Bioavailable Vitamin D in Obese Children: The Role of Insulin Resistance

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1.Background

Studies examining vitamin D levels in association with childhood obesity usually do not concurrently measure levels of vitamin D-binding protein and do not calculate the unbound, bioavailable vitamin D, that is considered the fraction of 25-hydroxyvitamin D able to exert biological activity (1).

2.Objective and hypotheses

To evaluate in a group of children for the most part obese i) the concentrations of both total 25-hydroxyvitamin D and of the bioavailable fraction ii) the potential role of insulin resistance in modulating the concentrations of bioavailable vitamin D.

3.Methods

Sixty-three obese children and 21 lean controls were enrolled and the main metabolic parameters were investigated. Total 25-hydroxyvitamin D and vitamin D-binding protein were measured, two SNPs in the coding region of the vitamin D-binding protein (rs 4588 and rs 7041) were studied and, using these data, the vitamin D bioavailable fraction was calculated.

4.Results

Obese children showed total 25-hydroxyvitamin D levels lower compared to not-obese children (21.3 +/- 6.7 ng/ml vs. 29.6 +/- 11.7 ng/ml; p: 0.0004) (Figure 1). Bioavailable 25-hydroxyvitamin D levels, on the contrary, were not different among obese and not obese children (3.1 +/- 1.6 ng/ml vs. 2.6 +/- 1.2 ng/ml; p > 0.05) (Figure 1). Insulin resistant children showed higher bioavailable levels of 25-hydroxyvitamin D compared to not insulin resistant children (HOMA>3) (Figure 2) (3.4 +/- 0.9 ng/ml vs. 2.0 +/- 0.9 ng/ml; p: 0.013) and an inverse correlation between insulin resistance and vitamin D-binding protein was found (r: - 0.40; p: 0.024).

5.Conclusions

Our data i) show that obese children, although have low concentrations of total 25-hydroxyvitamin D, present levels of bioavailable 25-hydroxyvitamin D similar to those of normal weight children ii) demonstrate that this finding is due to a reduced concentration of vitamin D-binding protein iii) suggest that the increased insulin resistance usually present in obesity may be associated to this reduction.

References


We have no conflicts of interest to declare.