Original Article

Anthropometric indices of middle socio-economic class school children in Karachi compared with NCHS standards - a pilot study

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Abstract

Objective: To measure height and weight of school going children (2-18 years of age) in Karachi. By means of these parameters we were able to document where the Pakistani paediatric population plot on NCHS growth centile charts.

Methods: A population based cross-sectional study (in government and private schools, Karachi), in which height and weight were taken using standardized techniques. Two thousand two hundred forty five healthy school-going children 2 to 16 years of age (calculated from date of birth); sex, height and weight were documented. After the survey was completed, height and weight of the children were plotted on NCHS centiles curves. Results: P5, P25 and P50 centiles for height and weight of the Pakistani girls and boys was much below that of NCHS. However, P95 for boys and girls weight and height did not differ markedly in the Pakistani and NCHS centiles.

Conclusion: Height and weight of these children is below the NCHS centile for height and weight. Children plotting near the P95 NCHS, indicates that obesity may be a serious concern in our population. However, further studies are required for support. This pilot study indicates the need for development of centile charts for Pakistani paediatric population (JPMA 56:264;2006).

Introduction

Measurement of height and weight of children (Anthropometric measurements) determine Centiles. These indices are used as principal criteria in assuming the adequacy of nutrition especially in early childhood. This is true because realization of the genetically determined growth potential of normal infants and children depends among other factors on the availability of adequate amount of nutrients.[1] Various studies have developed growth charts for United States.[2] Weight reference charts for British long term breast fed infants have also been developed[3] and also for Swedish Population.[4] Multicentre studies have been done to develop growth charts.[5] Some work has been done on the anthropometric measurements of Pakistani children.[6] However, centile charts have yet to be developed in our country. Our working hypothesis was that the centiles of Pakistani children are different from that of Western countries. Hence we planned this pilot study to measure height and weight of healthy school going children in Karachi. In our next nation wide survey we eventually plan to develop centile charts for the paediatric population. These charts can then be used in hospitals and health centers for evaluation of growth parameters in children. The objectives of this study was to measure height and weight of school going children (2-16 years) in Karachi and to plot them on NCHS centile charts for comparison.

Subjects and Methods

The study was a population based cross-sectional multi center (various schools) study. The data was obtained from different urban middle socio economic schools of Karachi. Data of 2245 children age range 2-18 years were collected. Age of the children was taken from the school register. From December 2004 to January 2005, a study team, comprising of a paediatrician, research officers,

dieticians, visited the respective schools. Physical examination included standardized measurements of height and weight of children. Body weight was measured in minimum clothing to the nearest 0.1 kg using a balance beam scale. Body height was measured without shoes, horizontally to the nearest 0.1 cm using wall mounted stadiometers. Using specially designed computer subroutines, these data were compared with the NCHS reference population.[2] This NCHS reference population was developed from height, weight, and age data collected in cross-sectional health and nutritional surveys in the United States. These data are representative of healthy non-institutional U.S children. Data was statistically analyzed using SPSS for windows, version 10.0 (1999, Chicago, IL, USA).

The study was approved by the ethics committee of the Sindh Institute of Urology and Transplantation (SIUT). Visit by the research team to each school principal was done with an explanation and introduction of the study. Following the agreement of the concerned principal, consent was obtained from the parents in writing and then the study was initiated.

Results

A total sample size of 2245 was taken, 1647 (69.5%) females and 598 (25.2%) males, 36 children were excluded because of missing values and their height and weight measurement differed by ≥ 5 cm. Estimated mean and SD were simply computed from the raw values for the two measurements i.e. height and weight.

Figures 1-4 give the selected sex-specific raw percentile values, means, and SD for height, weight of boys and girls aged 2-18 years. Crude data in this pilot study suggests that these children have a lower height and weight compared to NCHS. Mean values for weight, height were significantly larger in boys than in girls for both the Pakistani and NCHS children population.

Figures 1-4 show the P5, P25, P50 and P95 centiles

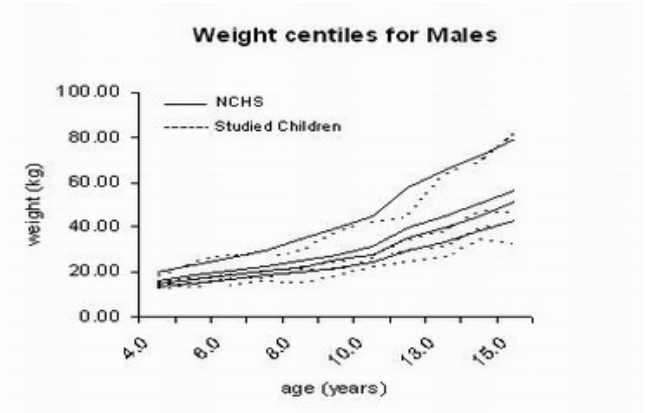

Figure 1. Shows the P5 centiles of studied children and the NCHS centile charts

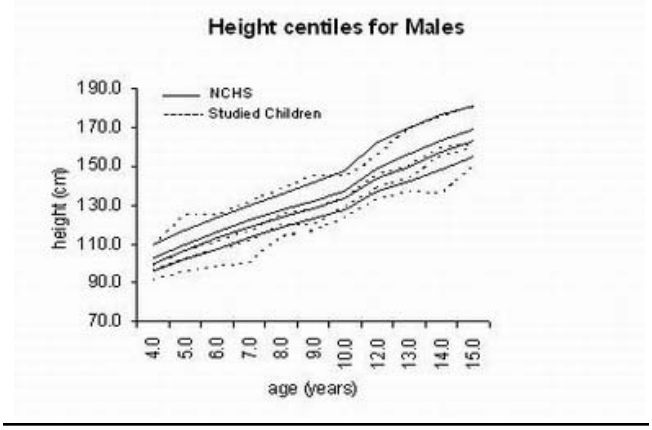

Figure 2. Shows P25 centiles of studied children and the NCHS centile charts

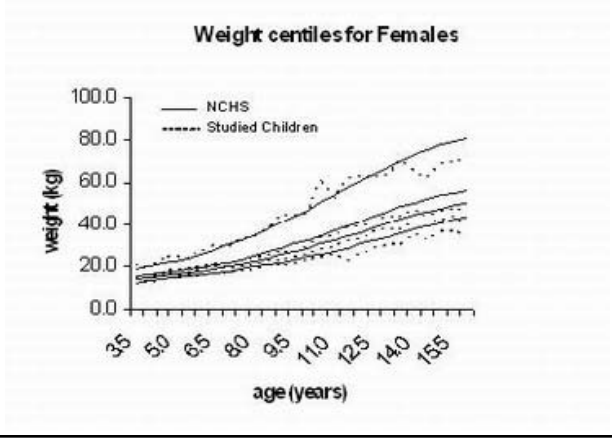

Figure 3. Shows P50 centiles of studied children and the NCHS centile charts

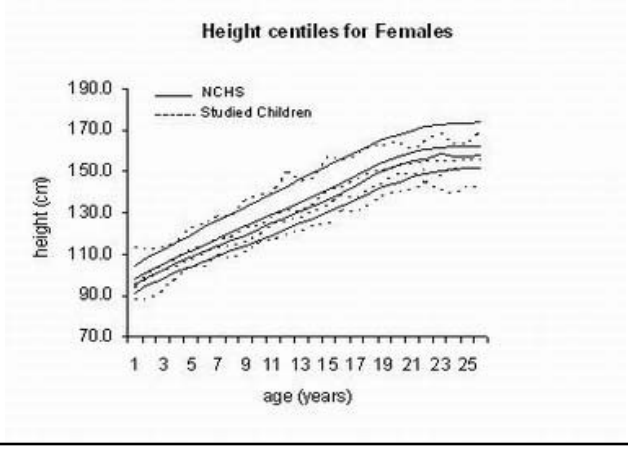

Figure 4. Shows P95 centiles of studied children and the NCHS centile charts

of studied children and of the NCHS population. The P95 centiles height and weight for age of studied children and NCHS population compare closely. However, centile curves these children plotted well below the P5, P25 and P50 centiles (5th, 25th and 50th percentiles) of the NCHS

Discussion

This was a pilot study of our ongoing project designed to develop growth centiles of Pakistani paediatric population. The children in this study are by no means representative of the Pakistani paediatric population. The ethnic and geographical backgrounds of the children examined in this pilot study and the U.S reference were vastly different. This is not a surprise as human stature varies in different populations that are at different stages of the secular trend.

Sample size was not large enough to permit reliable comparison with the NCHS, although several attributes are striking when combined data is observed. The height-for-age values for P5, P25, and P50 do not correspond with that of NCHS. This could emphasize environmental and or ethnic or genetic influence on height. Genetic factors are present in determining the growth of individuals within a well-nourished group. Our study population was from a middle socio-economic background and did not include children from high or low socio-economic population or malnourished population. Akram et al[6] did a longitudinal study to determine anthropometric measurements in Pakistani children from a high socioeconomic back-ground. Their results indicated weight and length curves of the study group duplicating NCHS standards at all centiles.

However, we observed that although our study population was of middle socio-economic healthy school children, their centiles were lower than that of NCHS, with exception of P95. It is difficult to comment in this study on the P95 both height-for-age and weight-for-age. A larger population is needed with all socio-economic groups as planned in our further study.

Ogden et al.[1] present a clinical version of the 2000 CDC growth charts and give a comparison with the previous version, the 1977 NCHS growth charts. Unlike the 1977 NCHS growth charts, the 2000 CDC growth charts more closely represent a cross-section of children based on the current mix of breast-fed and formula-fed infants and more closely match the national distribution of birth weight. In our study, we were unable to collect complete data on breast-fed and formula-fed infants. The provision of breast feeding specific centiles should be useful for professionals and parents to monitor the weight of long-term breast fed infants.[3,7,8] The results indicate new data based on breast-fed infants is necessary. However, it is important that the growth of children from South and East Asian populations be rigorously assessed in the process of developing the new international growth references.[9]

In this study, we observed that the studied children plotted on P95 of the NCHS. This important finding may indicate that there is a need for ethnic specific growth charts and Body Mass Index (BMI) cut-off points for underweight, overweight and obesity in children. Similar finding was observed by Deurenberg et al.[5] where a comparison in the relationship between BMI and body fat of children aged 7-12 years from Singapore, Netherlands and Beijing was done. This study strongly suggested that relationship between (BF %) Body for percentage and BMI is different among children of different background.

Study done by Onis et al[10] compared the mean BMI-for-age of adolescent boys from Calcutta with French, Dutch, British and NCHS reference medians. The study showed that children from Calcutta plotted well below the other groups including NCHS standard. This finding supports our work. Growth standards developed in industrialized countries may be appropriate for measuring child growth only of the privileged groups in developing countries.[6,11] Though WHO global data is available[12], updated, growth reference charts are essential for every country[4]; hence we embarked on this pilot study as a first step, to be followed eventually by the development of centile charts for Pakistani paediatric population.

Sample size of the male children was half that of female population, hence could have accounted for the centiles plotting well below the NCHS standards.

Conclusion

This pilot study shows that studied children have an overall lower height and weight centile when plotted on the NCHS centile chart. Further study at national level with all socio-economic population, varied ethnicity, obesity, BMI and emphasis on breast feeding pattern is being undertaken.

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