

LONGITUDINAL STUDY OF CHANGES OF BMI INDEX IN THE ONTOGENESIS OF CHILDREN AND YOUTH

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ABSTRACT

Obesity decreases the quality of life, as a result of which diseases increase the rate of morbidity and mortality. It markedly reduces the life time of people, especially when occurring already in children and youth. The aim of our work is to find out how BMI changes in the course of life of children and youth and to point to the fact that it will increase in the majority of children, when BMI was high already in the child's age. Results of our research in 113 quizzes prove that in 10% of boys a gradual increase in BMI started from 6th up to 17th year of age was recorded, while in girls it was found in 20%. The highest incidence in boys is in the beginning of puberty, but in the period of „second height increase“, when paradoxically girls had frequent problems with obesity and overweight, these phenomena in boys begin to decline. Incidence of obesity and overweight is higher in girls when compared with boys.

Acknowledgements: The contribution is a part of the grant project: VEGA 1/0478/11 „Prevention of obesity and functional disorders of the motor system and possibilities of their remedy in children and youth“

Keywords: BMI index, obesity, overweight, children

INTRODUCTION

Obesity is an increasing problem in children and will lead to significant morbidity in adults in the next decade.³

Childhood obesity tracks into adulthood, ie. obese children are likely to remain obese adults, with the associated health risks. Studies cited in the NHMRC obesity guidelines reveal that up to 50% of obese adolescents remain obese in adulthood. 7–13 The greater the degree of overweight, and the later in adolescence it persists, the greater the likelihood of adult obesity.^{1-2,6}

Ten per cent of the world's school-aged children are estimated to be carrying excess body fat (Fig. 1), with an increased risk for developing chronic disease. Of these overweight children, a quarter are obese, with a significant likelihood of some having multiple risk factors for type 2 diabetes, heart disease and a variety of other co-morbidities before or during early adulthood. The prevalence of overweight is dramatically higher in economically developed regions, but is rising significantly in most parts of the world.³

Aim

The aim of research was to longitudinally observe the dynamism of changes of BMI index in the ontogenesis of children and youth.

Hypotheses

1. Statistically significant changes will be observed between the group of boys and girls as to the incidence of obesity and overweight.
2. The majority of obese children will have obese parents.
3. The majority of overweight and obese children will suffer from at least one health complication.

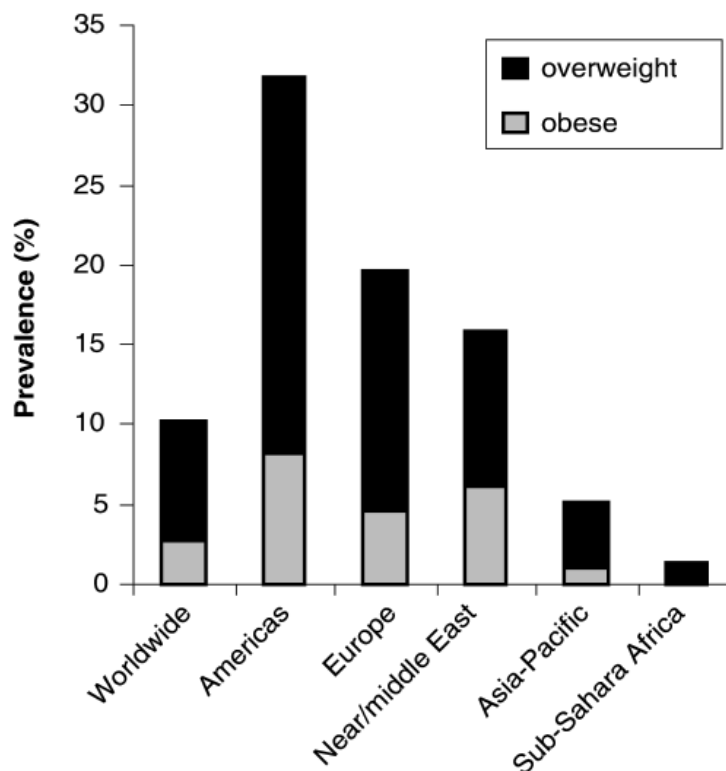


Figure 1

Prevalence of overweight and obesity among school-age children in global regions. Overweight and obesity defined by IOTF criteria. Children aged 5–17 years. Based on surveys in different years after 1990. Source: IOTF

METHODS

The observed group is formed by 113 students (55 women and 58 men). The observed students were born in 1992. We focused on the course of anthropometric data (body height, weight and BMI) between 6 and 17 years. Preventive examinations were carried out in years 6, 9, 11, 13, 15 and 17. Quizzes received a questionnaire and filled in the following data: body weight and height in years 6, 9, 11, 13, 15, and 17, when regular medical examinations are normally executed. Using these data BMI was calculated and expressed in percentile graphs. Thus the incidence of underweight, overweight, obesity and normal weight were found. Incidence of obesity and overweight in parents, frequency and volume of physical activity and sedentary behavior were also observed. In the last part of the questionnaire health problems connected with obesity and overweight were diagnosed. The observed experimental group was compared with the one of children's population, which was observed using the national anthropometric survey (CAP) realized by the Slovak Public Health Bureau (SPHB) in 2001. CAP. It was elaborated based on the national referential standards calculated from the CAP results carried out in the Slovak Republic in 1991. The observed group represents 10,889 boys and 10,742 girls aged 7 to 18 years.

RESULTS

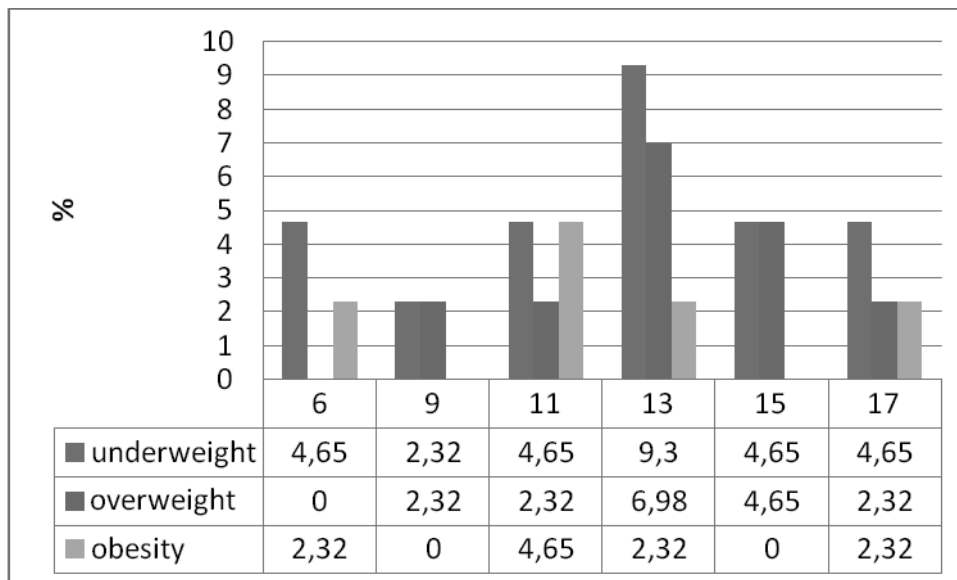


Figure 2
The incidence of underweight, overweight and obesity in boys with the birth year 1992

As seen from figure 2 incidence of obesity and overweight in boys is not so high. As far as obesity is concerned, the highest share was found at the age of 11, while obesity was not found in boys aged 9 and 15. The most frequent incidence of overweight was observed in the group of 13-year-olds and had no representation in the category of 6-year-olds. The highest incidence was in the period of beginning puberty, but as a result of the second period of rapid growth, when girls had paradoxically most frequent problems with obesity and overweight, the incidence of overweight and obesity began to drop. In the majority of boys incidence of obesity and overweight gradually dropped, while at the age of 17 there was only one boy in each class. Surprisingly, the highest share on the problems with food intake had the incidence of underweight. The highest share was found in the group of 13-year-olds (9,3%), but its incidence can be seen in each age category.

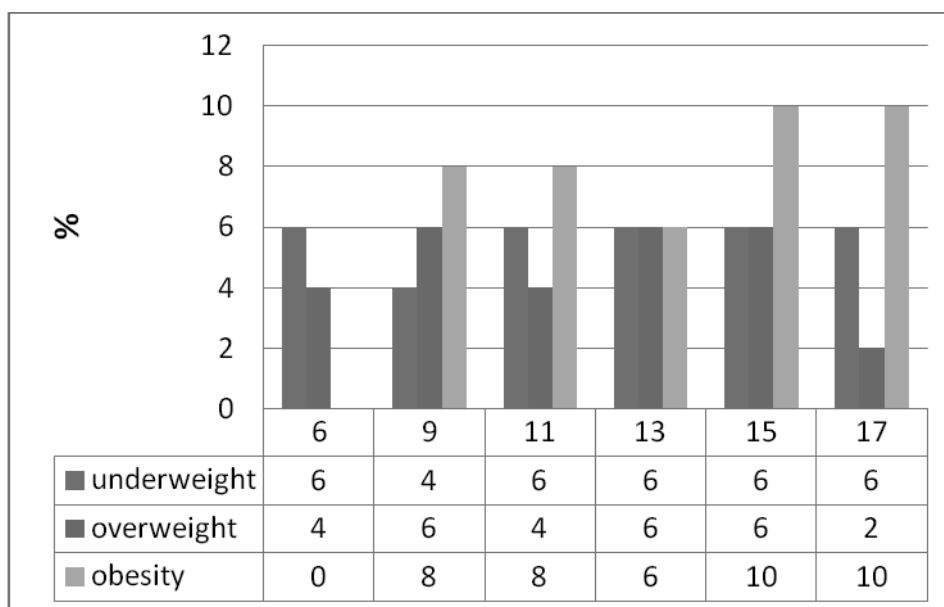


Figure 3
The incidence of underweight, overweight and obesity in girls with the birth year 1992

Figure 3 depicts the incidence of individual disorders in girls. Obesity recorded the highest share in the period of 15 to 17 years. It had no representation at the age of 6 and with overweight it forms only 4%. Then, incidence of obesity and overweight begins to grow and in the next period it persists, contrary to boys, where the course of incidence has a decreasing tendency after the beginning of puberty. The share of overweight is similar to the one of underweight (4-6%). Overweight decreases to 2% after the age of 17. There is a higher incidence of obesity and overweight in girls when compared with boys. Underweight is stabilized on the 6% level.

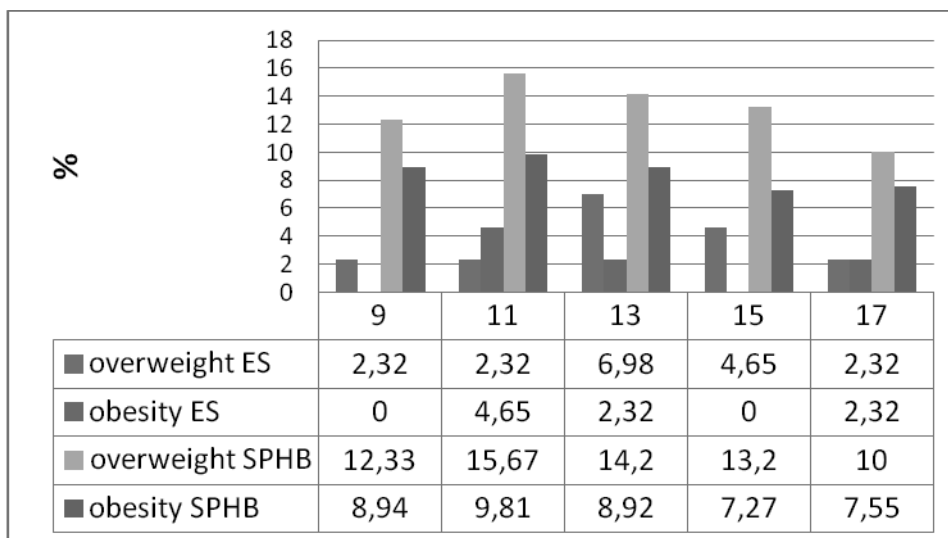


Figure 4

Comparison of overweight and obesity among boys aged 9 to 17 years between our school and respondents of UVZ SR

In figure 4 our results were compared with the data of the SPHB. Localization of our group only on a small territory (in the towns of Nitra and Žilina) is the limiting factor. Another limiting factor is the fact that our group is represented only by the data from regular examinations, which took place only once in 2-3 years. It represents the course of life of the observed persons, but the group of SPHB represents individual age categories in the year 2001. This factor, however, allows for finding, whether the incidence of obesity and overweight has been increasing during the last decades. Our group aged 9 represents the data from 2001 and 2002 until the data of the group aged 17 from the years 2008-2009. Similarity can be seen in the course of obesity. Percentage of boys with obesity increases with the growing age, reaching the peak values at the age of 11, just before the onset of puberty, and then it decreases. Percentage of individuals with overweight decreases with the growing age after the age of 13.

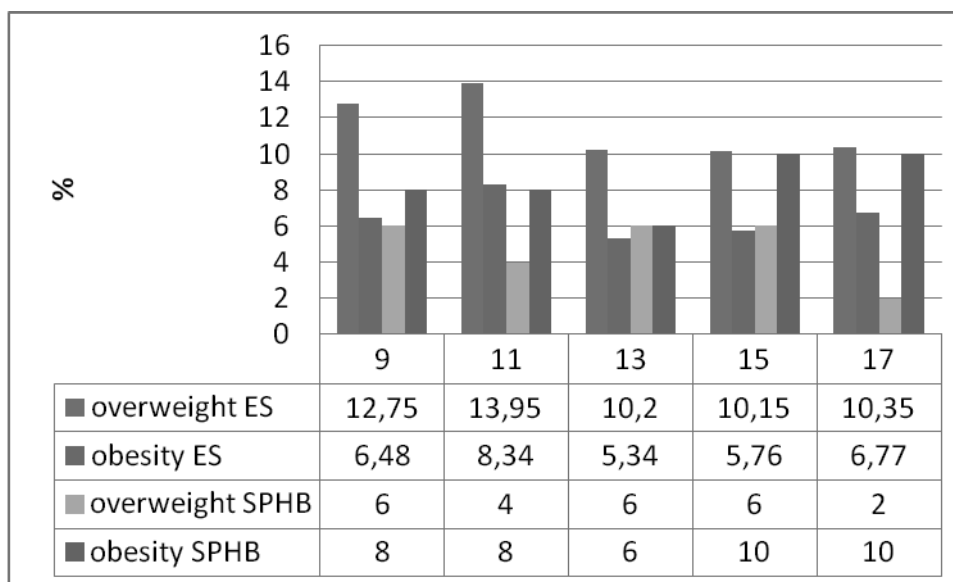


Figure 5

Comparison of overweight and obesity among girls aged 9 to 17 years between our school and respondents of UVZ SR

When comparing the incidence of overweight and obesity between the girls of the two above mentioned groups, smaller differences were found in girls than in boys. Largest similarity can be seen in the incidence of obesity in the period between 9 and 13 years of age. After this age obesity begins to increase between the years 2004 and 2009. On the other hand, we do not observe this trend in overweight and in comparison with the incidence in the group of SPHB the values of our group are very low. We can see that in the observed group of girls of SPHB from 2001 the decreasing trend in the incidence of overweight and obesity was observed with the growing age. On the other hand, this trend in our group was opposite. The opinion of Novakova that with the onset of puberty and maturation girls start to take a better care of their appearance, was thus not proved.⁵

When assessing the questionnaire we found that only one third of obese boys had obese parents, while in girls it was up to 50%. In these children only in two cases health complications connected with obesity were observed.

From the results we can see the increasing incidence of obesity in both children and youth, however, health complications connected with obesity in this group were not found, but obesity in the parents of obese children is high. We expect that this was caused by

an unhealthy way of life, first of all by an unhealthy diet and unsatisfactory physical activity. Children copy natural way of life of their parents. If they serve a negative example, we cannot expect these children and youth would positively change their ways of life and attitudes to their life.

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