9% are overweight and obese, respectively (21). These findings regarding short stature and thinness are more than the present study and regarding overweight and obesity are consistent with the present study. In anthropometric indices study on children entering elementary school in Yasuj city, based on NCHS standard charts, 6.5 % of children were underweight-for-height, 10.3% were suffering from underweight-for-age and 6% were short-for-age (22).

In a nationwide study on the nutritional status of 6-year-old Iranian children, Z-

Score comparison of anthropometric indices compared with reference values, the prevalence of thinness, short stature, underweight and obesity were calculated as 7.8%, 4.6%, 9.11% and 3.7%, respectively (23). The ten-year indices of malnutrition in children under 5 years in Iran shows that 4.7% of children in the whole country suffered from short stature, 5.2% were underweight and 3.7% were thin (24).

In a study on 400 pre-school children in Tabriz, 10.2%, 16.8% and 4.6% scored lower than fifth percentile of 6.5 in terms of weight for age, height for age, and weight for height according to NCHS chart 6.5% of the fifth percentile from NCHS growth charts (25). In Kashef et al study, the prevalence of underweight, overweight and obesity in children 3 to 6 years old from Tehran were 4.76%, 10.31% and 4.49% in girls and 4.78%, 9.81% and 4.77%, respectively (26). The prevalence of underweight, short stature and thinness in all of these studies were more than that in the present study and the prevalence of overweight and obesity was less than that in the present study.

In Ronald et al. study in France, the prevalence of overweight and obesity was reported as 14.1% and 9.1% among girl students and 14.6% and 9.3% in boy students, respectively, which are approximately the same as those in the present study (27). In Malick et al. study in UAE, the prevalence of overweight and obesity in 578 boy students was 24.6% and 12.8% which are higher than the results of the present study (19).

In Lazary et al. study on 1430 Italian students during 2002 and 2006; the prevalence of thinness was reported as 2% and overweight as 33.4% and these results are higher than those in the present study

(28). Kamal et al. study in Qatar studies under-five children compared with NCHS charts, and showed that 11% of children have short stature and 4.4 % are underweight and these results are higher than the results of present study (29).

In general, the overall results of this study indicate that the prevalence of underweight, thinness and short stature were lower than its national rate, but the prevalence of overweight and obesity is higher than the national rate. The main reasons for such results may be dietary habits, lack of physical activity and families' lifestyle whose effects on obesity in children have been reported in several studies (30).

In a global survey of 144 countries regarding overweight and obesity of pre-school children, it was found that 43 million children were overweight or obese and 92 million children were at risk of obesity. The results showed that the global prevalence of overweight and obesity has increased from 4.2% in 1990 to 6.7% in 2012 and it is predicted that this number would increase to 9.1% in 2020 (31).

Therefore, due to the importance of obesity in childhood and its associated complications, including hypertension, glucose intolerance, increased insulin, cardiovascular complications, neurological complications and psychosocial problems, the need to present appropriate education to parents and students about proper nutrition, performing daily exercise programs and for the prevention and control of childhood obesity seems to be necessary.

Conflict of interests

Authors had no conflict of interests in this study.

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