Brief Reports

Heights and Weights of Primary School Children of Different Social Background in Ankara, Turkey

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Summary

A cross-sectional anthropometric survey was carried out in a low socio-economic and high socio-economic region of Ankara, Turkey, to measure the weights and heights of school children. The study group consisted of 5289 children between the ages of 5 and 11 years. Both boys and girls from the high socio-economic group had superior body measurements compared to those of the low socio-economic group. The difference between the mean weight for age values of two groups was statistically significant ($P < 0.05$), whereas no statistically significant difference was found on the basis of height for age values among all age groups. To make a comparison both with National Centre for Health Statistics and World Health Organisation (NCHS-WHO) standards and Turkish standards we used the data from high socio-economic group only. Our results showed that the mean height and weight values of boys and girls were higher than the 50th centile height and weight values of NCHS-WHO standards. Almost 25 years have passed since the measurements of Turkish standards were taken. The height differences were in the range of 0.24–1.51 cm/decade, with a mean value of 0.96 cm/decade. These results led us to conclude that, local/regional standards for height and weight are needed, and repeated assessments are useful for follow-up of populations.

Introduction

Anthropometric indices of pre-school and school children such as weight-for-age and height-for-age have been widely used to express growth performance. Growth in a population is largely influenced by socio-economic and socio-cultural changes over time. Therefore, repeated assessments are useful for follow-up of populations, comparisons between groups and evaluation of a programme.

Several growth studies have been carried out in various parts of Turkey in the last three decades.[1–3] Among them, the data from the study by Neyzi *et al.* in 1978 in Istanbul was accepted as a national growth reference and is still being used by most centres for growth monitoring in Turkey.[4] Along with the steady growth in industrial production and the development of the national economy in recent years, the standard of living in Turkey has increased. The effect of these changes on children's health or general living conditions has not yet been shown clearly. The current study was carried out to examine term trends and growth patterns by socio-economic class.

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Methodology

A cross-sectional anthropometric survey was carried out from January to May, 1994 in Ankara, Turkey by performing the measurements of weight and height in school children. The study group consisted of 5289 healthy children (2719 boys and 2570 girls) between the ages of 5 and 11 years. Measurements were taken in four public primary schools in the Abidinpasa district and two private schools in the Çankaya region. Previously, five schools from each area were randomly selected from the official school lists of both areas. Applications were made via the hospital manager to the principal of each school; however, only six of them were willing to co-operate. Most of the inhabitants of Abidinpasa are unskilled workers, and 40 per cent of the houses are slums,[5] whereas majority of the inhabitants of Çankaya

are professionals, high level bureaucrats or businessmen, and only 10 per cent of the houses are slums.[6] Education in private schools is very expensive and, thus, mostly affordable for wealthy families; therefore, the children from the public schools in Abidinpasa were accepted to represent the low, and those from private schools in Çankaya the high socio-economic group.

Measurements were taken by a team consisting of a consultant pediatrician, pediatric residents, and a pediatric nurse. All equipment was transported to the schools. A Holtain-type stadiometer was used for height, and a standard adult scale sensitive to 100 g was used for weight measurements. Height was recorded to the nearest half centimetre. Each child's exact date of birth was obtained from the school files, and it was subtracted from the measurement date. Children within 6 months of their last birthday were included in that age group, and those 6 months or more from their last birthday were taken into the subsequent half age-group.

Student's *t*-test was used in the comparison of data and the significance level was accepted as $P < 0.05$.

Results

There were 1909 children in the high socio-economic group and 3380 children in the low socio-economic group. Both boys and girls from the high socio-economic group had superior body measurements. The difference between the mean weight for age values of the two groups was statistically significant, whereas no statistically significance difference was found in the basis of height-for-age values among all age groups.

Tables 1 and 2 demonstrate the mean weight and height for age values of girls and boys enrolled in the present study. Within each table, a comparison of the current data with the Turkish and National Centre for Health Statistics-World Health Organisation (NCHS-WHO) standards is also presented. The growth study of Neyzi *et al.* (Turkish standards)[4] included children from the high socio-economic population. Therefore, to evaluate the secular trend in Turkish children, only the data of children belonging to high socio-economic group were used in these analyses. The height and weight values of girls and boys in the present study were significantly higher than Turkish and NCHS-WHO standards up to the age of 9.5 years. At 10.5 years of age, the height values became equal in both sex groups, and at the age of 11 years it was even lower.

Discussion

The growth of an individual is a result of a complicated interaction between a number of different external and internal factors. A difference in standard of living is stated as the factor which most clearly causes differences in height and weight among groups of children or young adults.[7] The study of Singh in Delhi, India, showed that in every age groups the boys and girls of public schools, which were accepted to represent high socio-economic groups, had higher mean values of height, weight and arm girth than those from central and government schools, which were accepted to comprise children of low socio-economic level.[8] The results of our study were similar to those of

TABLE 1

Mean height and weight values of girls in Ankara and comparison with NCHS-WHO and Turkish Standards

		Weight					Height				
Age	*n*	Low SE[1] group X(kg)	*n*	High SE[2] group X(kg)	Turkish[3] standards X(kg)	NCHS[4] X(kg)	Low SE group X(cm)	High SE group X(cm)	Turkish standards X(cm)	NCHS	*P*[5]
5.0	47	19.48	6	23.41	18.20	17.66	110.43	111.75	108.3	108.4	<0.05
5.5	49	19.45	3	25.66	19.20	18.56	111.46	120.16	111.0	111.6	<0.05
6.0	131	20.48	113	22.28	20.20	19.52	115.18	117.41	114.0	114.6	<0.05
6.5	120	21.10	108	23.66	21.31	20.61	117.21	120.13	117.0	117.6	<0.05
7.0	178	23.10	77	23.57	22.50	21.84	120.95	122.66	120.0	120.6	<0.05
7.5	141	24.19	90	26.02	23.80	23.26	123.10	125.64	122.5	123.5	<0.05
8.0	188	25.14	94	27.10	25.40	24.84	125.27	126.76	125.5	126.4	<0.05
8.5	182	26.63	85	28.53	27.40	26.58	127.51	129.42	128.1	129.3	<0.05
9.0	178	28.86	92	31.71	29.40	28.46	131.68	133.24	130.5	132.2	<0.05
9.5	159	30.34	121	32.13	31.70	30.45	133.38	135.6	133.5	135.2	<0.05
10	159	32.47	100	34.25	34.0	32.55	137.63	139.14	137.0	138.3	<0.05
10.5	130	33.41	68	36.38	37.0	34.72	139.17	141.54	141.0	141.5	<0.05
11	24	31.70	33	37.03	40.0	36.95	138.00	143.07	145.0	144.8	<0.05

[1]Including girls from low socio-economic group.
[2]Including girls from high socio-economic group.
[3]Data from the study by Neyzi *et al.* in 1979.[4]
[4]National Centre for Health Statistics-World Health Organization (NCHS-WHO).
[5]Statistical significance for the differences between Turkish standards and data from high socio-economic group.

TABLE 2
Mean height and weight values of boys in Ankara and comparison with NCHS-WHO and Turkish Standards

		Weight					Height				
Age	*n*	Low SE[1] group X(kg)	*n*	High SE[2] group X(kg)	Turkish[3] standards X(kg)	NCHS[4] X(kg)	Low SE group X(cm)	High SE group X(cm)	Turkish standards X(cm)	NCHS	*P*[5]
5.0	53	20.52	7	22.71	18.70	17.22	111.64	114.50	109.5	106.5	<0.05
5.5	52	20.95	6	22.58	19.70	19.67	113.51	116.58	113.0	113.1	<0.05
6.0	132	21.31	151	23.23	20.80	20.69	115.29	118.34	116.0	116.1	<0.05
6.5	124	22.08	91	24.47	21.95	21.74	117.61	121.0	119.0	119.0	<0.05
7.0	185	23.90	103	24.85	23.20	22.85	121.83	122.84	121.5	121.7	<0.05
7.5	158	24.58	108	26.06	14.65	24.03	123.46	125.78	124.0	124.4	<0.05
8.0	191	25.96	117	27.73	26.10	25.30	126.46	128.26	127.0	127.0	<0.05
8.5	159	27.82	81	29.70	27.80	26.66	128.98	131.26	129.5	129.6	<0.05
9.0	168	29.50	101	31.51	29.50	28.13	131.84	133.23	132.0	132.2	<0.05
9.5	152	30.17	138	32.78	31.55	29.73	133.83	136.3	135.0	134.8	<0.05
10	136	31.44	121	33.64	33.70	31.44	136.69	138.20	137.5	137.5	<0.05
10.5	121	33.15	104	36.60	36.10	33.30	138.77	140.70	140.6	140.3	<0.05
11	34	32.61	39	38.26	35.50	35.30	138.11	141.00	143.5	143.3	<0.05

[1]Including boys from low socio-economic group.
[2]Including boys from high socio-economic group.
[3]Data from the study by Neyzi *et al.* in 1979.[4]
[4]National Centre for Health Statistics-World Health Organization (NCHS-WHO).
[5]Statistical significance for the differences between Turkish standards and data from high socio-economic group.

the above study and revealed that the height for age values of boys and girls from private schools were higher than those of children from public schools. The study of Neyzi *et al.* also stressed the significant height and weight differences in children from different socio-economic groups.[9] We assume that the parents of children from high socio-economic groups also have higher education levels, and that this affects the diet and pediatric care that these children receive in their infancy; thus, those children have higher height and weight measurements. The accuracy of the results could be questioned, as data related to the income of the families and the professional status of their parents were not presented. In addition, because of the obstacles caused by the school administrations in two additional private schools, it was not possible to include an equal number of children in the two socio-economic groups (1909 from private schools and 3380 from public schools). To have a more comprehensive picture of socio-economic differences, we believe there is a need to collect more data on school children from various social classes in various regions of Ankara, including the most peripheral and semirural districts.

Body measurements play a very important role in preventive and general pediatrics. In addition, the need for adequate growth references that consider both the sex and age of the child is well known. Currently NCHS-WHO growth references are being promoted for international use.[10] It is claimed that children brought up in an optimal environment show similar growth performance, regardless of their geographic and genetic backgrounds.[10] However, different human populations are known to vary from one to another in an ever-growing list of genetic markers as well as in growth patterns, body size, and composition. The growth study in Lahore, Pakistan, showed that infants from birth to 24 months of age were shorter (on average 1.7 cm less) than the NCHS-WHO references. The researchers pointed out that this difference could not be ignored and that NCHS-WHO references should not be used for different genetic/geographic populations.[11] Our results also showed that the mean height and weight values of boys and girls in Ankara were higher than the 50th centile height and weight values of NCHS-WHO standards (Tables 1 and 2). In addition, when we compared our data with the height of Iranian and Indian school children using the data of children from central and public schools, which were regarded as high socio-economic groups, it was found that the mean height for age values of Turkish children were higher than the Iranian and Indian counterparts in each age-group.[8,12,13] The growth differences in different socio-economic groups could lead us to believe that environmental factors are more influential than genetic and/or ethnic factors. However, the findings discussed above indicate that ethnic/racial/genetic factors are also important; hence, there is a need for local/regional standards for height and weight.

Secular changes in attained height and weight and in the rate of growth are regarded as an indicator of socio-economic conditions and the overall quality of life in industrialized countries.[14] The result of the national survey of Tunçbilek *et al.* from Turkey, showed that rates of malnutrition among children had decreased significantly in recent years.[15] Studies from Tokyo,[16]

Venezuela,[17] and Argentina[18] have all demonstrated a positive trend in the heights of school children. As shown in Tables 1 and 2 increase in the standing height of Turkish school children was in the range of 0.6–3.8 cm ($X = 2.4$ cm) for the age groups from 5 to 10 years when compared to Turkish standards. Almost 25 years have passed since the measurements were taken by Neyzi *et al.* Therefore, the height differences can be given as in the range of 0.24–1.52 cm/decade, with a mean value of 0.96 cm/decade. These results show that the secular trend in Turkey over the last 25 years is lower than that in Argentina[18] (1.9 cm/decade for boys, 1.5 cm/decade for girls), and Venezuela[17] (2 cm/decade for the 8–12 year age groups). However, it is higher or equal to that of Sardinian[19] and English[20] (0.75 cm/decade) children. The data from Europe and the United States concur well: from about the year 1900 or even earlier to the present time, children in average economic circumstances have increased in height at age 5–7 by about 1–2 cm each decade and at 10–14 by 2–3 cm each decade.[21,22] These variations in secular trend in different countries could be the reflection of numerous factors, such as wars or economic crisis, affecting socio-economic improvement in different time periods.

In conclusion, a positive trend in height in both sexes has been found in Ankara, most evident at 5–9.5 years of age. The positive shift decreased after the age of 10 years, a result that we could not explain. With the support of previous studies we can conclude that in the past two decades, improvements in socio-economic conditions in Turkey may have increased family income and educational levels, and this is reflected in the improvement in child nutrition and the positive trend in children's growth patterns.

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