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## Different threshold levels of circulating total and free 25-hydroxyvitamin D for the diagnosis of vitamin D deficiency in obese adolescents

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and the 25(OH)DB levels were calculated. The cutoff values for VDD were estimated according to the level of 25(OH)D below which parathyroid hormone begins to rise. The obese subjects had lower 25(OH)D-T (12.1 +/- 5.8 vs. 16.4 +/- 9.3 ng/mL,  $p < 0.001$ ), 25(OH)D-F (12.6 +/- 4.2 vs. 16.7 +/- 7.6 pg/mL,  $p < 0.001$ ), 25(OH)D-B [4.8 (2.3) vs. 6.1 (5.2) ng/mL,  $p = 0.012$ ], and VDBP [112.2 (51.3) vs. 121.9 (95.5) mu g/mL,  $p < 0.001$ ] levels than the controls. The cutoff values for 25(OH)D-T and 25(OH)D-F levels for VDD were lower in the obese group than in the control group (9.4 vs. 14.1 ng/mL; 12.2 vs. 16.8 pg/mL, respectively).

Conclusion: The vitamin D cutoff values for the diagnosis of VDD were different in the obese and control groups. Using the same cutoff value for VDD may cause overtreatment in obese adolescents.

#### Keywords

**Author Keywords:** Vitamin D; Vitamin D-binding protein; Cutoff level; Adolescent; Obesity

**Keywords Plus:** D-BINDING PROTEIN; BODY-MASS INDEX; PARATHYROID-HORMONE; INSULIN-RESISTANCE; D METABOLITES; SERUM; CHILDREN; CIRCUMFERENCE; 25(OH)D; ADULTS

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# Different threshold levels of circulating total and free 25-hydroxyvitamin D for the diagnosis of vitamin D deficiency in obese adolescents

Nurullah Çelik<sup>1</sup> · Halef Okan Doğan<sup>2</sup> · Gökmen Zararsız<sup>3,4</sup>

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## Abstract

The total serum 25-hydroxyvitamin D [25(OH)D<sub>T</sub>] level is lower in obese individuals than in their nonobese peers, despite similar bone turnover markers and bone mineral density. This study aimed to investigate whether the threshold level of 25(OH)D for the diagnosis of vitamin D deficiency (VDD) in obese adolescents was lower than that in controls and to compare 25(OH)D<sub>T</sub>, free [25(OH)D<sub>F</sub>] and bioavailable [25(OH)D<sub>B</sub>] vitamin D with VDBP levels in obese individuals and their controls. A total of 173 adolescents (90 obese individuals and 83 controls) aged 12–18 years were included in the study. The metabolic and anthropometric parameters of the participants were recorded, the 25(OH)D<sub>T</sub>, 25(OH)D<sub>F</sub>, and VDBP levels were measured, and the 25(OH)D<sub>B</sub> levels were calculated. The cutoff values for VDD were estimated according to the level of 25(OH)D below which parathyroid hormone begins to rise. The obese subjects had lower 25(OH)D<sub>T</sub> (12.1 ± 5.8 vs. 16.4 ± 9.3 ng/mL,  $p < 0.001$ ), 25(OH)D<sub>F</sub> (12.6 ± 4.2 vs. 16.7 ± 7.6 pg/mL,  $p < 0.001$ ), 25(OH)D<sub>B</sub> [4.8 (2.3) vs. 6.1 (5.2) ng/mL,  $p = 0.012$ ], and VDBP [112.2 (51.3) vs. 121.9 (95.5) µg/mL,  $p < 0.001$ ] levels than the controls. The cutoff values for 25(OH)D<sub>T</sub> and 25(OH)D<sub>F</sub> levels for VDD were lower in the obese group than in the control group (9.4 vs. 14.1 ng/mL; 12.2 vs. 16.8 pg/mL, respectively).

**Conclusion:** The vitamin D cutoff values for the diagnosis of VDD were different in the obese and control groups. Using the same cutoff value for VDD may cause overtreatment in obese adolescents.

## What is Known:

- Vitamin D deficiency is more prevalent in obese children than nonobese controls, despite the same bone turnover markers and bone mineral density
- The cutoff value of vitamin D level for the diagnosis of VDD is based on the PTH elevation

## What is New:

- In obese adolescents, total and free vitamin D cutoff value for the diagnosis of VDD was lower than nonobese peers
- Using the same cutoff value for vitamin D deficiency in both obese and nonobese adolescents may cause overtreatment

**Keywords** Vitamin D · Vitamin D-binding protein · Cutoff level · Adolescent · Obesity

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