Determination of growth pattern of 7-12 years old children in YAZD city and comparison of it with WHO standards

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Abstract

Objective: To assess the growth pattern of children in Yazd, and compare it with standards outlined by the World Health Organisation.

Methods: The cross-sectional study, which was conducted in 2009, involved 20 guidance schools of Yazd city. A total of 1921 children were chosen by simple cluster method and general demographic and anthropometric information regarding the subjects was extracted from students' health identification booklets. Data was analysed through SPSS.

Results: The mean values of height in 7th and 12th years of age were 119±8.8cm and 150±6.6cm in boys and 117±5.97cm and 152±7.3cm in girls respectively. The mean values of weight in 7th and 12th years of age were 20±3.39kg and 39±1kg in boys and 20±3.78kg and 41±1.07kg in girls respectively. These values generally were below the values set by the World Health Organisation till the 9th year of age, and above them beyond the 9th year.

Conclusion: The growth pattern among children in Yazd is better than some of the other provinces in Iran. Larger studies are needed for generating Iran-specific standard for better assessment of the growth and nutritional status of Iranian children.

Keywords: Growth, Yazd city, WHO standards. (JPMA 62: 1289; 2012)

Introduction

The goal of paediatric care is to maximise each child's potential. It is necessary for physicians to understand the growth development and behaviour, in order to monitor children's progress, to determine any probable abnormality, and to counsel parents. Familiarity with developmental theory can enhance the potential of physicians in monitoring children's progress.[1]

In middle childhood (6-11 years) most children have issues with their parents, and want to be close to their teachers and peers.[2] Height and weight growth during this period would be between 3-3.5kg and 6-7 cm per year. Growth occurs in 3-6 irregularly timed spurts each year; each spurt lasts an average 8 weeks. The head circumference will increase only 2-3cm during the entire period. Body habitus is more erect than previously, with long legs compared with trunk.[3] Body fitness will decline and sedentary habit increases the rate of obesity in this phase.[1] Growth charts are simple instruments to monitor growth parametres and nutritional status of children.[4] International growth standards provide an equitable chance to compare data from different countries. Regional and national resources are also useful to assess the effect of nutritional change on children's growth.[5,6] Anthropometric data enables experts to reach effective and trustable resources for different goals.[7] Analysis of population growth pattern is widely dependent on standards that are used.[8] Reliability of National Centre for Health Statistics (NCHS) 1977 standards as an international resource for monitoring growth is under doubt[9-13] to some extent and some papers have discouraged its use.[14-16] For correction of shortages, the Centre for Disease Control (CDC) recommended a new set of standards in 2003.[9,17] Both these standards were based on American population. In 2006, the World Health Organisation (WHO) published its own set of growth curves for children less than 60 months of age based on a multi-centre study carried out in four continents.[18] WHO believes that these resources not only create new standards for growth of children, but can also explain the expected growth pattern that any child must have in normal situation.[19] These have been recommended instead of CDC standards.[20,21] In 2007, the WHO published new standards for children aged 5-20 years. These standards were a result of merging the WHO standards related to 0-5 year-old children with the NCHS values for 1-24 year-old people.[22]

In Iran there are frequent cross-sectional studies about comparison of children's anthropometric data with

NCHS standards, but there is no study with the WHO standards.

This study set out to determine the growth pattern of 7-12 year-old children in Yazd, a city in central Iran with good socioeconomic indicators.

Material and Method

The cross-sectional study was conducted in spring and summer of 2009 in Yazd city schools. The Ministry of Health and Medical Education in collaboration with the Ministry of Education had started a project to monitor and record the physical and psychological health status of Iranian students with the help of booklets called the Health ID Booklet. Yazd city happened to be one of the first pilot regions for that project in 2000. Besides, anthropometric data from Yazdi students was also available since 2000. Based on cluster sampling, we chose 20 schools (10 for boys and 10 for girls) randomly. The sample size was calculated on the basis of the following parameters: test power of 80%; d=1.5; and based on previous studies S=2). A total of 680 cases were needed for the study. The required data was extracted from Health ID Booklets and to fill the pre-designed questionnaire. The records related to the period between 2002 and 2008. The questionnaire explored demographic data, weight and height of all students between 7 and 12 years of age. In fact, we had 6 weights and 6 heights for each child. Children with incomplete booklets and with any diagnosed disease that could influence a child's growth were excluded. Data was extracted from the dossiers related to Iranian nationals only.

The WHO data was obtained from its website. WHO had categorised its data by month and had placed it on its website in Pdf and Exel formats. Our data had been gathered on a monthly basis too. In fact, we had written our cases birth dates and also the time of measurement that was

the first month of a new school session, which is September 23 in Iran. The WHO had reported its curves by years of age (not month). We, therefore, calculated back the two sets of data in terms of years, and then generated our curves.

We also remeasured weights and heights of 200 children at seven years old and compared them with the readings in the booklets. Data was transferred to SPSS, version 16 and the mean and SD of each age weight and height were calculated and analysed by single T test.

Results

We initially completed 2100 questionnaires and after the exclusion of incomplete questionnaires, 1921 (91.4%) children were included in the study. Of them, 938 (48.8%)
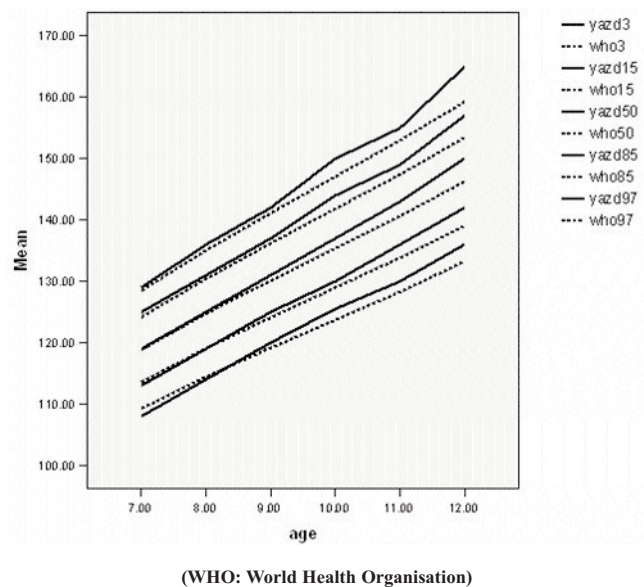

(WHO: World Health Organisation)

Figure-1: Comparison of girls` weight with WHO standards in different percentiles.

Table: Different percentiles in Yazdi girls and boys' weight and height for age.

Scale Percentile	Weight 7 y/o	Height 7 y/o	Weight 8 y/o	Height 8 y/o	Weight 9 y/o	Height 9 y/o	Weight 10 y/o	Height 10 y/o	Weight 11 y/o	Height 11 y/o	Weight 12 y/o	Height 12 y/o
GIRLS												
3	15	105.17	18	114	19.59	120	21	125	24	130	28	138
15	17	111	20	119	22	125	25	130	27	136	32	144
50	20	117	23	125	26	131	30	137	34	144	41	152
85	23	123	27	130	32	137	38	144	45	152	53	159
97	29	128	36	136.83	42.91	143	50	152	58.83	158	67.83	165
SD	3.782	5.971	4.915	5.655	6.073	6.047	7.624	6.761	9.342	7.432	1.071	7.3
BOYS												
3	16	108	18	114	20	120	23	125.42	25	130	28	136
15	18	113	20	119	22	125	25	130	28	136	32	142
50	20	119	23	125	26	131	30	137	34	143	39	150
85	24	125	27	131	32	137	37	144	43	149	52	157
97	29	129	34	136	42	142	46.48	150	55	155	65	165
SD	3.396	8.809	4.217	7.644	1.332	6.089	6.649	6.322	8.271	6.606	1.006	6.606

(WHO: World Health Organisation)
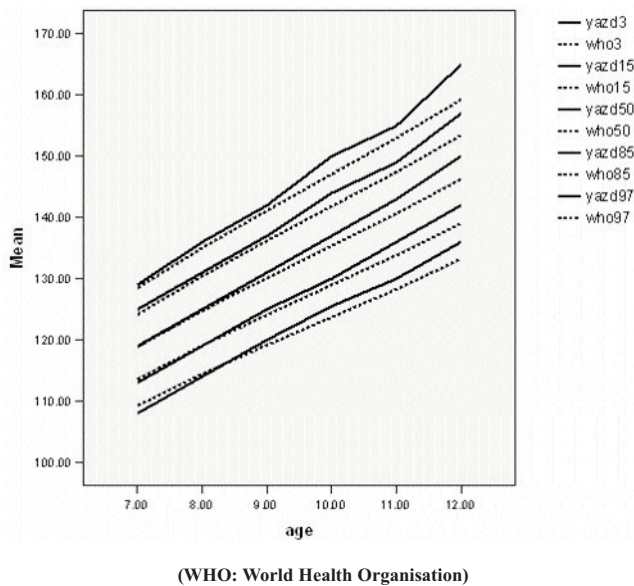
Figure-2: Comparison of boys` weight with WHO standards in different percentiles.

(WHO: World Health Organisation)
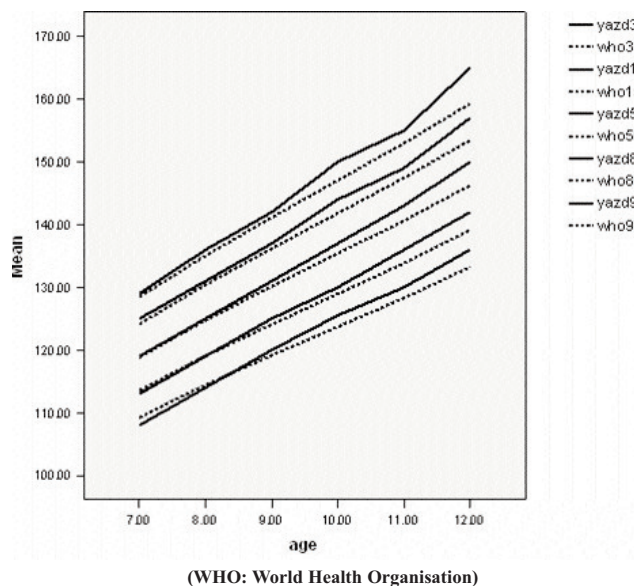
Figure-4: Comparison of boys' height with WHO standards in different percentiles.
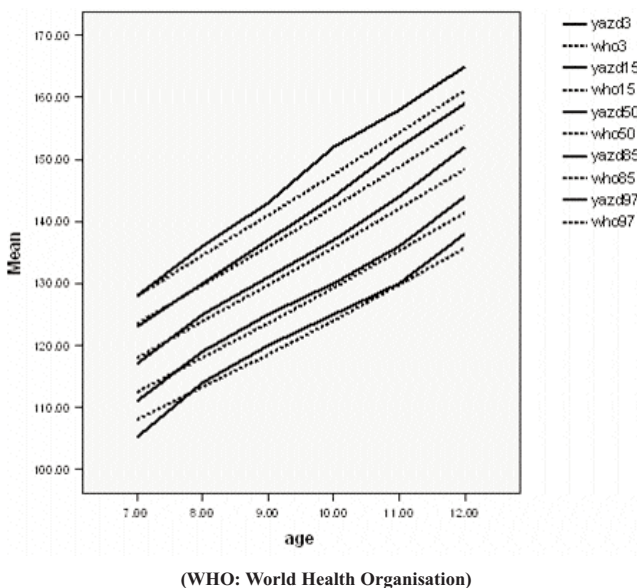

(WHO: World Health Organisation)

Figure-3: Comparison of girls` height with WHO standards in different percentiles.

were female and 983 (51.2%) were male. From all the fathers, 592 (30.8%) had <9 years, 482 (25.1%) had 9-11 years, 644 (33.5%) had 12-14 years, and 203 (10.2%) had >14 years of graduation. Among the mothers, the numbers were: 809 (42.1%), 474 (24.7%), 543 (28.3%) and 95 (4.9%) respectively. Of all the parents, 1221 (63.6%) had no family relations prior to marriage; 334 (17.4%) had close family relations, 126 (6.6%) had near-close, and 240 (12.5%) had distant family relations. Regarding family size, 237 (17%)

families had less than 3 members, 838 (43.6%) 4, 417 (21.7%) 5, and 338 (17.6%) had more than 5 members.

The weight and height of Yazdi girls and boys were compared at different points with WHO data[11] (Table; Figures-1-4).

Discussion

Growth is one of the main scales for health. Detection of chronic diseases and interpersonal relationships and stress screening in children is possible by following a child and his family over time through growth charts. A paediatrician can detect relationships between physical, cognitive and motor growth.

Saeed ebrahimzade conducted a study in Shiraz, Mashhad and Urumia in 2003. All heights and weights of the study were higher than ours.[23] This results has been repeated in Ali Sohrabi's study[24] in 2002, Freydoun Azizi's study in 1986 in Tehran,[25] and Taghavi's study in 2008 in Shahroud.[26]

Mustafa in Saudi Arabia measured heights and weights which were lower than our results.[27] This study had low number of cases and there were no more than 230 children in any age group.

Another study in Assam, India,[28] measured mean scores, and had much different results, highlighting severe malnutrition in that area of India. Another study in 2005 in Punjab, India,[29] measured mean scores which were higher than some of our scores.

In 1999, a study in Rasht, Iran, calculated mean

scores which were higher than ours.[30] All Iranian studies showed that Iranian children's height and weights were lower than NCHS (1977 scores) mean scores. None of these studies compared its results with WHO standards.

Only the Babol study[31] had a study design similar to our study, but it only involved girls. Results of the Babol study were similar to ours; though our mean scores were somewhat higher. The Babol study followed the children till 15 years of age, while we stopped at 12.

Heights and weights in our study were lower than international scores initially, but gradually matched them and finally crossed them after the 10-year work. This can be due to Iranian genetic specifications.

Different and varying results in Iranian surveys indicated that different geographic, economic and nutritional situations and even nutritional habits in different areas of Iran can influence children's growth. One more reason for these differences could be the different study design. All other studies conducted in Iran didn't follow a specific group of children across time. They measured anthropometric data at a specific time period involving children of different ages. Our study, however, analysed anthropometric data of 1921 cases over 5 consecutive years. In this way, we tried to partly limit the bias of the other studies.

Conclusion

Although Yazdi children have a a positive growth pattern, but considering the geographic, cultural and economic differences in various Iran regions, our results should only be generalised conservatively. A longitudinal study with proper supervision is recommended to obtain more valuable and accurate data about the Iranian population.

Conflict of interest and Financial Support:

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