Differences in the nutritional status of urban and rural children

Milana Marković[1], Goran Vasić[2], Bojan Bjelica[2], Milan Zelenović[2]

1-Faculty of Physical Education and Sport, University of East Sarajevo, student drugog ciklusa studija
2-Faculty of Physical Education and Sports, University of East Sarajevo
Bosnia and Herzegovina, 71420 Pale
Corresponding author mail: bojan.bjelica@ffvis.ues.rs.ba

Abstract: The research was conducted with the aim of determining the differences in the body mass index between rural and urban students in the fourth grade of elementary school. The research included 58 respondents aged 9±6, divided into two subsamples, children from urban and rural areas. After statistical analysis, it can be concluded that children from rural areas are taller than children from urban areas, but that children from urban areas are heavier than children from rural areas. The body mass index is lower in children from rural areas, while it is higher in children from urban areas and represents the prevalence of overweight in children from urban areas and the need for quick intervention.

Keywords - percentiles, BMI, obesity, weight, height

INTRODUCTION

Overweight and obesity are associated with more deaths worldwide than malnutrition. It is the main risk factor for non-communicable diseases such as cardiovascular diseases, diabetes, musculoskeletal disorders and some types of cancer (including breast, ovarian, prostate, liver, gall bladder, kidney and colon cancer). The population of developed countries shows an increasingly frequent tendency to a significant increase in body mass above the ideal weight (Mekonnen, et al., 2021). The increasing trend in body mass index (BMI) in children and adolescents has reached a plateau in many high-income countries, however the trend has stalled, but at high levels, while in Asian countries it is increasing with trends that do not correlate with adults. Excess body mass (BWM), obesity or undernutrition during childhood and adolescence are associated with negative health consequences throughout the lifespan. Malnutrition among children and adolescents is associated with an increased risk of infectious diseases, and in girls, it increases the possibility of risky pregnancies later, including maternal mortality, birth complications, premature birth, and intrauterine growth retardation (Burkill, Waterhouse, & Pazzagli, 2021). Prevention of excess body weight in children and adolescents is also important because those who have it at that age are most likely to have it when they grow up (Davies, Copley, & Neville, 2021).

The constant increase in BMI in a large part of the world, parallel to the increase in the population living in cities, has led to the same opinion that urbanization is one of the main causes of obesity. However, recent research among adults refutes these claims, and even proves the opposite, namely that BMI increases at the same or higher rate in rural areas. Research conducted on the population of children and adolescents related to rural/urban differences in nutrition show different results, and the trend of changes in PTM and obesity between rural-urban areas still remains unknown and varies between countries. The question to what extent the obesity of children determines the obesity of adults is usually considered. However, the question to what extent fat parents determine the fatness of children is also interesting. A child of obese parents will largely have their pattern of obesity development. Some studies show that the family association of obesity is a consequence of certain patterns of behavior in one family, where common eating habits or physical activities determine the nutritional status of their members (Jansen, et al, 2021).

In general, the prevalence of PTM and obesity in children is higher in rural areas in developed countries than in developing countries. Nor does the picture in Europe differ from the rest of the world when it comes to children and adolescents, so some studies indicate a higher prevalence of PTM and obesity in rural areas (Wake, Kerr, & Jansen, 2018), and others in urban areas (Bably, Laditka , Paul, & Racine, 2022).

Health problems associated with being overweight in childhood include shortness of breath, apnea, asthma and other breathing problems, high blood pressure, type 2 diabetes, knee and hip problems, irregular periods, high cholesterol, liver disease, gallstones and diseases bile (Zhang, et al., 2021). It should be noted that obesity can cause some abnormalities in endocrine gland physiology, such as low concentrations of growth hormone and high concentrations of transport proteins for growth hormone, with normal values of insulin-like growth factors (Inokuchi, Matsuo, Takayama, & Hasegawa, 2011). There are also negative psychological effects of childhood obesity, of which the most frequently mentioned are lack of self-confidence, the feeling of rejection from the environment, and mediocre schooling achievements (Danielzik, et al., 2002).

METHOD

A sample of respondents

The sample of respondents consisted of 58 elementary school students aged 9±6 months. The sample was divided into two subsamples, children from Rural (DRUR) and Urban (DURB) environments. Children of the primary school Jovan Dučić in Šekovići (n=30) represented the respondents of the Rural environment. The second sub-sample of children from Sveti Sava elementary school in East Novi Sarajevo (n=28) represented the respondents of the Urban environment.

All respondents voluntarily agreed to participate in the experiment with prior written approval and consent from the principals of both elementary schools.

A sample of measuring instruments

The sample of measuring instruments consisted of two variables that were needed to calculate the body mass index as the main indicator of children's nutrition.

Anthropometric variables taken:

Body height (ATV),

body weight (ATT)

The variable obtained by calculating body height and body weight is:

Body mass index (BMI).

Statistical data processing

For the purposes of this research, the student's t-test for independent samples was used, which was relevant for determining the differences between the two subsamples of respondents and for determining the differences in the measurement instruments taken. In addition to basic statistics, descriptive parameters are presented: n-number of respondents; Mean - central value of the result; Std.dev-standard deviation and significance level denoted as - Sig.

The body mass index was calculated according to the formula: $BMI = m / h^2$. Given that the respondents are under the age of eighteen and are not of legal age, nutrition will also be expressed in percentiles.

RESULTS WITH DISCUSSION

Table 1 shows the basic anthropometric values expressed by descriptive parameters for both subsamples of rural and urban respondents.

Table 1. Descriptive parameters of body height and weight for a sample of urban and rural environments

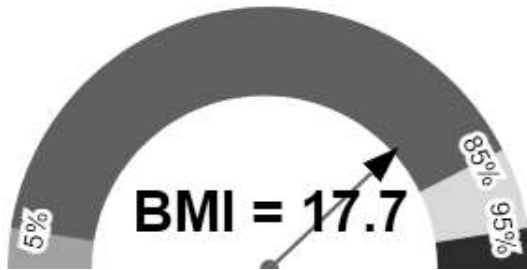| Respondents	n	ATV			ATT		
		Mean	Std. dev.	t-test	Mean	Std. dev.	t-test
DR	28	144.54	7.22	0.52	36.95	8.52	0.60
DURB	30	142.66	7.36		38.40	10.61	

From Table 1, we can see that children from rural areas are on average taller than children from urban areas, numerically by 1.88 cm, but that children from urban areas are heavier on average by 1.45 kg. Based on the presented descriptive values, BMI values and their statistical significance were calculated.

Table 2 shows BMI values in relation to children from the environment to which they belong, urban/rural.

BMI

Respondents	n	Mean	t-test	Sig.
DR	28	17.7	2.11	**0.03**
DURB	30	18.9		

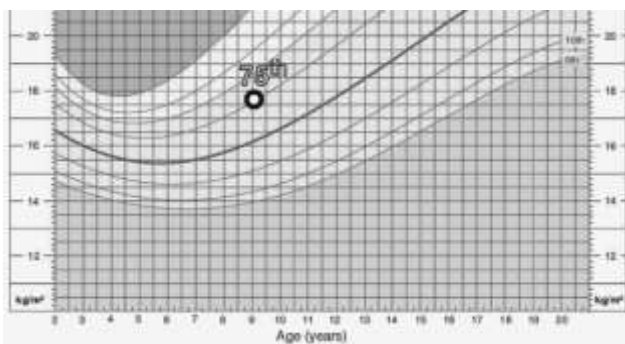*Children of rural areas (DRUR)*   *Urban Children (DURB)*


In Table 2, we can see that the BMI (BMI) is lower in children from rural areas and is 17.7, while it is higher in children from urban areas and is 18.9, which represents the prevalence of overweight in children from urban areas and the need for quick intervention.

Several types of percentile curves are used around the world, and the most commonly used are the percentile curves of the Centers for Disease Control and Prevention, the World Health Organization, and the International Obesity Task Force. Percentile curves are used for growth in weight and height and are used to assess the development and growth of children, and children are ranked by percentiles and compared with children of the same age and sex. Percentile curves are made on the basis of a representative sample, and at different time intervals it is necessary to update the data. It is important to emphasize that the percentile curves show the growth and development of the child. It is important to emphasize that the gender of the child is important for assessing growth and development, because boys and girls develop with unequal intensity. Percentiles are the relative position of a child's BMI in relation to children of the same gender and age and show the state of nutrition for children and adolescents (Marić, 2017). 5,206 children participated in the research in seven European countries. The children were from 6 to 11 years old. Body mass index was used for nutritional status. The percentage of overweight children was 15.6%, and the percentage of obese children was 4.9% (Leskošek, Strel, & Kovač, 2010). Based on a 2010 survey in which 651,852 children from Greece at the age of 8 and 9 participated, data on height and weight in the period from 1997 to 2007 were analyzed. Data on nutritional status were obtained from that research. From 1997 to 2004, obesity increased in girls from 7.2% to 11.3%, and in boys from 8.1% to 12.3%. In the period from 1997 to 2007, overweight and obesity increased for girls from 20.2% to 26.7%, and for boys from 19.6% to 26.5% (Olaya, et al., 2015). In 2001, researchers compared two studies from 1985 and 1995 in Australia. In the research from 1985, 8,492 children aged 7 to 15 years participated, and at that time 10.6% of girls and 9.3% of boys were overweight. The percentage of overweight and obesity increased, regardless of the fact that in 1995 the number of children who participated in the research was smaller, 2,962 children. Overweight increased for boys to 15.8% and for girls to 15.0%. In a 1985 survey, obesity increased from 1.6% to 5.3% for girls, and from 1.6% to 4.5% for boys (Tambalis, et al., 2010).

BMI percentile ratio of rural children   *BMI percentile ratio of urban children*
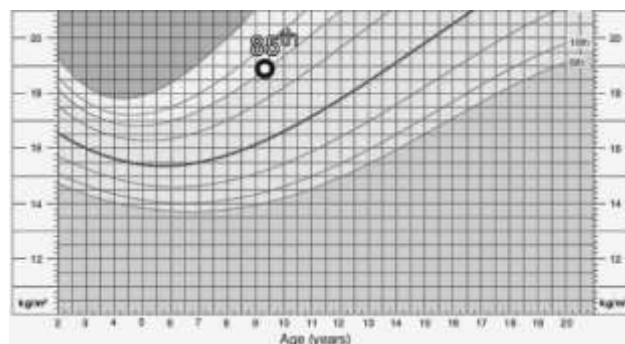
Students from rural areas are more active than their peers from urban areas, which is influenced by their active lifestyle. Also, related to anthropometric characteristics, students from rural areas have a lower body mass and are taller than students from urban areas. Likewise, they scored better during the assessment of most motor skills due to spending most of their time engaged in outdoor activities, walking to school and doing housework.

On the other hand, students from urban areas are shorter and heavier than their peers from rural areas. The reason for this is their sedentary lifestyle, spending less time outdoors, improper diet and frequent use of public transport. However, living in urban areas allows them to engage in various sports, which is why their motor skills are developed earlier than their peers from rural areas.

Research shows a significant genetic influence in the development of obesity (Maes, Neale, & Eaves, 1997). More and more research points to the association between the duration of breastfeeding and a lower risk of obesity in the first half of life, lower blood pressure, lower total and LDL cholesterol in adulthood and a lower risk of type 2 diabetes (Agostoni, et al., 2009). , as well as lower probabilities of school-age obesity by as much as 20% (Arenz, et al., 2004). WHO recommends starting breastfeeding in the first hour of life, exclusive breastfeeding until 6 months, and continuing breastfeeding in combination with complementary feeding until 2 years of age (WHO, 2009). These recommendations are in line with the biological (Wells, 2006) and especially the evolutionary (Mead, 2008) characteristics of humans as a species of mammal and primate,

The tradition of the environment, eating habits, natural factors, socioeconomic conditions and the quality of living standards are only some of the factors that significantly influence the development of anthropological characteristics of students.

CONCLUSION

Since overweight is becoming an increasingly important public health problem, special attention should be paid to solving the issue of overweight in children. Monitoring the diet and nutritional status of children and young people is important because these vulnerable groups are in the period of fastest growth and development, so they are also a good indicator of the nutritional status of the local community. The aim of this research was to determine if there is a statistically significant difference in the body mass index between students from rural and urban areas in the fourth grade of elementary school. The research results showed that there is a statistically significant difference in the BMI of students from rural and urban areas. For future research that will treat differences between elementary school age students, it is recommended to collect data on a larger sample of subjects with the application of modern methods, preferably laboratory ones (bioelectric impedance).

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