

Relationship between Iron-Related Parameters and Soluble Tumor Necrosis Factor-Like Weak Inducer of Apoptosis in Obese Children

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Abstract : Iron is physiologically essential. However, it also participates in the catalysis of free radical formation reactions. Its deficiency is associated with amplified health risks. This trace element establishes some links with another physiological process related to cell death, apoptosis. Both iron deficiency and iron overload are closely associated with apoptosis. Soluble tumor necrosis factor-like weak inducer of apoptosis (sTWEAK) has the ability to trigger apoptosis and plays a dual role in the physiological versus pathological inflammatory responses of tissues. The aim of this study was to investigate the status of these parameters as well as the associations among them in children with obesity, a low-grade inflammatory state. The study was performed on groups of children with normal body mass index (N-BMI) and obesity. Forty-three children were included in each group. Based upon age- and sex-adjusted BMI percentile tables prepared by World Health Organization, children whose values varied between 85 and 15 were included in N-BMI group. Children whose BMI percentile values were between 99 and 95 comprised obese (OB) group. Institutional ethical committee approval and informed consent forms were taken prior to the study. Anthropometric measurements (weight, height, waist circumference, hip circumference, head circumference, neck circumference) and blood pressure values (systolic blood pressure and diastolic blood pressure) were recorded. Routine biochemical analysis including serum iron, total iron binding capacity (TIBC), transferrin saturation percent (Tf Sat %), and ferritin were performed. Soluble tumor necrosis factor-like weak inducer of apoptosis levels were determined by enzyme-linked immunosorbent assay. Study data was evaluated using appropriate statistical tests performed by the statistical program SPSS. Serum iron levels were 91 ± 34 mcrg/dl and 75 ± 31 mcrg/dl in N-BMI and OB children, respectively. The corresponding values for TIBC, Tf Sat %, ferritin were 265 mcrg/dl vs 299 mcrg/dl, 37.2 ± 19.1 % vs 26.7 ± 14.6 %, and 41 ± 25 ng/ml vs 44 ± 26 ng/ml. in N-BMI and OB groups, sTWEAK concentrations were measured as 351 ng/L and 325 ng/L, respectively ($p > 0.05$). Correlation analysis revealed significant associations between sTWEAK levels and iron related parameters ($p < 0.05$) except ferritin. In conclusion, iron contributes to apoptosis. Children with iron deficiency have decreased apoptosis rate in comparison with that of healthy children. sTWEAK is inducer of apoptosis. Obese children had lower levels of both iron and sTWEAK. Low levels of sTWEAK are associated with several types of cancers and poor survival. Although iron deficiency state was not observed in this study, the correlations detected between decreased sTWEAK and decreased iron as well as Tf Sat % values were valuable findings, which point out decreased apoptosis. This may induce a proinflammatory state, potentially leading to malignancies in the future lives of obese children.

Keywords : apoptosis, children, iron-related parameters, obesity, soluble tumor necrosis factor-like weak inducer of apoptosis

Conference Title : ICOM 2022 : International Conference on Obesity and Metabolism

Conference Location : Istanbul, Türkiye

Conference Dates : February 15-16, 2022