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5TH NATIONAL ANTHROPOLOGICAL SURVEY OF CHILDREN AND ADOLESCENTS OF THE CZECH REPUBLIC, 1991

ABSTRACT: The fifth nation-wide survey of children and adolescents (Czech Republic) was conducted in the fall of 1991 and comprised, similarly to the four preceding studies in 1951, 1961, 1971, 1981, a representative sample of children and adolescents obtained by the method of random selection. Cross-sectional studies have proved their extreme importance because the child organism reflects very sensitively environmental influences. The values of growth parameters and their changes also provide information about the nutritional status of children. Altogether seven anthropometric parameters were studied and a questionnaire included information on the family background of the child, dietary habits, and basic data from the family history. The positive impact of the secular trend on the increase of stature was confirmed by analysis of anthropometric data from more than 90 000 probands aged 0 to 18 years. The impact of this trend shifts to the lower age categories when compared with preceding surveys. This study also confirmed the trend towards a more slender stature in both sexes, more pronounced in girls, as well as a gradual shift of this trend to lower age categories.

KEY WORDS: Nation-wide anthropological survey – Body mass – Body height – Children – Adolescents – Secular trends.

INTRODUCTION

Extensive anthropological studies, and especially studies of the Czech child and adolescent population, have a long tradition in Czech lands. The first extensive research was conducted by Professor Matiegka as early as in 1895. Teachers of all Czech regions contributed to this research. The subsequent extensive survey was made in 1951 and could indicate whether the World War II affected in some way the growth and development of Czech youth. However, the main purpose of the survey was to obtain badly needed new standards of the Czech child population.

Nation-wide surveys were repeated every ten years, i.e. in 1961, 1971, 1981, 1991. The first four surveys included 120 000 children and adolescents from birth to 18 years (Prokopec et al. 1973, 1986), and the last one more than 90 000 probands from all Czech regions, which is roughly 3 % of the child population.

These cross-sectional studies are of great importance because the child organism reflects very sensitively all environmental influences. Growth parameters and their changes also indicate the nutritional status of children. Experience has proved that national growth standards based on representative population groups are necessary for the evaluation of growth and development of the young population.

The fifth nation-wide anthropological survey of children and adolescents, which comprised a representative random sample of the child population, was carried out in September and October 1991. The research was done with the assistance of teachers and health professionals under new social and political conditions.

MATERIAL AND METHODS

A representative sample of the Czech child and adolescent population from 0 to 18 years, representing both sexes, was

obtained by random selection. Data from 90 910 probands were included in the total processing after logical checking. The pre-school group from 0 to 6 years comprised 18 956 boys and 18 984 girls. 25 682 boys and 27 288 girls were in the age group from 6 to 18 years. The age groups are consistent with the WHO classification system. The questionnaire used for data collection had two parts. The first comprised anthropometric data (height, mass, head circumference, chest circumference, waist circumference, hip circumference and left arm circumference). The second part included questions about the child's family background, dietary habits and data from the family history (Lhotská et al. 1993). Anthropometric data were collected using Martin and Saller's methods (1957).

Data processing

The collected material was recorded on PC media. Writing, logical control of data and all other operations, including the final processing of data, were made on IBM PC compatible computers using the software package EPI Info, version 5.0 (Epidemiology Program Office, Atlanta, USA, A Global Program on AIDS, WHO Geneva, Switzerland).

RESULTS

1. Height in the 1991 study compared with the 1981 study

The average length of boys up to 1.25 years in the 1991 study is smaller than in the 1981 study. From the age of one and a half years boys from the 1991 survey are taller in all age groups than boys in the 1981 survey. The main differences were found at the age

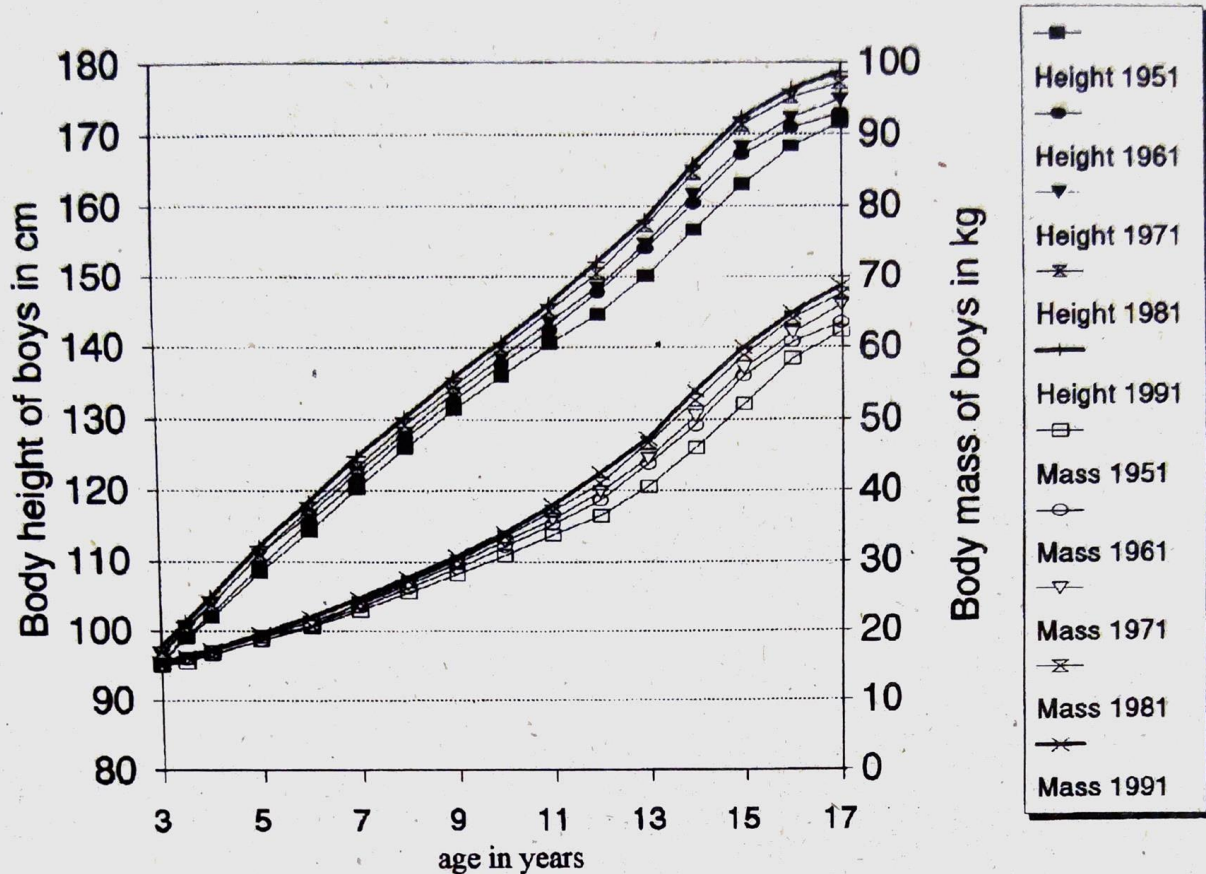


FIGURE 1. The development of body height and body mass in Czech boys: 1951–1991

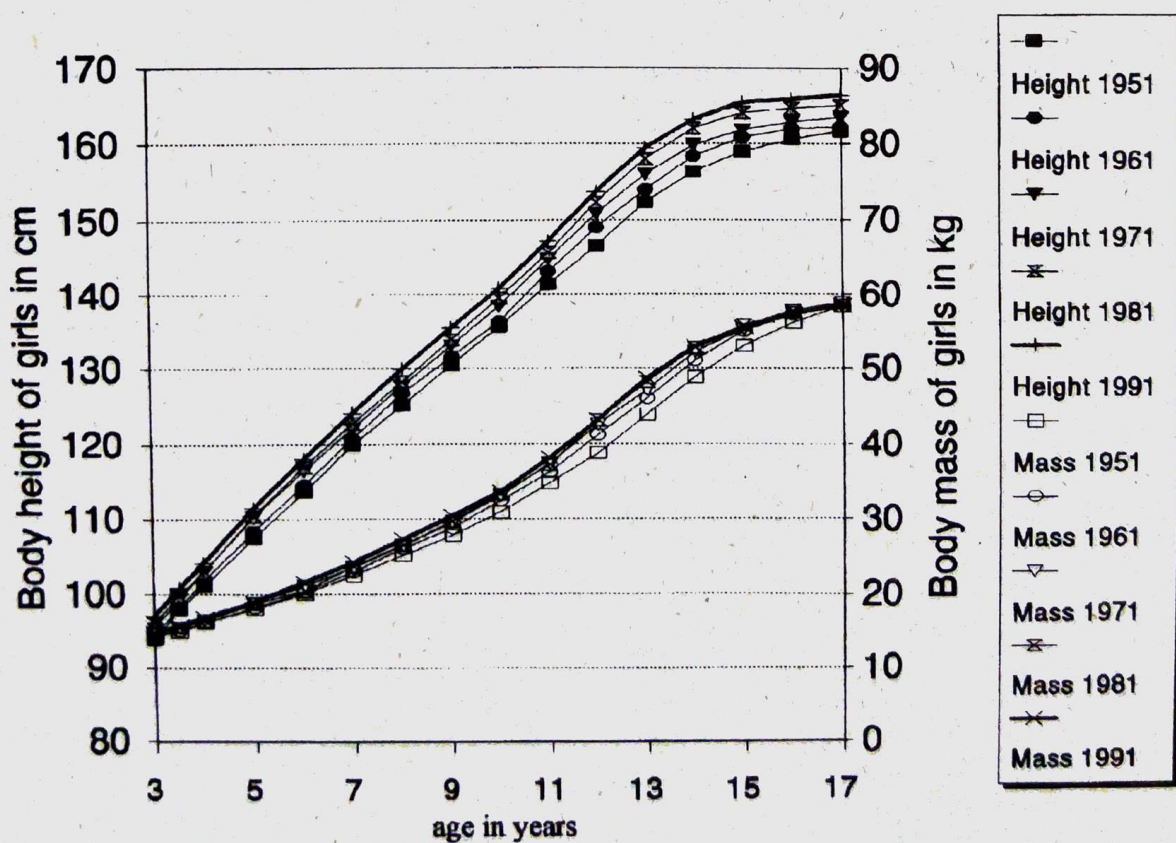


FIGURE 2. The development of body height and body mass in Czech girls: 1951–1991

of four years, between seven and nine years, and at the age of 16 and 17 years. We can summarize that boys in the 1991 survey are on average by 1.2–1.5 cm taller than boys in the 1981 survey (Figure 1).

Also the average length of girls up to the age of 1.25 years in the 1991 study is smaller than in the 1981 survey. From the age

of one and half years girls of all age groups in 1991 are taller than girls in 1981. More pronounced differences were found between three and five years (1.0–1.7 cm), and especially between seven and nine years (1.5–1.7 cm) and at the age of 15 and 16 years (1.3 cm) (Figure 2).

Czech boys-body height

Secular trend 1951 - 1991

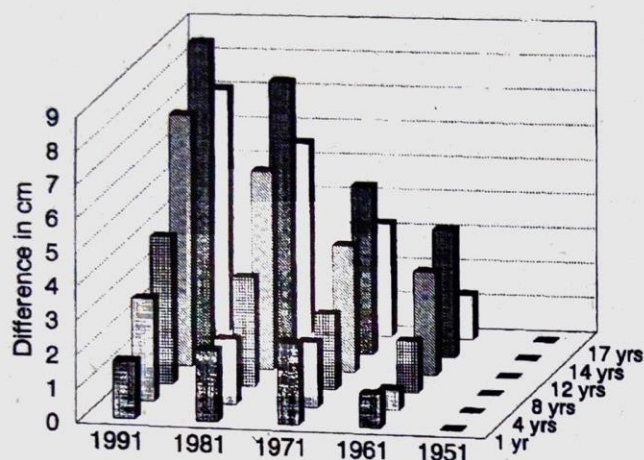


FIGURE 3. Secular trend in Czech boys - Body height.

Czech girls-body height

Secular trend 1951 - 1991

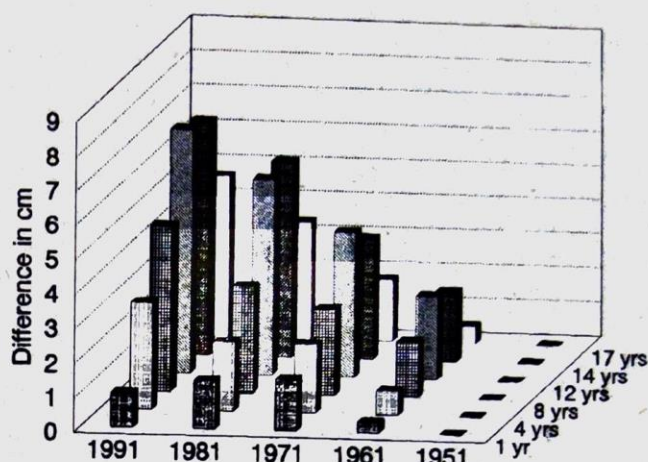


FIGURE 4. Secular trend in Czech girls - Body height.

Czech boys-body mass

Secular trend 1951 - 1991

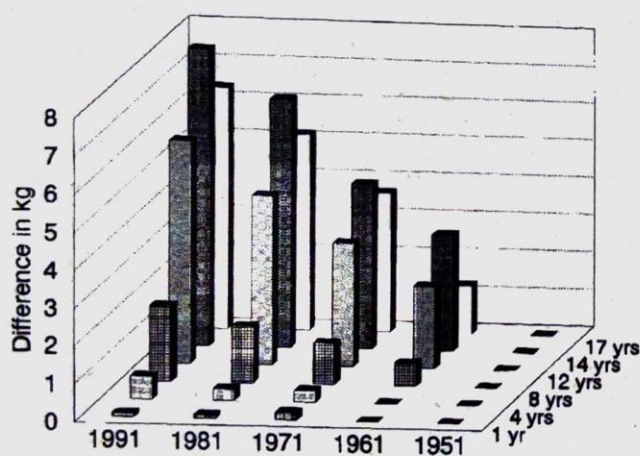


FIGURE 5. Secular trend in Czech boys - Body mass.

2. Body mass in the 1991 study compared with the 1981 study

In 1991 the average body mass of boys aged 0 - 1.25 years of age was lower in comparison with the 1981 survey. The average body mass of the further two age groups is basically the same. In subsequent age groups up to the age of 18 years the body mass of the 1991 sample is higher than that of the 1981 sample. The increase in average values of body mass in relation to height is lower in 1991 than in 1981. In other words the increments of height are relatively greater than the increments of body mass. It means that the trend towards a more slender stature was manifested also in boys (Figure 1).

TABLE 1. The average body height (cm) of 17 year-old boys and girls:

	boys	girls
1951	171.6	161.7
1961	172.9	162.2
1971	174.9	163.5
1981	177.2	165.1
1991	178.7	166.4

Czech girls-body mass

Secular trend 1951 - 1991

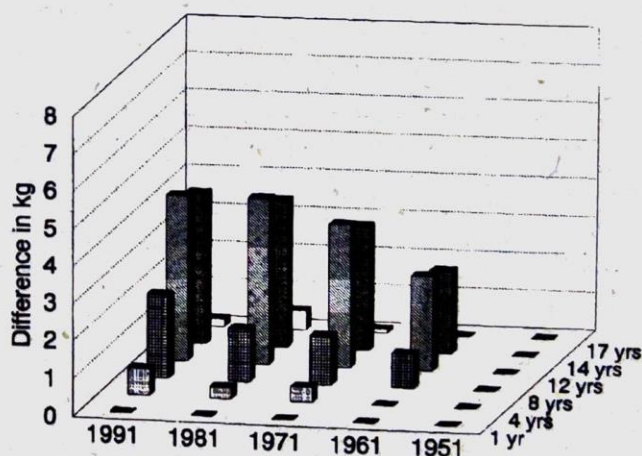


FIGURE 6. Secular trend in Czech girls - Body mass.

Similarly in 1991 the average body mass of girls up to the age of 1.25 years was lower than in 1981. Girls of all age groups from 1.75 to 14 years have an average body mass greater than in 1981 but the mass increments are relatively smaller than those of height, especially in girls between 11 and 13 years. The trend towards a more slender stature started already at the age of 9 years and is more marked after the age of 12 years (Figure 2).

It is difficult to evaluate whether the decrease in the average body mass, especially in the older age groups, is only a quantitative change and not a qualitative one. A detailed analysis of body composition would probably help us to answer this question.

3. Secular trend

During this century, especially after the Second World War, a secular trend of increasing stature was described in many European countries including the Czech Republic. Nation-wide anthropological studies of children and adolescents made it possible to describe this trend including its specific changes. Curves of selected age groups illustrate clearly this secular trend. Age categories used for plotting the curves e. g. in the group of 9-year-old probands include all individuals from 8.51 to 9.50 years. Individual columns show the difference of mean values in a given age group compared with the same group in 1951. The time scale of the X axis is reversed to prevent the overlapping of columns.

Body height

If we compare one-year-old boys from the 1951 survey with the same age categories from previous surveys the greatest increase is found in 1971, a somewhat smaller one in 1981 and an even smaller one in 1991. Four year-old boys in 1971 and 1981 have the same average increase, while the increase in 1991 is larger. An ascending linear trend is found in all subsequent age groups (Figure 3).

As compared with 1951, the same increase was recorded in one-year-old girls in 1971 and 1981. The position was similar in four-year-old girls but the greatest increase was observed in the 1991 survey. Similarly as in boys, an ascending linear trend was found in all subsequent age categories (Figure 4).

The pattern of the pubertal growth spurt has the greatest impact on height increments and the final height.

Body mass

The increase in body mass of one-year-old boys, as compared with 1951, is minimal especially in the 1991 survey.

In four-year old boys no significant increments were recorded. The only marked increment was observed in 1991. In subsequent age groups an ascending linear trend can be found. The greatest increment occurs during puberty with a slight declining trend in the last two surveys (Figure 5).

The position is different in girls (Figure 6). Average body masses of one-year-old girls in all surveys are practically the same. The average body masses of four-year-old girls in 1951 and 1961 do not differ. An increase is found in the last three surveys in the following order: 1981, 1971 and 1991. Body mass increments in eight-year-old girls are practically the same in 1971 and 1981 and are the highest in 1991 as compared with 1951. In the subsequent two age groups the greatest increment in body mass was found between 1951 and 1961, a smaller difference between 1961 and 1971 and a much smaller difference between 1971 and 1981. There is practically no difference between average values in 1981 and 1991. Body mass increments in 17-year-old girls are small and the average mass of this group in 1991 is even lower than in the previous survey.

GENERAL REMARKS

The secular trend of height and body mass still persists, however, with a different pattern. There are specific differences in the patterns recorded in boys and girls: in boys there is a slightly rising trend while in girls there is a slightly declining tendency (Figures 3, 4, 5, 6).

4. Maturation

For assessment of the mean menarcheal age "status quo" method was used and the data were calculated using the logit method. The menarcheal age has been steeply declining in Czech girls since the end of the last century (15.1 in 1895, 13.9 in 1934, 13.1 in 1962, 13.1 in 1981 and 13.0 in 1991). The survey in 1991 revealed results almost identical to 1961 and 1981, i.e. the mean menarcheal age was 13 years. The stagnation of the mean menarcheal age seems to precede the stagnation of the secular growth trend.

To assess the process of maturation in boys, a change in the voice was recorded. The mean age of occurrence of this phenomenon was calculated and results were compared with the mean of the menarcheal age of girls. The same 1.5-year difference in maturation between the two genders was found as in 1981.

CONCLUSIONS

1. The results of the fifth nation-wide survey of children and adolescents confirmed the continuing influence of secular trends on the increase of stature. It must be stressed that the

increments are not constant in different age groups. The influence of this trend shifts to lower age categories as compared with the past decades. The average height from the age of one and half years in both sexes is always higher than in corresponding samples of the 1981 survey, and in the age group of 17.00 – 17.99 years it attains 179.2 cm in boys and 166.5 cm in girls.

2. Increments of body mass in boys are relatively smaller than those of height. A similar position was found in girls but those above 14 years in the 1991 survey have a lower mass than the girls of the 1981 survey. This means that the trend towards a more slender figure is persisting and shifting to lower age groups. However, whether this trend is favourable as regards body composition, remains open.

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