Physical Growth of Czech Children and Some Socio-Economic Factors

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KEY WORDS Growth of Children, Height, Body Weight, Czech Child Population, Socio-economic Factors.

ABSTRACT In the 5th Nationwide Anthropological Survey of Children and Adolescents in 1991 (Czech Republic) anthropometric characteristics of some 3% of the Czech population aged 0-18 years were assessed. The survey comprised also a questionnaire addressed to parents. This questionnaire contained some questions concerning the child's health status, family background, dietary habits and basic data on the parents, and the family-history. This paper deals with the impact of the number of children in the family, birth order, the mother's education and size of the community where the child lives, on height and the height-weight ratio of the child. The interaction of the effect of the investigated factors on the mean height and weight-height ratio of the child was tested by multivariate analysis of variance. By using the Z-score of both investigated parameters the effect of age was eliminated. The highly significant effect of different factors on the height and weight-height ratio of the child was confirmed. The interactions of these factors are not significant in any combination. The results were compared with WHO reference data.

INTRODUCTION

Nation-wide anthropological surveys of 0-18-year-old children were carried out in the Czech Republic (former Czech regions of Czechoslovakia) five times during the last 40 years, always after 10-year intervals (Prokopec, 1994). These measurements provide reference data for observation of growth and development in the Czech child population and at the same time ample material for comparison with other populations.

MATERIAL AND METHODS

Czech population: The Czech population is ethnically homogeneous with a relatively small proportion of ethnic minorities. In the examined sample in 1991 non-Czech nationality was recorded in 1.2% of cases, one third of this total (0.4%) being children of Slovak nationality. The growth of the Czech child population is comparable with reference data of the World Health Organization (Vignerova, 1997).

The Socio-economic Conditions: The socio-economic conditions were until 1989, and in majority of cases still are, assessed best by using the level of the parents' education as criterion. Income per head was in the past strongly levelled. Salaries of people with lower education (manual workers) often exceeded those with academic education. Therefore neither income per head nor occupation can serve for satisfactory assessment of socio-economic status. A higher level of education implies awareness of the impact of various factors, such as nutrition, on child development. When associated with better distribution of resources it leads to a healthier lifestyle meeting the child's needs (diet, leisure activities, extra education). It can be anticipated that eventually dramatic changes in the social sphere after 1989 will be reflected in the child population.

Age Groups: The same age groups were used as by WHO. In each category under the age of one year for each sex in the 5th Nationwide Anthropological Survey in 1991, 300-400 children were included, under the age of six years 1000-2000 children of each age group of both sexes, under the age of 18 years 2000 to 3000 male and female subjects resp. in this age group (Lhotska, 1993).

Parents' Education: Since the correlation of mother's education with that of the father has been well established, the present analysis takes into account the mother's education only (Lhotska, 1995).

According to the mother's education the sample is divided into the following four groups: (1) elementary school (13.2% mothers) (2) apprentice (37.9% mothers) (3) high school (39.2% mothers) (4) graduate (9.7% mothers)

Number of Children in the Family: Czech Republic falls into the category of countries with an average of two children per family:

Distribution, in percentage, number of...
children/family follows:
(1) One child (12.0 % in analysed sample)
(2) Two children (59.5 %)
(3) Three children (23.6 %)
(4) Four and more children (4.9 %)

Child’s Birth Order: The ratio of children in
the sample who were born 1st, 2nd, 3rd etc. was
as follows:
(1) 1st (45.7 %)
(2) 2nd (40.3 %)
(3) 3rd (11.5 %)
(4) 4th and subsequent (2.5 %)

Community Size: The size of communities
where the children live is divided into four
groups:
(1) 1 - less than 5000 inhabitants (22.7 %)
(2) 2 - 5000 - 19 999 (28.1 %)
(3) 3 - 20 000 - 99 999 (33.7 %)
(4) 4 - 100 000 and more (15.5 %)

Statistics: The actual comparison of the Czech
child population with the WHO (World Health
Organisation) reference population was done
using the programme the ANTHRO (National
Center for Chronic Disease Prevention and
Health Promotion, CDC, Atlanta, Georgia, USA
and Nutrition Unit, WHO, Geneva, Switzerland).
This programme evaluates height and weight for
0-18-year-old children in relation to reference
values. Height/age, weight/age and weight/height
ratio of a child is then expressed in Z-score values
(Dibley, 1987; Gorstein, 1994).

RESULTS

Using analysis of variance, the presence of
statistical significance of mean values of height
in age groups was tested. The following factors
were analysed: a) mother’s education; b) number
of children in the family; c) birth order; d) size
of community.

The effect of the mother’s education on child’s
height was highly significant in all age categories,
with the exception of the youngest ones (Table
1). The effect of the number of children in the
family on the attained height varies. It is highly
significant in all age groups between 10 and 18
years. The effect of birth order was significant
only in some age groups and seems incidental.
The effect exerted by the size of the community
on the mean height of children was very low in
majority of under 10s and rose after that age.

Based on the above, only data collected in a
sample of children older than 10 years were
further analysed. The interaction of the effect
exerted by the investigated factors on the mean
height and weight-height ratio was tested by
multivariate analysis of variance. Z-score for
mean height and weight-height ratio, calculated
from individual values in relation to the WHO
reference were used to eliminate the effect of age.
The data of 34 000 children from 10 to 18 years
was processed. Grouping the age categories, the
highly significant effect of three of the four of
the factors, i.e. the mother’s education, the
number of children in the family and the size of
the community, on the height and body weight-
height ratio of the child was confirmed. No
significant effect was identified in case of the
birth order. Further analysis, however, showed
that interactions of these factors in any
combination did not have any significant effect
on height and weight-height ratio.

For each of the three statistically significant
socio-economic factors the difference in the mean
Z-score of the height (upper parts of graphs) and
weight-height ratio (lower parts) was assessed.
Figure 1 shows an increasing mean height and a
slightly declining value of the body weight-height
ratio with mother’s education. Figure 2 shows a
decreasing mean height and almost stationary
mean body weight-height ratio with the increasing
number of children in the family. Figure 3 shows
that with increase in community size there was no
clear difference in mean height or the body
weight-height ratio among the categories. These
charts were plotted using the data for boys, the picture
would be the same for girls.

These three charts seem to indicate that
mother’s education has the greatest impact on
differences in the mean height in all of the
assessed age groups. In fact, the following figures
illustrate the interplay between the mother’s
education and the two other socio-economic
factors.

- The higher the mother’s education, the
  smaller the number of children in the
  family.
- The greater the size of the community, the
  lower the ratio of mothers with elementary
  education and the higher the ratio of
  university educated mothers.
Table 1: Statistical significance of mean values of height in age groups (n=78,354)

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Boys</th>
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<th>Girls</th>
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<td></td>
<td>Mothers’ education</td>
<td>Number of children</td>
<td>Birth order</td>
<td>Size of community</td>
<td>Mothers’ education</td>
<td>Number of children</td>
<td>Birth order</td>
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* p < 0.05  ** p < 0.01

Fig. 1. Mean height/age and weight/height ratio by age groups and mothers’ education. Boys, n=16,651
Fig. 2. Mean height/age and weight/height ratio by age groups and number of children in the family. Boys, n=16,651

Fig. 3. Mean height/age and weight/height ratio by age groups and size of community. Boys, n=16,651
Table 2: Factors differing significantly according to the parent’s education

<table>
<thead>
<tr>
<th>Parents’ education</th>
<th>Elementary</th>
<th>Apprentice</th>
<th>High school</th>
<th>Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of children with low birth weight (less than 2500 g)</td>
<td>7.6 %</td>
<td>5.7 %</td>
<td>4.6 %</td>
<td>4.2 %</td>
</tr>
<tr>
<td>Breast feeding more than 3 months (% of mothers)</td>
<td>15.2 %</td>
<td>17.4 %</td>
<td>25.9 %</td>
<td>37.8 %</td>
</tr>
<tr>
<td>Watching TV by children (hours per week - children up 6 years)</td>
<td>2.1 h</td>
<td>1.8 h</td>
<td>1.5 h</td>
<td>1.3 h</td>
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<td>Ratio of parents - smokers</td>
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<tr>
<td>- Mothers</td>
<td>42.0 %</td>
<td>30.2 %</td>
<td>20.4 %</td>
<td>14.2 %</td>
</tr>
<tr>
<td>- Fathers</td>
<td>71.2 %</td>
<td>53.6 %</td>
<td>39.2 %</td>
<td>27.4 %</td>
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<tr>
<td>Parent’s mean body height</td>
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<tr>
<td>- Mothers</td>
<td>163.7 cm</td>
<td>164.8 cm</td>
<td>165.6 cm</td>
<td>165.9 cm</td>
</tr>
<tr>
<td>- Fathers</td>
<td>175.3 cm</td>
<td>177.7 cm</td>
<td>178.8 cm</td>
<td>179.3 cm</td>
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<tr>
<td>Parent’s mean BMI</td>
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<tr>
<td>- Mothers</td>
<td>24.9 kg/m²</td>
<td>24.1 kg/m²</td>
<td>23.2 kg/m²</td>
<td>22.9 kg/m²</td>
</tr>
<tr>
<td>- Fathers</td>
<td>26.1 kg/m²</td>
<td>25.9 kg/m²</td>
<td>25.6 kg/m²</td>
<td>25.3 kg/m²</td>
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</table>

Other relations observed were:

- The lower education of the mother, the higher the ratio of low birth weight infants (below 2500 g).
- The higher the mother’s education the higher the ratio of breastfed infants.
- The higher the mother’s education, the lower the mean number of hours per week spent by the child watching television.
- The higher parents’ education, the lower the ratio of parents-smokers.
- The parents’ education seems to have also an impact on their own height and weight. The higher their education the taller they are and the smaller their mean BMI is.

The values of the above factors differ significantly (Table 2) in relation to the parents’ education.

CONCLUSION

The Vth Nation-wide Survey in 1991 provided the last possibility to record growth and development of Czech children in the conditions of the pre-market economy when economic situation of families was levelled out to a great extent. Therefore great diversity of socio-economic conditions, such as extreme poverty or extreme wealth did not exist. However, just like in other societies mother’s education seemed to be a key factor with the greatest impact on child’s wellbeing.

ACKNOWLEDGEMENTS

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REFERENCES


