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Letter to the Editor

The Impact of Socio-Economic Status on Obesity of Adolescents in the Largest Municipality in the Former Yugoslavia

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Dear Editor-in-Chief

In the 21st century, obesity is characterized as a public health problem, and in many countries in the world is characterized as an epidemic (1). Obesity is one of the factors that increases the risk of coronary disease, stroke, as well as diabetes mellitus and characterize it as the basic benchmark of a person's health (2). In addition, one of the key benchmarks for obesity could be socio-economic status (SES) and economic insecurity (3). The household wealth and level of parental education are the most relevant indicators of SES, which can affect the risk of obesity among children (4).

Given that a positive ratio of overweight and obesity with SES has been confirmed in many developing countries, which the World Bank defines as countries with per capita income up to $12,275 (5) including Montenegro (6), it can be said that there is fear that Montenegro may have the same trend.

The aim of this research was to determine the impact of SES on obesity of adolescents in Niksic (Montenegro), the largest municipality in the former Yugoslavia. The total number of examinees in this study was 95, aged 15 years. The total sample of examinees was divided into two sub-samples. First sub-sample of the examinees consisted of 44 boys, while the second consisted of 51 girls. All participants gave informed consent before the study.

For the purposes of this research, the following anthropometric indices were formed to evaluate nutritional status: Body mass index (BMI), waist-to-hip ratio (WHR), and waist-to-high ratio (WHtR). The normative values for healthy weight of the above-mentioned indices for boys were as follows: BMI-16.5 to 23.7 kg/m^2 (5-85th percentile), WHR ratio was set at 1. The normative values for girls were as follows: BMI-16.5 to 22.8 kg/m^2 (5-85th percentile), WHR ratio was set at 0.8. WHtR ratio for both genders was set at 0.5. Moreover, bio-impedancemetry body composition analyzer, Jawon Medical ioi 353, was used to evaluate the level of visceral fat of respondents (V.F.A.). According to research so far, the normal value of V.F.A. for ages 10 to 15 yr was set at 68.57 cm^2 for both genders (7), and the normal level range was from 1 to 9. A standardized questionnaire European Childhood Obesity Surveillance Initiative - COSI (8) was used to evaluate SES.

Due to a small sample of respondents, the questionnaire was modified and categories were reduced. Namely, three categories have been set for education: 1. Primary school or less; 2. Secondary/High school; 3. Undergraduate/Bachelor degree or higher. For household wealth were set

two categories: 1. High household wealth; 2. Low household wealth. Binary logistical regression analysis was used to show the association between SES and obesity. The connection was shown as odds ratio (OR) with a 95% confidence interval, and a significance of $P \geq 0.05$.

Regarding boys, analyzing the results obtained by the assessment between SES and BMI-percentiles (mother's education-OR=1.77, household wealth-OR=1.25), and V.F.A. (mother's education-OR=2.09) can be said that the situation is similar to many developing countries. Namely, the results are approaching expectations that children will be more obese if the education of mothers is higher, and the greater the household wealth is. Other variables did not yield enough reliable results to draw any conclusion. When it comes to girls, the results obtained by the assessment between SES and BMI-percentiles (mother's education-OR=0.13, father's education-OR=0.58), WHR (mothers's education-OR=0.63) and WHtR (mother's education-OR=0.65, father's education-OR=0.76) indicate that situation is such as in developed countries, when it comes to the parental education, especially mothers (i.e. the higher the level of education is, the chance of obesity is lower). As for other variables, there was no data that could be used to tell if expectations set in the method, were met. There was no statistical significance in mentioned variables in both cases, but results showed that problem was worth attention.

As a limitation of this study, it can be said that the sample was collected during the COVID-19 pandemic and that the work cessation of schools limited the sample of respondents to be larger. Certainly this does not diminish the importance of this study, which is preliminary in Montenegro when it comes to SES and obesity. Also, the recommendation for future research would be to conduct the same research after the end of the COVID-19 pandemic, and to evaluate impact of pandemic on above-mentioned trends in the entire Montenegro.

Conflict of interest

The authors declare that there is no conflict of interests.

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