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An Indispensable Parameter in Lipid Ratios to Discriminate between Morbid Obesity and Metabolic Syndrome in Children: High Density Lipoprotein Cholesterol

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Abstract : Obesity is a low-grade inflammatory disease and may lead to health problems such as hypertension, dyslipidemia, diabetes. It is also associated with important risk factors for cardiovascular diseases. This requires the detailed evaluation of obesity, particularly in children. The aim of this study is to enlighten the potential associations between lipid ratios and obesity indices and to introduce those with discriminating features among children with obesity and metabolic syndrome (MetS). A total of 408 children (aged between six and eighteen years) participated in the scope of the study. Informed consent forms were taken from the participants and their parents. Ethical Committee approval was obtained. Anthropometric measurements such as weight, height as well as waist, hip, head, neck circumferences and body fat mass were taken. Systolic and diastolic blood pressure values were recorded. Body mass index (BMI), diagnostic obesity notation model assessment index-II (D2 index), waist-to-hip, head-to-neck ratios were calculated. Total cholesterol, triglycerides, high-density lipoprotein cholesterol (HDLChol), low-density lipoprotein cholesterol (LDLChol) analyses were performed in blood samples drawn from 110 children with normal body weight, 164 morbid obese (MO) children and 134 children with MetS. Age- and sex-adjusted BMI percentiles tabulated by World Health Organization were used to classify groups; normal body weight, MO and MetS. 15th-to-85th percentiles were used to define normal body weight children. Children, whose values were above the 99th percentile, were described as MO. MetS criteria were defined. Data were evaluated statistically by SPSS Version 20. The degree of statistical significance was accepted as p≤0.05. Mean±standard deviation values of BMI for normal body weight children, MO children and those with MetS were 15.7±1.1, 27.1±3.8 and 29.1±5.3 kg/m², respectively. Corresponding values for the D2 index were calculated as 3.4±0.9, 14.3±4.9 and 16.4±6.7. Both BMI and D2 index were capable of discriminating the groups from one another (p≤0.01). As far as other obesity indices were considered, waist-to hip and head-to-neck ratios did not exhibit any statistically significant difference between MO and MetS groups (p≥0.05). Diagnostic obesity notation model assessment index-II was correlated with the triglycerides-to-HDL-C ratio in normal body weight and MO (r=0.413, p≤0.01 and r=0.261, (p≤0.05, respectively). Total cholesterol-to-HDL-C and LDL-C-to-HDL-C showed statistically significant differences between normal body weight and MO as well as MO and MetS (p≤0.05). The only group in which these two ratios were significantly correlated with waist-to-hip ratio was MetS group (r=0.332 and r=0.334, p≤0.01, respectively). Lack of correlation between the D2 index and the triglycerides-to-HDL-C ratio was another important finding in MetS group. In this study, parameters and ratios, whose associations were defined previously with increased cardiovascular risk or cardiac death have been evaluated along with obesity indices in children with morbid obesity and MetS. Their profiles during childhood have been investigated. Aside from the nature of the correlation between the D2 index and triglycerides-to-HDL-C ratio, total cholesterol-to-HDL-C as well as LDL-C-to- HDL-C ratios along with their correlations with waist-to-hip ratio showed that the combination of obesity-related parameters predicts better than one parameter and appears to be helpful for discriminating MO children from MetS group.

Keywords : children, lipid ratios, metabolic syndrome, obesity indices
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