

Abstract

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Relation of body fat indexes to vitamin D status and deficiency among obese adolescents.

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BACKGROUND: Data on the relation between vitamin D status and body fat indexes in adolescence are lacking.

OBJECTIVE: The objective was to identify factors associated with vitamin D status and deficiency in obese adolescents to further evaluate the relation of body fat indexes to vitamin D status and deficiency.

DESIGN: Data from 58 obese adolescents were obtained. Visceral adipose tissue (VAT) was measured by computed tomography (CT). Dual-energy X-ray absorptiometry was used to measure total bone mineral content, bone mineral density, body fat mass (FM), and lean mass. Relative measures of body fat were calculated. Blood tests included measurements of 25-hydroxyvitamin D [25(OH)D], parathyroid hormone (PTH), osteocalcin, type I collagen C-telopeptide, hormones, and metabolic factors. Vitamin D deficiency was defined as 25(OH)D < 20 ng/mL. PTH elevation was defined as PTH > 65 ng/mL.

RESULTS: The mean (+/-SD) age of the adolescents was 14.9 +/- 1.4 y, 38 (66%) were female, and 8 (14%) were black. The mean (+/-SD) body mass index (in kg/m²) was 36 +/- 5, FM was 40.0 +/- 5.5%, and VAT was 12.4 +/- 4.3%. Seventeen of the adolescents were vitamin D deficient, but none had elevated PTH concentrations. Bone mineral content and bone mineral density were within 2 SDs of national standards. In a multivariate analysis, 25(OH)D decreased by 0.46 +/- 0.22 ng/mL per 1% increment in FM (beta +/- SE, P = 0.05), whereas PTH decreased by 0.78 +/- 0.29 pg/mL per 1% increment in VAT (P = 0.01).

CONCLUSIONS: To the best of our knowledge, our results show for the first time that obese adolescents with 25(OH)D deficiency, but without elevated PTH concentrations, have a bone mass within the range of national standards (+/-2 SD). The findings provide initial evidence that the distribution of fat may be associated with vitamin D status, but this relation may be dependent on metabolic factors. This study was registered at www.clinicaltrials.gov as NCT00209482, NCT00120146.

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