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Correcting vitamin D insufficiency improves insulin sensitivity in obese adolescents: a randomized controlled trial.

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Abstract

BACKGROUND: **Obese adolescents are at a greater risk of vitamin D deficiency because vitamin D is thought to be sequestered by excess adipose tissue**. **Poor vitamin D status has been associated with a higher prevalence of the metabolic syndrome, type 2 diabetes, or both in adults and adolescents**. Objective: The objective was to determine in obese adolescents the efficacy and safety of 4000 IU vitamin D3/d and whether subsequent increased circulating concentrations of 25-hydroxyvitamin D [25(OH)D] are associated with improved markers of insulin sensitivity and resistance and reduced inflammation. DESIGN: Obese adolescent patients [n = 35; mean ± SD age: 14.1 ± 2.8 y; BMI (in kg/m(2)): 39.8 ± 6.1; 25(OH)D: 19.6 ± 7.1 ng/mL] were recruited from the University of Missouri Adolescent Diabetes and Obesity Clinic and were randomly assigned to receive either vitamin D3 (4000 IU/d) or placebo as part of their standard care. Anthropometric measurements, inflammatory markers (IL-6, TNF-α, C-reactive protein), adipokines (leptin, adiponectin), fasting glucose, fasting insulin, and HOMA-IR values were measured at baseline and at 2 follow-up visits (3 and 6 mo). Results: After 6 mo, there were no significant differences in BMI, serum inflammatory markers, or plasma glucose concentrations between groups. Participants supplemented with vitamin D3 had increases in serum 25(OH)D concentrations (19.5 compared with 2.8 ng/mL for placebo; P < 0.001), fasting insulin (-6.5 compared with +1.2 μU/mL for placebo; P = 0.026), HOMA-IR (-1.363 compared with +0.27 for placebo; P = 0.033), and leptin-to-adiponectin ratio (-1.41 compared with +0.10 for placebo; P = 0.045). Inflammatory markers remained unchanged. **Conclusion: The correction of poor vitamin D status through dietary supplementation may be an effective addition to the standard treatment of obesity and its associated insulin resistance**.