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Association of Brain Derived Neurotrophic Factor with Iron as well as Vitamin D, Folate and Cobalamin in Pediatric Metabolic Syndrome

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Abstract : The impact of metabolic syndrome (MetS) on cognition and functions of the brain is being investigated. Iron deficiency and deficiencies of B9 (folate) as well as B12 (cobalamin) vitamins are best-known nutritional anemias. They are associated with cognitive disorders and learning difficulties. The antidepressant effects of vitamin D are known and the deficiency state affects mental functions negatively. The aim of this study is to investigate possible correlations of MetS with serum brain-derived neurotrophic factor (BDNF), iron, folate, cobalamin and vitamin D in pediatric patients. 30 children, whose age- and sex-dependent body mass index (BMI) percentiles vary between 85 and 15, 60 morbid obese children with above 99th percentiles constituted the study population. Anthropometric measurements were taken. BMI values were calculated. Age- and sex-dependent BMI percentile values were obtained using the appropriate tables prepared by the World Health Organization (WHO). Obesity classification was performed according to WHO criteria. Those with MetS were evaluated according to MetS criteria. Serum BDNF was determined by enzyme-linked immunosorbent assay. Serum folate was analyzed by an immunoassay analyzer. Serum cobalamin concentrations were measured using electrochemiluminescence immunoassay. Vitamin D status was determined by the measurement of 25-hydroxycholecalciferol [25-hydroxy vitamin D3, 25(OH)D] using high performance liquid chromatography. Statistical evaluations were performed using SPSS for Windows, version 16. The p values less than 0.05 were accepted as statistically significant. Although statistically insignificant, lower folate and cobalamin values were found in MO children compared to those observed for children with normal BMI. For iron and BDNF values, no alterations were detected among the groups. Significantly decreased vitamin D concentrations were noted in MO children with MetS in comparison with those in children with normal BMI (p ≤ 0.05). The positive correlation observed between iron and BDNF in normal-BMI group was not found in two MO groups. In THE MetS group, the partial correlation among iron, BDNF, folate, cobalamin, vitamin D controlling for waist circumference and BMI was r = -0.501; p ≤ 0.05. None was calculated in MO and normal BMI groups. In conclusion, vitamin D should also be considered during the assessment of pediatric MetS. Waist circumference and BMI should collectively be evaluated during the evaluation of MetS in children. Within this context, BDNF appears to be a key biochemical parameter during the examination of obesity degree in terms of mental functions, cognition and learning capacity. The association observed between iron and BDNF in children with normal BMI was not detected in MO groups possibly due to development of inflammation and other obesity-related pathologies. It was suggested that this finding may contribute to mental function impairments commonly observed among obese children.

Keywords : brain-derived neurotrophic factor, iron, vitamin B9, vitamin B12, vitamin D
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