

## Analysis of nutrition of boys and girls, adolescents from Montenegro

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Published online: December 26, 2015

(Accepted for publication October 20, 2015)

DOI:10.7752/jpes.2015.04107

### Abstract:

The research involved 188 adolescents from Niksic-Montenegro, 95 boys and 93 girls, ages 16, 17 and 18 years, with the aim of analysing the state of nutrition of adolescents. The state of nutrition was verified to subjects by means of BMI percentile values. By analysing the results of our research, encouraging is the fact that the subject population, adolescents from Niksic, is within the limits of normal weight, except for the boys aged 17 years who are approaching the excessive weight. Results obtained by the authors of work can be explained by the fact that the total population in Montenegro is among the highest in Europe, and according to Bjelica and et al. (2012) in their sample of 285 subjects (178 men, aged  $20.97 \pm 2.44$  and 107 women, aged  $20.86 \pm 2.63$ ) the average height was 183.2cm for men and for women 168.

**Key words:** Body composition, adolescents, nutrition

### Introduction

Obesity is one of the main health issues the modern society is faced with (WHO, 2000), and which arises as the result of the imbalance between energy intake and consumption (Bukara-Radujković, & Zdravković, 2009). Aside from hypokinesia and inadequate nutrition, on childhood obesity also have an effect psychogenic, physiological, pathophysiological factors (Mitrović, Pelemiš, & Pelemiš, 2014). Children that have increased body mass are faced with serious health risks which are life-threatening (Janssen, Katzmarzyk, & Ross, 2004; Daniels, 2006). The body mass index (BMI) is a simple index that represents the ratio of the body mass and body height, and it is normally used for classifying excessive body mass and obesity. It is defined as the ratio of the body mass and the square of the body height in meters ( $\text{kg}/\text{m}^2$ ). The body mass index can be regarded as an alternative for direct measuring of the body mass. Furthermore, the body mass index is a cheap and simple method to utilise. For children and young people the body mass index is calculated according to their age and gender, and it is very specific because of their growth and development (Vasiljevic et al., 2015). Adolescents obesity has not yet been diagnosed in a proper manner, and has not been sufficiently examined, but it is known that in a ten-year period in certain countries childhood obesity doubled or tripled, and in some other countries it even quadrupled (Despotović et al., 2013). Worldwide, obesity has more than doubled since 1980. Even 65% of the world population live in the countries in which increased weight and obesity are larger issues than famine. In 2004 the World Health Organization adopted the Global Strategy on Diet, Physical Activity and Health, whose primary goal was the improvement of health by means of proper nutrition and physical activity. In order to successfully achieve this goal it is necessary for the national programmes to include children and young people, and the institutions created for this population are especially important for forming the habits that contribute to the preservation and improvement of health, such as proper nutrition, the promotion of physical activity or limiting the time spent in front of a screen (WHO, 2014). The most important parents' task in development is to be the carriers of habits related to nutrition and of their changes in childhood (Gardasevic et al., 2015) The influence of the environment on children's nutrition and emergence of obesity was proved, especially eating habits of their parents as well as the influence of parents' behaviour on the emergence of childhood obesity (Anzman, Rollins, & Birch, 2010). The aim of this research is to analyse the state of nutrition of adolescents from Niksic-Montenegro.

### Material and method

The research involved 188 adolescents from Niksic-Montenegro. Of the total number of children, boys were 95 (50.53%) and 93 girls (49.47%). The subjects' state of nutrition was verified by means of BMI percentile values. The body height was measured by a stably attached height indicator (anthropometer) on which there were clearly visible marks of centimetres and millimetres. During the measurement process, the subject was barefoot, only in underwear, with skin-tight heels, standing upright (with the spine in the upright position), standing on a flat, firm surface, with the head in such a position that the Frankfurt plane (the line that connects the inferior margin of the left orbit and the upper margin of the left external auditory meatus) occupied the horizontal position. The researcher who was measuring the body height was positioned on the child's left side,

was controlling the position of the height indicator and the position of the child, and was lowering the slider on the height indicator down to the subjects' vertex. The body mass was measured by the decimal scale placed on a flat surface in a stable position. During the measurement process, the subjects were barefoot, dressed only in underwear, standing completely still with skin-tight heels. Every ten measurements it was checked whether the scale was indicating the "zero degree". The state of nutrition of the subjects was analysed by calculating the body mass index,  $BMI = BW (kg)/BH(m^2)$ . The subjects whose BMI was above the 95<sup>th</sup> percentile for the appropriate age and gender, were marked as obese, and the excessive body mass was designated as the BMI between the 85<sup>th</sup> and the 95<sup>th</sup> percentile (Table 1.). After analysing and processing the acquired data by means of appropriate methods of descriptive statistics, the acquired data will be shown in the tables.

## Results

Having calculated the body mass index for the adolescents, its numerical value is represented on the CDC BMI growth chart for age (for boys or girls) in order to achieve the percentile rank. The body mass index on the percentile indicates the relative position of a child among the children of the same age and gender. The rise in the values of the body mass index on the chart indicates the severity of the condition by category (malnutrition, normal weight, excessive weight, and obesity).

The BMI for age groups, the severity of the condition and the appropriate percentiles are shown in Table 1.

Table 1. Categorisation by percentiles

Category	Percentile range
Malnutrition	less than 5 (<5)
Normal weight	5 to 85
Excessive weight	85 to 95
Obesity	Equal or >95

The categorisation from the table is a recommendation of the Centres for Disease Control and Prevention-CDC. In Table 2. the structure of the boys adolescents (16, 17 and 18 years) is shown. The average height and body weight are shown for the above mentioned age groups, as well as the BMI percentile values. On the basis of these BMI percentile values, the boys aged 16 and 18 fall into the category of normal body weight (Table 1.), while the boys aged 17 were at the limit of the category of excessive body weight.

Table 2. Analysis of results for boys by age

No. of examinees	Age	Body weight (BW-kg)	Body height (BH-cm)	Percentiles	BMI
36	16	73.25	180.5	72	22.47
27	17	79.37	177.74	82	24.9
32	18	78.5	185.93	63	22.8

In Table 3. the structure of the girls adolescents (16, 17 and 18 years) is shown. The average height and body weight are shown for the above mentioned age groups, as well as the BMI percentile values. On the basis of these BMI percentile values, all the girls aged 16, 17 and 18 years fall into the category of normal body weight.

Table 3. Analysis of results for girls by age

No. of examinees	Age	Body weight (BW-kg)	Body height (BH-cm)	Percentiles	BMI
52	16	60.46	168.75	59	21.21
23	17	62.22	178.65	30	19.4
18	18	57.94	169.44	37	20.3

The shown percentile values of the body mass index give an insight into the state of nutrition of the analysed sample of boys and girls. By analysing the acquired BMI index percentile values for boys and girls with the categorisation of the state of nutrition from Table 1, it is possible to ascertain that the coefficients of the average BMI values for boys and girls according to the given categorisation imply normal body weight.

## Discussion

According to the data of the World Health Organization (WHO) about 2,1 billion people suffer from excessive body weight, 160 million children, of which even 22 million is under fiveyears of age. The prevention of obesity occurs more frequently in western countries, where the figures indicate that in the last twenty years the number of those who suffer from excessive body weight has increased three times. The number of obese children aged 6–15 is from 22% to 31% with a constant rising tendency (Reilly, & Dorosty, 1999). It is estimated that nowadays in the USA every fourth child is obese (Nicklas et al., 2001). If no preventive measures are taken, as far as the modern lifestyle with all the characteristics of hypokinesia are concerned, the numbers will continually rise, so it is believed that this number will be larger for about 1,3 million children every year (Kosti, & Panagiotakos, 2006). Due to its simplicity of calculating and assessing obesity in the world, even in our part of the world the most popular and the most often applied method for assessing the state of nutrition is the body mass index (BMI). The body mass index represents an important indicator of the state of nutrition and of the risk

to health (Janssen, Katzmarzyk, & Ross, 2004). When it comes to our neighbouring countries, the children from the two analysed regions of Bosnia and Herzegovina have normal body weight so it is asserted that such results are the consequence of an ever-growing number of sports schools that are being opened in the area of these two regions, and that there is a possibility that many children involved in this sample undergone various kinesiological activities which contributed to maintaining the normal body mass (Mitrović, Pelemiš, & Pelemiš, 2014). By analysing the results of our research, encouraging is the fact that the subject population of adolescents in Niksic is within the limits of normal body weight, except for boys aged 17 years who are approaching the excessive weight. Preventive measures against childhood obesity need to include increasing physical activity, reducing the energy intake, changing the factors that influence the excessive body mass and obesity, and which originate from the surrounding and from the educational work with parents (Despotović et al., 2013).

### Conclusion

One of the main causes of obesity in children are the genetic factors, the very behaviour, but also the family environment in which a child grows up (Ahmad, Q.I., Ahmad, C.B., & Ahmad, S.M., 2010). Also, the main causes of obesity are also seen in missing the breakfast and in consuming unhealthy food (Niemeier et al., 2006). In order to deal preventively with issues that we and the subject population are faced with, it is necessary to act aggressively upon, above all, the reduction of hypokinesia, by raising awareness of physical activity, first of all in schools, and subsequently by high-quality nutrition, and by educating adolescents as well as their parents. Kinesiologists and teachers of physical education should timely recognise this issue and advise the child and their parents on the proper lifestyle necessary for maintaining the normal body weight. The analyzed sample showed all participants within the limits of normal body weight data which can be encouraging, overweight and obesity are one of the biggest problems of modern ages. Results obtained by the authors of work can be explained by the fact that the total population in Montenegro is among the highest in Europe, and by Bjelica et al. (2012) in their sample of 285 subjects (178 men, aged  $20.97 \pm 2.44$  and 107 women, aged  $20.86 \pm 2.63$ , the average height was 183.2cm for men and for women 168.3cm. In order to draw some more concrete conclusions, it is necessary for the future research to take into account a much larger number of factors, as well as a larger number of examinees of different ages.

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