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The Association of Vitamin B12 with Body Weight-and Fat-Based Indices in Childhood Obesity

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Abstract : Vitamin deficiencies are common in obese individuals. Particularly, the status of vitamin B12 and its association with vitamin B9 (folate) and vitamin D is under investigation in recent time. Vitamin B12 is closely related to many vital processes in the body. In clinical studies, its involvement in fat metabolism draws attention from the obesity point of view. Obesity, in its advanced stages and in combination with metabolic syndrome (MetS) findings, may be a life-threatening health problem. Pediatric obesity is particularly important because it may be a predictor of severe chronic diseases during the adulthood period of the child. Due to its role in fat metabolism, vitamin B12 deficiency may disrupt metabolic pathways of the lipid and energy metabolisms in the body. The association of low B12 levels with obesity degree may be an interesting topic to be investigated. Obesity indices may be helpful at this point. Weight- and fat-based indices are available. Of them, body mass index (BMI) is in the first group. Fat mass index (FMI), fat-free mass index (FFMI) and diagnostic obesity notation model assessment-II (D2I) index lie in the latter group. The aim of this study is to clarify possible associations between vitamin B12 status and obesity indices in the pediatric population. The study comprises a total of one hundred and twenty-two children. Thirty-two children were included in the normal body mass index (N-BMI) group. Forty-six and forty-four children constitute groups with morbid obese children without MetS and with MetS, respectively. Informed consent forms and the approval of the institutional ethics committee were obtained. Tables prepared for obesity classification by World Health Organization were used. Metabolic syndrome criteria were defined. Anthropometric and blood pressure measurements were taken. Body mass index, FMI, FFMI, D2I were calculated. Routine laboratory tests were performed. Vitamin B9, B12, D concentrations were determined. Statistical evaluation of the study data was performed. Vitamin B9 and vitamin D levels were reduced in MetS group compared to children with N-BMI ($p>0.05$). Significantly lower values were observed in vitamin B12 concentrations of MetS group ($p<0.01$). Upon evaluation of blood pressure as well as triglyceride levels, there exist significant increases in morbid obese children. Significantly decreased concentrations of high density lipoprotein cholesterol were observed. All of the obesity indices and insulin resistance index exhibit increasing tendency with the severity of obesity. Inverse correlations were calculated between vitamin D and insulin resistance index as well as vitamin B12 and D2I in morbid obese groups. In conclusion, a fat-based index, D2I, was the most prominent body index, which shows a strong correlation with vitamin B12 concentrations in the late stage of obesity in children. A negative correlation between these two parameters was a confirmative finding related to the association between vitamin B12 and obesity degree.

Keywords : body mass index, children, D2I index, fat mass index, obesity
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