

Hypovitaminosis D In Obese Children

Recent studies have reported a relation between obesity and vitamin D hypovitaminosis.¹ In this cross-sectional study, Çizmecioglu et al aimed to determine the prevalence of vitamin D hypovitaminosis in a highly industrialized city in the Marmara region of Turkey where obesity is on the rise. At the first stage of the study, anthropometric measurements of 2491 subjects participating in the research were performed in the schools. At the second stage, participants whose BMI was over the 85th centile were invited to the hospital for further investigation. A total of 301 students (177 girls, 124 boys) aged 11 to 19 years were selected by multistage stratified sampling design. Children with any systemic disease or using any medications or supplements known to affect skeletal metabolism were excluded from the study.

Of the 301 children and adolescents who were included in the study, 102 were obese (34%) and 145 were overweight (48%). BMI values were within normal percentile ranges in 54 (18%) who had lost weight and returned to normal BMI when the blood samples were collected for further investigation. Serum 25-hydroxyvitamin D (25-OHD), intact parathyroid hormone (iPTH), and alkaline phosphatase (ALP) were measured in late winter months. Vitamin D deficiency was defined as a 25-OHD <10 ng/mL, insufficiency as 25-OHD 10 to 20 ng/mL, and normal vitamin D level as >20 ng/mL.

The prevalence of hypovitaminosis D was 65% in all students (12% deficiency and 53% insufficiency). Vitamin D deficiency in female students was about 2 times more common than in males. None of the girls were veiled in this study. Although the girls appeared to have higher BMI values than the boys, there was no statistically significant difference between their BMI SDS values. There was also no relation between obesity status and vitamin D categories. However, there was a negative correlation between serum vitamin D level and BMI in obese and overweight subjects whose vitamin D level <20 ng/mL ($r: -0.186$ $p<0.01$). There were no correlations between serum 25-OHD and ALP and iPTH levels.

The authors concluded that vitamin D deficiency and insufficiency were common in obese and overweight schoolchildren, especially in girls, and obesity could be a risk factor in adolescents.

Çizmecioglu FM, Etiler N, Görmüş U, Hamzaoglu O, Hatun Ş. Hypovitaminosis D in obese and overweight schoolchildren. *J Clin Res Ped Endo.* 2008;1:89–96.

Editor's Comment: *The same authors previously reported high rates of subclinical vitamin D deficiency (65%) in adolescent girls (from the same region) who wear concealing clothing.² This study shows that a veil is not the only factor responsible for hypovitaminosis D. Air pollution that may block ultraviolet light may also contribute to the lack of sun exposure in this highly industrialized city. Indeed,*

the rate of vitamin D deficiency was higher in industrialized towns compared to the rural area in this study. However, it was shown that among students who live in the same area, serum 25-OHD levels decreased as BMI increased suggesting a causative role of obesity as well. The authors argued that this inverse relationship was consistent with the hypothesis suggesting that the increased adipose tissue decreases vitamin D bioavailability by sequestration in body fat.³ Unfortunately, there is no information about the dietary intake of these patients and the effect of reduced ingestion of micronutrients such as iron and vitamin D in obese people is not taken into account. The duration of sun exposure could not be assessed either, but it was assumed that industrialized areas would be exposed to less sunlight because of blockage by air pollution. In this study, the cut-off for vitamin sufficiency was taken as 20 ng/mL, in contrast to many other studies where the cut-off is more appropriately suggested at 30 ng/mL or even 40 ng/mL. Nevertheless, vitamin D levels were studied as a continuous variable and regression analysis revealed the inverse relationship between BMI and serum vitamin D level.

Other studies have also reported that inadequate vitamin D intake was associated with obesity in young adults.⁴ Infants with rickets are also known to be chubby. Reverse causality may also be suggested, and whether or not vitamin D deficiency per se causes obesity remains to be investigated. However, the possible role of isolated hypovitaminosis D in causing obesity is a difficult issue to be studied in humans since vitamin D deficiency may be associated with other nutritional deficiencies which may lead to malnutrition rather than obesity.

Whether obese children and adolescents require a higher dose of vitamin D supplementation is controversial. As the authors stated, cross-sectional design and the limited number of subjects were limitations of this study. Further longitudinal studies are necessary to define the role, if any, of hypovitaminosis D in the etiology of obesity and the dose and duration of vitamin D supplementation in childhood, particularly in the obese and overweight population.

Ömer Tarım, MD

References

1. Smotkin-Tangorra M, Purushothaman R, Gupta A, Nejati G, Anhalt H, Ten S. Prevalence of vitamin D insufficiency in obese children and adolescents. *J Pediatr Endocrinol Metab.* 2007;20:817-823.
2. Hatun S, Islam O, Cizmecioglu F, et al. Subclinical vitamin D deficiency is increased in adolescent girls who wear concealing clothing. *J Nutr.* 2005;135:218-222.
3. Bell NH, Epstein S, Greene A, Shary J, Oexmann MJ, Shaw S. Evidence for alteration of the vitamin D endocrine system in obese subjects. *J Clin Invest.* 1985;76:370-373.
4. Parikh SJ, Edelman M, Uwaifo GI, et al. The relationship between obesity and serum 1,25-dihydroxy vitamin D concentrations in healthy adults. *J Clin Endocrinol Metab.* 2004;89:1196-1199.