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Acceleration and secular trend in a survey ot the Olomouc children and youth

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Abstract

ACCELERATION AND SECULAR TREND IN A SURVEY OF OLOMOUC CHILDREN AND YOUTH. On the basis of the graphs and standardization indexes we document the changes of basic anthropometric characteristics in a period of 20 to 32 years.

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In the current population, there are objective facts of acceleration and the secular trend. We can only guess what the future progress will be like. It is obvious that these will be apparent untill a certain limit which is based in the interaction of the given endogenous and exogenous factors and then they will stop. We can also expect some oscilation based on economic conditions and furthermore changes in lifestyles of population groups.

The tendency of growth and development acceleration concerns most of the body proportions - the whole process of growth is progresively accelerated. By acceleration we do not understand the final size of a mature body. We only take the speed by which the individual is approaching his/her mature size into consideration.

There are also some factors which condition acceleration. We take the improvement of hygienic conditions of the environment, nutrious possibilities, application of the psychological factors resulting in the intensive urbanisation effects into consideration. It is also necessary to stress the desintegration of isolates which influences the increase of the share of heterozygots in the populations. The changes of development caused by acceleration do not consider the early phases of human growth only but they affect the hole human biological rhythm. Acceleration of the development and functional activity of the individual are basically conditioned by the acceleration trends.

Secular trend means the tendency of increasing of the mature body height. To explain this, we primarily take the desintegration of isolates into consideration, secondary the improvement of the life standard is what matters. The increase of an average body height is caused especially by the decrease of the number of individuals with a smaller body size and also by the increase of number of very tall individuals. The result of it is the frequency curve moving to the right during the century.

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This is the reason why the regional surveys of the basic body characteristics still do not lose importance. They make possible to consider the variability of the surveyed characteristics and they document a certain ethnic specific feature of the particular region.

Material and methods

Having analysed the basic somatometric characteristics of the Olomouc children we stated before that their average sizes represent the city population type. The results from 1957 published by Šmirak [1959] show that even then, the Olomouc youths' height and weight were above average.

On the basis of the graphs and standardization indexes we document the changes of basic anthropometric characteristics in a period of 20 to 32 years. Šmirak's data come from the transversal survey which was carried out in 1957 [ŠMIRAK 1957]. Our data come from two longitudinal surveys carried out in 1977-1981 and 1986-1989 [RIEGEROVÁ 1986, 1988, 1990]. This means that the periods between the surveys ere 20 and 32 years. The standardization index calculation for the groups from surveys in 1977-1981 (set A), 1977-1981, 1984 (set B) and 1986-1989 (set C) was carried out in relation to the 1957 survey (set S). The sets consisted of elementary school pupils of the age of puberty. Set B was examined in the age of 17 (Figs. 1, 2).

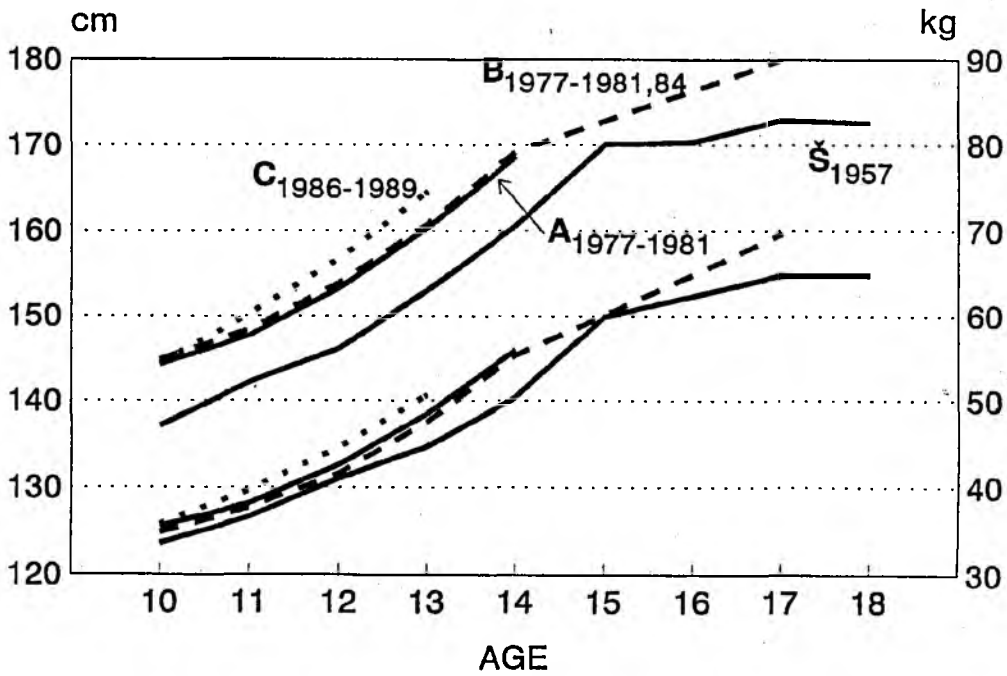

Fig. 1. Body height and weight comparison - boys

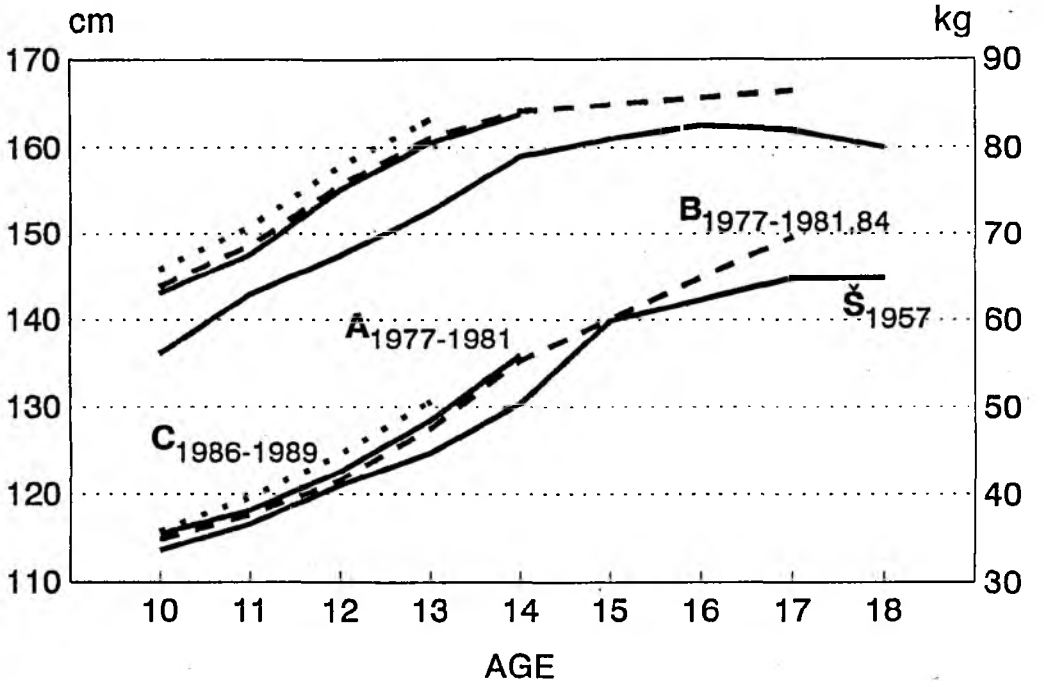

Fig. 2. Body height and weight comparison - girls

Results and discussion

The difference in body height of the two sexes is above average. The highest value of the standardization index is in set C where we compared the average body height in the time period of 29 to 32 years (Fig. 3).

The body weight difference is very small - in boys it does not even reach statistic significance. The highest variation is also found in set C. The female set C shows a considerable weight increase in the age of 12 and 13, the standardized abberation is -0.82s and -0.96s (Fig. 4).

In the relation to the Fifth National Anthropological Survey data from 1991, our 13 year old boys from set C are taller again (0.33s; 2.92 cm) with the same weight. 13 year old girls are 0.27s (1.75 cm) taller and they weight 0.17s (1.54 kg) more.

The B set of girls was examined in the time period responding their age of 10-17. We also paid attention to the development of particular anthropometric features in relation with early, average and late maturity characterized by the highest growth speed of the age of puberty - PHV [RIEGEROVÁ 1987]. In the accelerated girls, average age of menarche was 11.60 (PHV 10.80), in average girls - 12.67 (PHV 11.70 years) and in retarded - 13.64 and 14.27 years (PHV 12.70 and 13.73) years). In the whole set, we found PHV in the age of 11.94 years, and the age of menarche was 12.87 years. Set A, exami-

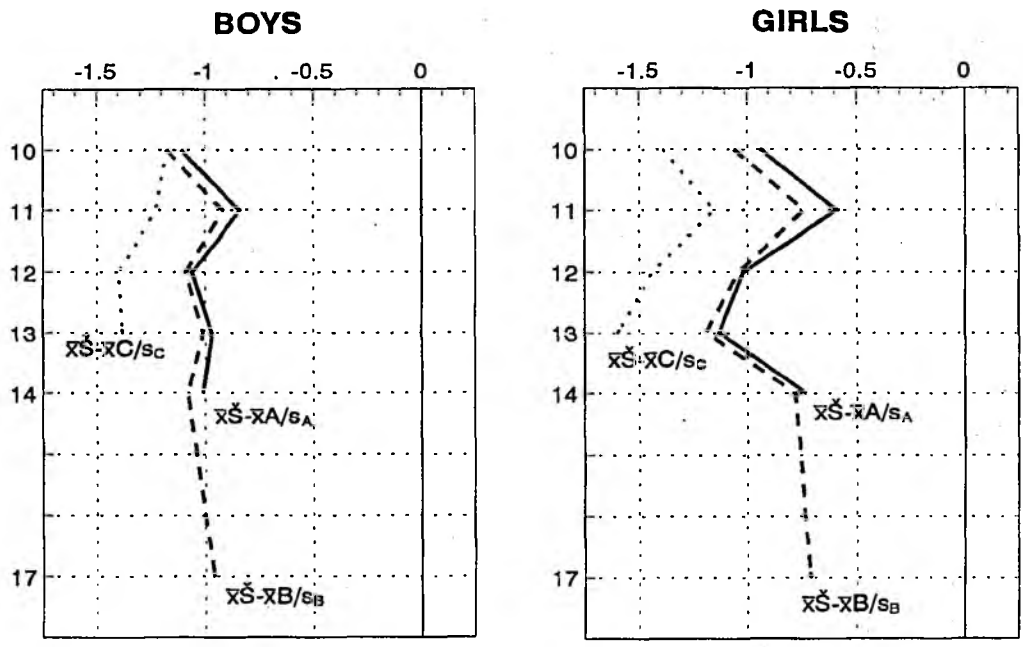

Fig. 3. Set S body height standardized variation values in comparison with sets A, B, C

ned 9 years ago, had the same age of menarche - 12.85 years which supports the conclusions about the termination of acceleration in the period of growing up.

In this survey we also measured the parents. We used this anthropometric data to evaluate the heredity of particular anthropometric features. The average age of children was 17.27 and the average age of their parents was 44.20. Comparison of the Olomouc sets showed that we could consider parents of boys as above average in height. Probably there was an impact of the secular trend. Only men proved to be above average in weight. Women's weight was within the average framework. The explanation might be that women show higher interest in their weight. As far as somatotypes ere concerned, we see that the mature population is moving in the endomorphic direction behind the limits of somatograph which of course is not ideal for the body. Mothers' weight was 10.36 kg higher than daughters'. Fathers were 13.10 kg heavier than sons.

As far as comparing the body heights of children and parents is concerned, daughters were taller than mothers (average of 3.44 cm - 0.66s). At the age of 17, sons were also taller than fathers (average 3.00 cm), the average predicted height from the initial state at 17 years of age then increased up to 4.23 cm (0.54s).

The comparison of average weight ands height from our longitudinal surveys (time difference: 9 years) confirms the acceleration in progress (Fig 5).

Standardized body height variation of boys increases with age and this supports the idea of surviving growth acceleration.

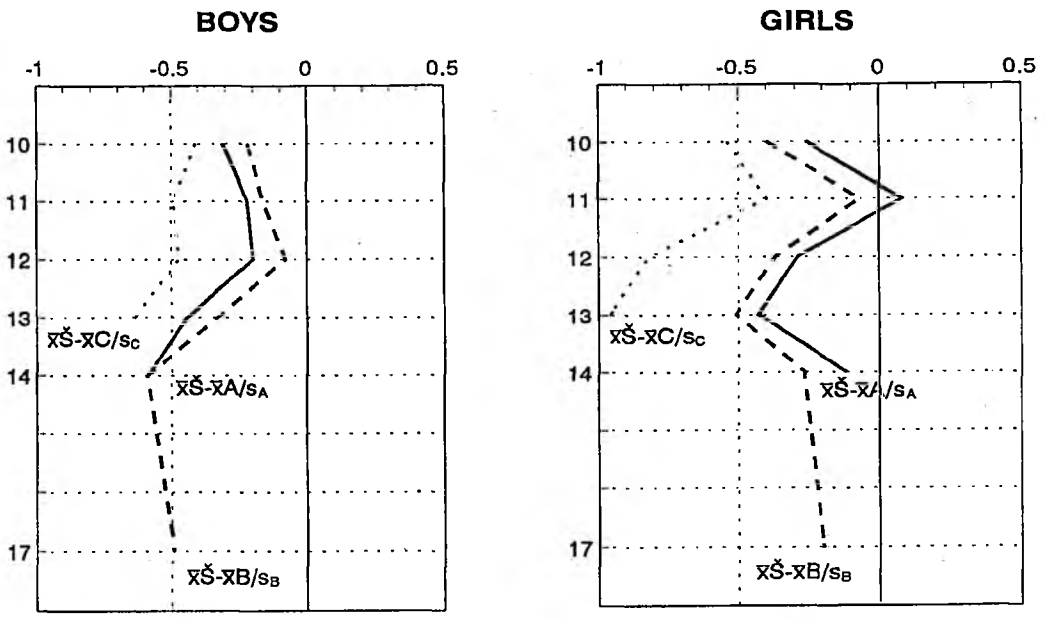

Fig. 4. Set S body weight standardized variation values in separate age categories in comparison with sets A, B, C

Values of standardized variation of girls are quite balanced, with no statistical significance for both sexes. Standardized weight variation is stabilized for boys of 11 to 13 yeras of age, with girls we find an increase with age. This fact corresponds with the average age of PHV and with the age of menarche.

Conclusions

In the end we can state that results of surveys of the Olomouc children and youth confirm the existance of acceleration and the secular trend. The results of the Fifth National Anthropological Survey on children and youth from 1991 also confirm the positive function of the secular trend with a shift to a younger age. As far as the presented tendencies toward growing slim are concerned, we cannot confirm a favourable proportion of body components in our sets. There is a growing tendency of a non sufficient growth of muscle fraction with a higher proportion of fat fraction in children and youths who do not exercise. This is a results of hypokinetic tendencies in young generation.

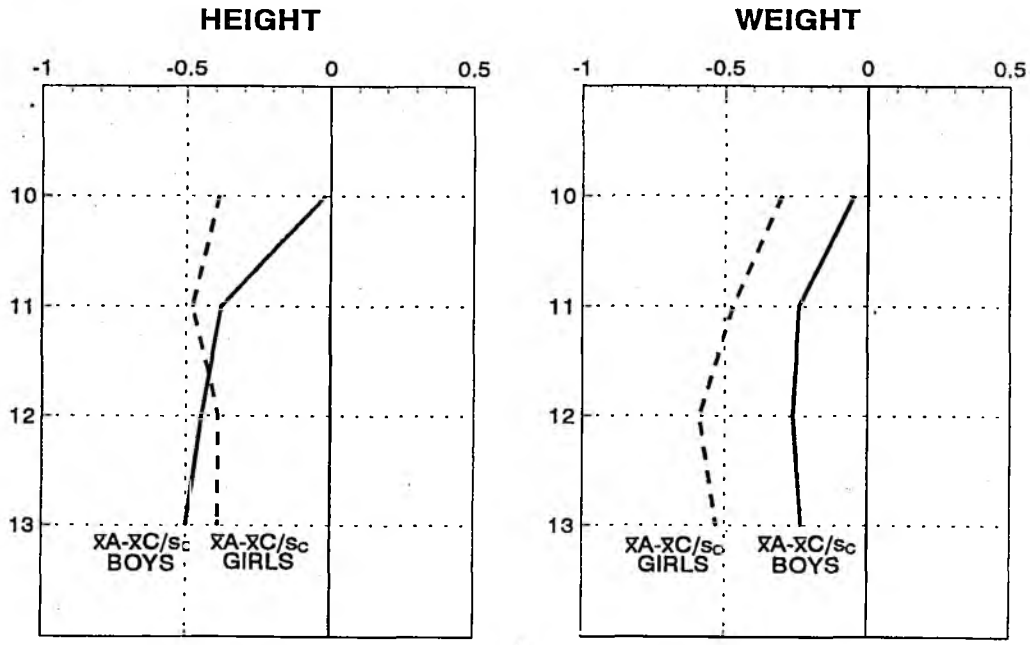

Fig. 5. Sets A and C - Body height and weight standardized variation values

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