Relation of serum 25 hydroxy-vitamin D3 levels with body-mass index in pediatric patients

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Introduction

- Vitamin D is an essential prohormone for correct absorption of calcium in intestine and its deficiency is associated in children with rickets, a disease characterized by a lack of mineralization of bone and growing cartilage.
- The "classic" function of vitamin D is regulation of phosphocalcic metabolism.
- There is consensus that the dosage of the plasma level of the 25OH vitamin D (25(OH)D), is the one that best reflects the state of this vitamin in an individual, because this is the most stable metabolite with a longer half-life (2-3 weeks).
- There is currently no consensus regarding cut-off points to define "sufficiency", "insufficiency" and "deficiency".
- Childhood obesity has been associated with low circulating serum concentrations 25(OH)D, and vitamin D deficiency has been shown in the range of 17–57%, depending on how vitamin D deficiency is categorized.

Objectives

- The aims of this study were to determine whether vitamin D deficiency is more prevalent among children and adolescents with body-mass index (BMI) increase compared to their normal weight peers and analyze serum levels of 25(OH)D according to age and month of extraction in pediatric patients in Barcelona, Spain.

Materials and methods

- Retrospective study, clinical history review, CEIC approved
- Patients attended between June 2016 to June 2018, Barcelona, Spain (latitude 41°23.327° N).
- Inclusion criteria: age under 18 years, healthy with normal weight children visited by Ambulatory Pediatrics or overweight or obesity children visited by the Children's Endocrinology Service.
- Exclusion criteria: age above 18 years, intake of medications known to affect vitamin D metabolism as well as intake of supplementary vitamin D or calcium and diseases affecting calcium or vitamin D metabolism
- Variables: 25(OH)D (Chemiluminescent Immunoanalysis), age, BMI, month of extraction.

Results

The medical records of 179 patients (female 96/male 83) were reviewed, mean age: 10.1 years (95%CI:9.4-10.7), 39.1% normal weight children and 60.9% overweight or obesity children. Of the total of 25(OH)D determinations obtained, we observed levels of sufficiency (≥30 ng/ml) in 34.1% patients, insufficiency in 42.5% (20-29 ng/ml) and deficiency in 23.5% (<20 ng/ml) (graphic 1). We detected significant negative relationship between 25(OH)D and BMI (r: -0.211, p: 0.005) (graphic 2), and between 25(OH)D and age (r: -0.281; p: 0.000) (graphic 3); and significant positive relationship between 25(OH)D and month of extraction (r: 0.256, p:0.001) (graphic 4), increasing levels during summer months (August, average: 49.8ng/ml, 95%CI:15-110) and decreasing during winter (January, average: 21.3ng/ml, IC95%: 16-26.7).

Conclusion

- These results suggest that there is an inverse association between BMI and 25(OH)D levels.
- Vitamin D decreases significantly during winter and from the beginning of puberty, moment of great vulnerability due to the fact that the maximum peak of corporal growth takes place.