Dragan Bacovic

DIFFERENCES IN THE NUTRITIONAL STATUS AND BODY COMPOSITION OF CHILDREN ATTENDING THE FIRST AND FOURTH GRADE OF PRIMARY SCHOOL IN MONTENEGRO

RAZLIKE V PREHRANSKEMU STANJU IN SESTAVI TELESA ČRNOGORSKIH PRVOŠOLCEV IN ČETRTOŠOLCEV

Faculty for Sport and Physical Education, University of Montenegro, Niksic, 81400, Montenegro

Corresponding author*:

Dragan Bacovic
Faculty for Sport and Physical Education, University of Montenegro,
Podgorica, Montenegro
E-mail: dragan.b@ucg.ac.me

The manuscript contains only original material, has not been previously published, is not currently under consideration elsewhere, and will not be submitted elsewhere pending a final journal decision.

Dear Editor-in-Chief,

Underweight, overweight and obesity during childhood and adolescence are associated with adverse health consequences throughout the lifetime. If obesity exists in early childhood, there is a tendency for the child to have problems with obesity in growing up, with the risk of chronically non-comunicable diseases such as diabetes, elevated blood pressure, and coronary artery disease (Han et al., 2011; Black, 2013; Popovic et al., 2018).

The aim of of this research is to examine differences in nutritional status and body composition of first and fourth grade children who attend primary school in Niksic.

The total sample of examinees in this survey is 52, male and female, aged 6 and 9. All examinees were divided into two sub-samples. The first subsample consisted of 26 first grade children (17 girls and 9 boys), while the second subsample consisted of 26 fourth grade children (12 girls and 14 boys). For the purposes of this research, the following anthropometric variables have been measured: body height, body weight, hip and waist circumference. Mentioned anthropometric characteristics were used to determine: body mass index (BMI), waist-to-hip ratio (WHR) and waist-to-height ratio (WHtR) that were used to assess nutritional status. When assessing nutrition, the children was considered to be in the category underweight if the values were under 5 percentile, normal weight if the values were from 5 to 85 percentile, while values <85 and ≤95 indicated the category of overweight, eventually obesity was established if the value exceeded the 95 percentile. The relationship between waist and hip circumference (WHR) is different for girls and boys. A value of 0.8 is a cut off value for girls (below 0.8 indicates normal weight, and above 0.8 indicates obesity). A value of 1 is a cut off value for boys (below 1 indicates normal weight, and above 1 indicates obesity). The cut off value for the WHtR ratio is 0.5 for both genders. Values below 0.5 indicate normal weight while values above 0.5 indicate obesity. Also, visceral fats (V.F.A.) were examined using an innovative apparatus used to assess body composition (Jawon Medical ioi 353). The normal level of visceral fat is from 1 to 9.

Based on the analysed results of t-test there are no statistically significant differences in BMI first grade and fourth grade girls and both groups belong to the category of overweight with the following BMI values: first grade girls (17.0 kg/m^2 – 84th percentile) and fourth grade girls (18.6 kg/m^2 – 87th percentil). When it comes to first and fourth grade boys, there are also no statistically significant differences in BMI and both groups belong to the category of overweight with the following BMI values: first-grade boys (17.7 kg/m^2 – 91st percentile) and fourth grade

boys (18.3 kg/m^2 – 87th percentile). There is no statistically significant differences between first and fourth grade girls in the WHR ratio, and according to this variable, both groups of examinees are characterized as obese (first grade girls have a value of 0.89, and fourth grade girls have a value of 0.90).

Also, according to the WHR ratio, there are no statistically significant differences between first and fourth grade boys and both groups of examinees are in the category of normal weight (first grade boys have a value of 0.90, and fourth grade boys have a value of 0.89). When it comes at the waist-to-height ratio (WHtR) the girls of the first grade have a value of 0.46 and the boys 0.47 and both genders belong to the category of normal weight. Also, girls and fourth grade boys belong to the normal weight category with WHtR ratio value of 0.47. T-test results indicate that there are no statistically significant differences in nutritional statsu between first and fourth grade girls and first and fourth grade boys. When it comes at the values of V.F.A. it can be noted that the entire sample has V.F.A. level within normal range. First grade girls have an average value of level 1 (27.3cm^2) and first grade boys of level 2.5 (31.2cm^2). Also, fourth grade girls have an average value of level 3.7 (38.7cm^2), and boys of level 3.3 (37cm^2). There is no statistically significant difference in the value of V.F.A. between first and fourth grade girls and first and fourth grade boys.

When it comes at the results obtained by calculating the BMI it can be noted that all examinees belong to the overweight category, while in the WHR ratio girls of the first and fourth grades are characterized as obese. Although the BMI is highly prevalent in assessing obesity, BMI does not measure how fats are distributed in the body, so it can be said that it is not a reliable indicator in determining risk factors for various metabolic diseases (Ashwell, 2011). Also, when evaluating adipose tissue using the WHR ratio, inaccurate health risk data may be obtained when examining short and high examinees who have a similar level of this ratio (Browning, Hseih, & Ashwell, 2010). When it comes at the results obtained through the WHtR ratio, it can be noted that the entire sample belongs to the category of normally weight children. There are a many of studies in which WHtR values were within healthy limits, while BMI values showed otherwise. There are reasons why BMI has proven weaker than WHtR when determining risk factors for various metabolic diseases. It does not take into account a number of factors such as muscle tissue size, bone density, different fat proportions, cartilage, bone tissue and body fluidSince the WHtR variable in many studies has proven to be one of the best instruments in assessing children's nutritional status (Ashwell, 2011), those results should be consider as relevant. The cessation of educational institutions during COVID-19 pandemic limited number

of examinees, what can be consider as a limitation of this study. The recommendation for future research could be to compare the nutritional status of first and fourth grade children of the entire Montenegrin population.

Conflicts of interest

The author declare no conflicts of interest.

REFERENCES

Ashwell, M. (2011). Charts based on body mass index and waist-to-height ratio to assess the health risks of obesity: A review. *The Open Obesity Journal, 3*, 78-74.

Black, R. E., Victora, C. G., & Walker, S.P. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet, 382*(9890), 427–51.

Browning, L. M., Hsieh, S. D., & Ashwell, M. (2010). A systematic review of waist-to-height ratio as a screening tool for the prediction of cardiovascular disease and diabetes: 0·5 could be a suitable global boundary value. *Nutrition Research Reviews, 23*(02), 247–269. doi:10.1017/s0954422410000144

Han, Z., Mulla, S., Beyene, J., LiaoG., & McDonald, S. D. (2011). Maternal underweight and the risk of preterm birth and low birth weight: a systematic, review and meta-analyses. *International Journal of Epidemiology, 40*(1), 65–101.

Popovic, S., Bjelica, D., Masanovic, B., & Vukotic, M. (2018). Deskribing physical activity profile of young Montenegrin females using the international physical activity questionnaire (IPAQ). *In Proceedings World Congress of Perfomance Analysis of Sport XII* (344). Opatija: International Society of Performance Analysis of Sport.