



Growth reference centiles and secular changes in Turkish children and adolescents

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Abstract

The purpose of the study is to develop current reference growth centiles for Turkish children and adolescents. A cross-sectional growth survey was conducted on 1,427 (709 boys and 718 girls) healthy schoolchildren aged 6–17 years in Ankara, the capital city of Turkey. As an indicator of socio-economic status, the occupation of the parents was recorded. Growth references of height, weight, body mass index (BMI), sitting height, iliospinal height, relative iliospinal height and relative sitting height were constructed by the LMS method. Sex differences, association of parental occupation with height and BMI standard deviation scores were assessed by analyses of variance. Results showed significant sexual dimorphism for height, weight, sitting height and iliospinal height ($p < 0.001$). Significant effect of socio-economic background was found on height and BMI. The prevalence of overweight and obesity was found using the International Obesity Task Force (IOTF) reference criteria 22.4% and 5.6% in boys and 21.2% and 3% in girls. Present results demonstrated an increment during the last three decades in height, leg length and weight curves which is more prominent in boys, but not in the sitting height. This positive secular change appears to be a logical outcome of the gradual changes in nutrition, health care and education, and environmental and economic conditions.

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1. Introduction

Growth can be used as a proxy of health and well-being, and has been largely attributed to improved nutrition and living conditions (Molinari and Gasser, 2004; Himes, 2004; Komlos, 2003; Schell and Knutsen, 2002; Bogin, 1999; Neyzi et al., 1996). In the last century, increases in body size, growth rate and consequently early maturation has been recorded in many industrialized countries (Roche and Sun, 2003). In Turkey (as a developing country), over the last 75 years, significant improvements have occurred in education level, income per capita, urbanization, child mortality rates and life span (TURKSTAT, 2004). Taking into consideration these factors, documentation of the current growth centiles is important for interpreting the growth profile of Turkish school children.

There is a lack of a continuous growth-monitoring program (providing data) involving children and adolescents in Turkey. Until 1939, no information was available on the anthropological investigation of the Turkish schoolchildren (Kansu, 1939). From the 1940s–1960s, pioneer studies were carried out to determine the local norms for growth and development in various parts of the country (Yalim, 1940; Binbasioglu, 1950; Bostanci, 1954). However, in these studies, there were some methodological limitations concerning data analyses and sample selection. In the 1970s, the first growth standards were constructed on schoolchildren in Istanbul (Neyzi et al., 1973, 1976, 1978) and were followed by a broader study in 1988 and 1992 (Saatcioglu, 1988; Duyar, 1992). However, in these studies centile curves were developed only from children representing higher social status, addressing the upper socio-economic strata (SES). Here, it is important to note that in developing countries, the socio-economic structure is heterogeneous and complex. Therefore, the impact of urbanization, improvement in income per capita, and social and health indicators varies with different social backgrounds (Neyzi et al., 1996). A sample can be representative only if the study design takes into account the different socio-economic classes.

The purpose of the present study is to determine up-to-date growth curves of Turkish school children and adolescents. Reference centile curves of height, body weight, body mass index, sitting height and iliospinal height (leg length) are constructed. An additional aim is to elaborate on the secular changes in correspondence with the changing socio-economic conditions in Turkey over the last three decades.

2. Material and methods

2.1. Subjects

Cross-sectional anthropometric data were collected in November–December 2005 on 1427 children, 709 boys and 718 girls aged 6–17. Data were collected from primary school and high school children living in Ankara, the capital of Turkey. With its socio-cultural and economic mixture, Ankara has a varied population. In addition, due to in-migration, Ankara has a good mix of the Turkish population. The survey was conducted under the permission of the Turkish National Educational Ministry and local area boards of education and the Ankara University Foundation. Data was collected from schools belonging to different social strata; from private schools, from central public schools and from suburban public schools. All subjects were randomly selected. A questionnaire was completed. The date of birth was recorded (according to day–month–year), and ages were computed based upon the recorded date. Age groups are defined in terms of the whole year (e.g. 6.00–6.99 years, so that the average age of the group is

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