

Trends in the nutritional status of Saudi children

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ABSTRACT

الأهداف: تقييم الحالة الغذائية للأطفال السعوديين على مدى 10 سنوات.

الطريقة: مقارنة نتائج دراسة نمو الأطفال التي أجريت في عام (1993م – 1994م) بالدراسة الحالية التي أجريت في عام (2004م – 2005م). صُممت الدراستان بناء على الطريقة العشوائية متعددة المراحل، مما أدى إلى إختيار عينة تمثل الأطفال السعوديين. كما تم استخدام طرق مماثلة لقياسات الوزن والطول. تم مطابقة معلومات الدراستين ومقارنة منحنيات النمو الثالث، الخامس، الخمسين، الخامس والتسعين والسابع والتسعين، الخاصة بالوزن والطول.

النتائج: بمقارنة نتائج الدراسة التي أجريت في عام 1994م، تشير نتائج دراسة 2005م، إلى اتجاه منحنيات النمو السفلى إلى الأعلى بالنسبة للوزن، والوزن للطول، وأكثر من الطول. مما يشير إلى تحسن الحالة الغذائية، وكذلك اتجاه المنحنيات المعوية العليا إلى الأعلى بالنسبة للوزن، والوزن للطول في دراسة 2005م، مما يشير إلى ارتفاع نسبة زيادة الوزن لدى الأطفال السعوديين.

خاتمة: تشير هذه الدراسة إلى تحسن ملحوظ في الحالة الغذائية للأطفال على مدى 10 سنوات، كذلك هناك اتجاه نحو ارتفاع في معدلات زيادة الوزن والسمنة لدى الأطفال السعوديين.

Objective: To evaluate the trend in the nutritional status of Saudi children over a 10-year period.

Methods: The growth data collected between 1993-1994 were compared with those collected between 2004-2005 from all regions of the Kingdom. Both nutritional surveys had a similar design leading to representative samples of Saudi children determined by multistage probability sampling. Similar methodology of measurements of the weight and height were used. The data from the 1994 study, including the third, fifth, fiftieth, ninety-fifth, and the ninety-seventh percentiles, were plotted on the 2005 charts for the weight for age, height for age, weight for height.

Results: Compared to the 1994 results, the data of the 2005 study indicate an upward shift of the lower

percentiles of the weight for age, and the weight for height, more than height for age, indicating improved nutritional status. However, the upward shift of the higher percentiles for the weight for age, and weight for height in the 2005 survey, indicate increased trend for overweight and obesity.

Conclusion: There is a demonstrable improvement in the nutritional status of Saudi children, and also tendency toward overweight and obesity over the last decade.

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Growth parameters in the form of weight for age, height for age, and weight for height are important tools for the assessment of the nutritional status of children, and many countries have established their own comprehensive growth charts for children and adolescents.¹⁻³ In the Kingdom of Saudi Arabia (KSA), among previous studies of the growth of children,⁴⁻⁸ only one was representative of children below 5 years of age.^{9,10} All these studies, pointed out major differences with the NCHS/WHO reference growth charts commonly

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used in the past, in most health facilities in KSA. The lack of representative growth charts for healthy Saudi children older than 5 years and adolescents, indicated the need for a new survey, that included children from birth-19 years of age. The study was completed in 2005, and reported in 2007.¹¹ The objective of this report was to evaluate the change in nutritional status of Saudi children, as assessed by the growth indicators between, and to point out the implications of these changes in clinical practice.

Methods. The present study was based on the findings of 2 surveys conducted from all region of the Kingdom in 1994 and 2005. The design and methodology of the 1994 study was reported elsewhere.^{9,10} The details of the 2005 study were also reported recently.¹¹ Conversely, well-established guidelines and criteria established for this type of studies, were followed in the determination of the sample size.¹² In both studies, the sample was selected by multistage probability sampling procedure from a stratified listing, based on the population census available at the time of each study. Accordingly, the sample was representative of all the socioeconomic strata, including urban and rural representation. Data collection was carried out in the primary health centers in the 1994 study, and by house-to-house visits in the 2005. All survey questionnaire, clinical examination, and body measurements were completed by primary care physicians and nurses. Percentile construction and smoothing in the 1994 study used the moving average method, however, the 2005 study used the newly-recommended lambda mu sigma (LMS) Methodology.¹³⁻¹⁵ Weight for age, length/stature for age, and weight for length/stature, were selected for comparison of the third, fifth, fiftieth, ninety-fifth, and ninety-seventh percentiles. For simplification purposes, the term height will be used to refer to the length/stature, the higher percentiles to refer to the ninety-fifth, and ninety-seventh, the lower percentiles for the third and the fifth. Approval was obtained from King Abdul-Aziz City for local ethics committee prior to the commencement of the study,

Results. The number of children in the 1994 sample was 23821, and the 2005 sample was 17119. There were 11913 boys in the 1994 sample, and 8677 boys in the 2005 sample. In both studies, all the children were below 60 months of age. A comparison of the weight for age percentiles boys is depicted in Figure 1. Compared to the 1994 reference, the lower percentiles in the 2005 chart tend to shift upward from birth, to approximately 8 months of age, overlap from 8-9 months, and then followed by another upward shift to overlap again, starting around 54 months. The upper

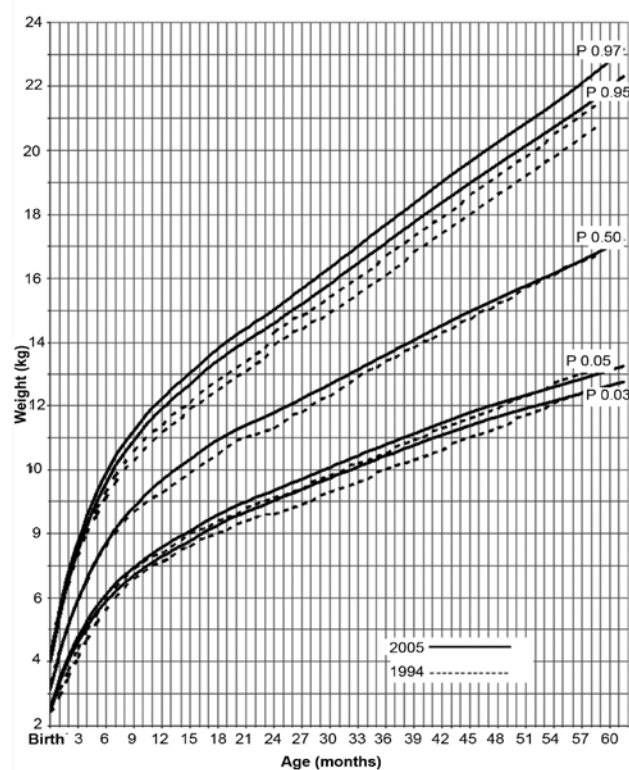


Figure 1 - Weight for age in boys.

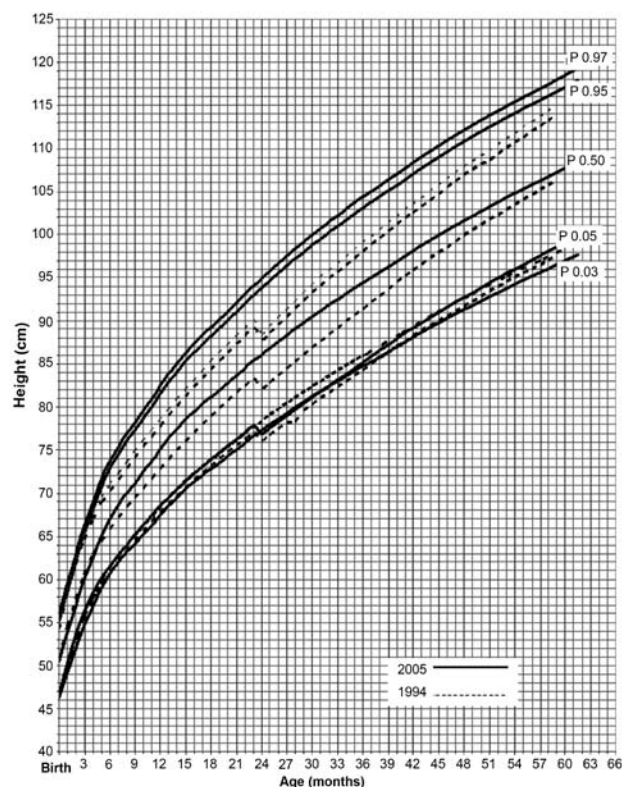


Figure 2 - Height for age in boys.

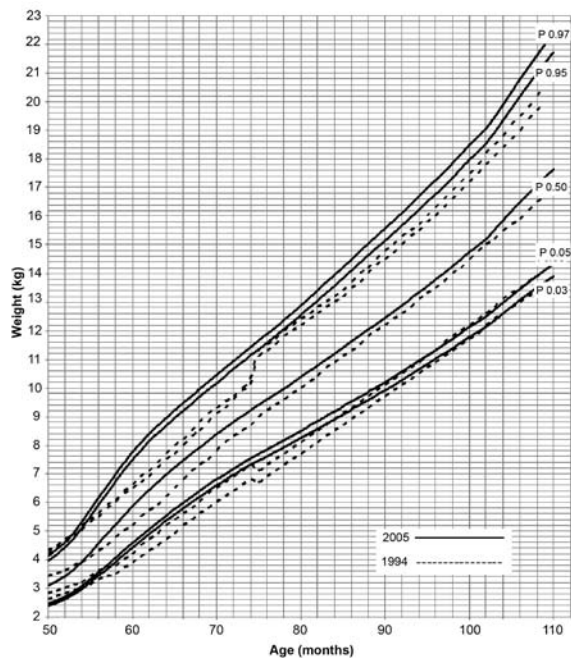


Figure 3 - Weight for height in girls.

percentiles, however, show an initial overlap from birth-3 months of age followed by a gradually increasing upward shift of the 2005 curves. Comparison of the fiftieth percentiles indicate a similar trend of overlap from birth to approximately 9 months of age, followed by an upward shift of the 2005 curve, which decreases gradually to overlap again, by 50 months of age. Nearly similar results are found when comparing curves for girls (figure not shown). The pattern of changes in the height for age, is presented in **Figure 2** for boys, and there is no appreciable shift in the lower percentiles. However, there is a marked upward shift of the upper percentiles of the 2005 survey starting after 3 months of age with a tendency to increase with age up to 24 months, then tend to decrease gradually. The fiftieth percentile comparison, however, shows a trend similar to the higher percentiles. The pattern of comparison of height for age for girls, is similar to that of boys. A comparison of the weight for height for girls is shown in **Figure 3**. The curves shows an initial downward shift of the 2005 lower percentiles for the first 54 cm, affecting all percentiles, followed by a gradual upward shift of the lower percentiles, with a tendency to decrease with age. Regarding the higher percentiles, however, an upward shift starts after a height of 54 cm, and maintained with some variation to the height of 110 cm. The fiftieth percentile pattern for weight for height, is similar to the higher percentiles. Similar changes for weight for height of boys are found (figure not shown).

Discussion. It is well known, that the growth of children as assessed by anthropometric measurements is affected by a combination of genetic, and environmental factors. Although studies suggest a minimal role of genetics factors,¹⁶⁻¹⁸ ethnic variations, both between individuals and populations cannot be excluded.¹⁹ In most developing countries, environmental factors in the form of frequent infections, and inadequate food are the main causes of growth deficiency in children. This assessment is based mostly on studies conducted in countries, with poor socioeconomic status. Unlike the situation in developed countries, there is a trend of improvement in the nutritional status of children, and hence their growth indicators from generation to generation in developing countries, suggesting the need to update the growth charts regularly.²⁰ In KSA, as well as, in an increasing number of developing countries, improvement in socioeconomic status, and health of the population over the last several decades, is expected to result in better nutritional status in children.

Despite the relatively short time between the 2 studies, there is a demonstrable trend in 2 directions. First, the upward shift of the lower percentiles of the weight for age, and weight for height, more than height for age indicates a decrease in the prevalence of undernutrition and wasting, suggesting improved nutritional status. This is considered a beneficial effect of improved socioeconomic status of the population. Second, the upward shift of the higher percentiles for the weight for age, and weight for height, indicates increased trend for overweight and obesity. The latter finding is consistent with recent data from KSA indicating a significant increase of weight, height, and body mass index in schoolchildren and adults,^{21,22} and with the worldwide increase in the prevalence of obesity.²³ This harmful consequence of improved socioeconomic status of the population, is believed to be caused by lifestyle changes with less physical activity, and poor eating habits.

Although the 2 surveys are similar, there are at least 2 differences that may explain some of the variations in nutritional status of the children. In addition to the difference in statistical methods, the collection of data by house-to-house visit in the 2005 survey of the randomly-selected households, has insured representation of the population socioeconomic strata, with good representation of middle- and high-class families. This is due to the fact, that many of the middle- and high-class families, including military dependents and employees of companies, seek both preventive and curative medical care in health facilities, other than the primary health care centers of the Ministry of Health.

In summary, the findings of this study indicate the need for a continuous surveillance program of the nutritional status of children and adolescents, to monitor not only the beneficial effects of improved

socioeconomics, and also for the detection of harmful effects found in this study. In addition, the data collected from such surveillance program should be used to update the growth charts on a regular basis, to reflect changes in nutritional status of children and adolescents.

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Related topics

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