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Determination of 25 OH Vitamin D in Pediatric Population

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Abstract **Original Research Article**

Vitamin D plays a fundamental role in overall health, especially in the pediatric population where bone growth is at its maximum. In this work, we will report the experience of our biochemistry laboratory in the evaluation of vitamin D deficiency in the pediatric population by assessing 25 OHvitamin D levels. A vitamin D deficiency was found in 51% of our patients, mainly in the age group between 6 and 11 years old, hence the interest of integrating vitamin D supplementation in the national program of nutrition in children.

Keywords: Vitamin D, child, dosage, insufficiency.

INTRODUCTION

Vitamin D, or calciferol, is a fat-soluble vitamin with many important roles in the body. Not only is it essential for the maintenance of phosphocalcic homeostasis but it also plays a plethoraof role on global health: anti-infectious, anti-inflammatory, anti-tumor and cardiovascular protective roles [1, 2]. Our study aims to illustrate the experience of our laboratory in the determination of 25 OH vitamin D levels in order to evaluate the state of vitamin D deficiency in the pediatric population.

MATERIALS AND METHODS

We carried out a retrospective, descriptive study at the biochemistry laboratory of the Mohamed VI university hospital center of Marrakesh. Our work focused on determining the 25 OH vitamin D levels and a phosphocalcic evaluation in patients under 16 years old, hospitalized in the pediatric or neonatal wings. The method adopted was an electrochemiluminescence immunoassay performed on the COBAS 6000 analyzer over a period of two years.

RESULTS

During the study period 298 patients were included. The average age was 7.8 years with extremes ranging from 20 days to 16 years. The sex ratio M/F was of 1.2. Vitamin D insufficiency was found in 51% of patients. This insufficiency was mainly found in the age group between 6 and 11 years old (image 1). This deficiency is associated with hypocalcemia in 40% of cases and hypophosphatemia in 23% of cases.

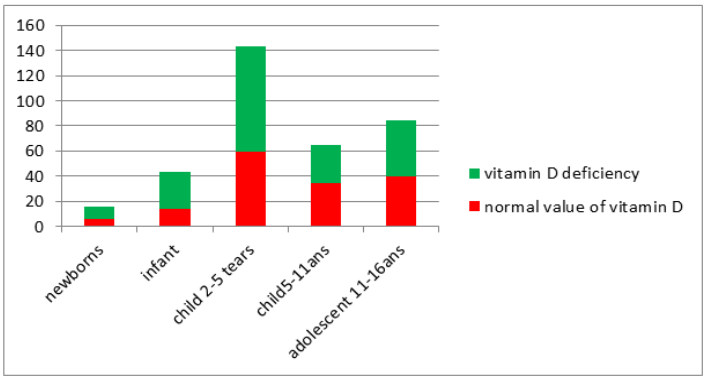

Figure 1: Distribution of patients with hypovitaminosis D according to age

DISCUSSION

Vitamin D is a secosterol hormone that is present in humans in an endogenous (vitamin D3) and exogenous (vitamin D2) form (31,32). The endogenous form of vitamin D, cholecalciferol (vitamin D3), is synthesized in the skin from the cholesterol metabolite 7-dehydrocholesterol under the influence of ultraviolet radiation. Vitamin D3 is also available in oral supplements. An exogenous form of vitamin D (vitamin D2) (ergocalciferol) is produced by ultraviolet irradiation of the plant sterol ergosterol and is available through the diet. Both forms of vitamin D require further metabolism to be activated, and their respective metabolism is indistinguishable. Vitamin D metabolites are solubilized for transport in blood by specific vitamin D-binding proteins. In the liver, vitamin D is converted by a hydroxylase to 25-hydroxyvitamin D (25-D), the principal fat storage form of vitamin D (21). Thus, the serum level of 25-D is the best measure of overall vitamin D status. In the proximal tubule of the kidney, 25-D is 1 -hydroxylated to produce 1,25-D, the most active form of the hormone [3].

Vitamin D has a fundamental role in general health. In fact, a vitamin D deficiency is a risk factor for the development of type 1 diabetes, cancer, inflammatory or autoimmune diseases and infections [4]. The best known role of this hormone is the maintenance of phosphocalcic homeostasis. This role is particularly important in children because it is essential for normal growth and optimal bone development. At the intestinal level, vitamin D stimulates the absorption of calcium and phosphorus, thus allowing maintaining a state of normocalcemia, necessary for adequate bone mineralization.

The effects of vitamin D metabolites on bone are complex. By providing sufficient ambient calcium and/or through some other unappreciated direct effect, vitamin D promotes the mineralization of osteoid. Vitamin D causes bone resorption by mature osteoclasts, but this effect is indirect, requiring cell recruitment and interaction with osteoblasts. Vitamin D also promotes the fusion of monocytic precursors to osteoclasts. Vitamin D regulates the expression several bone proteins, notable osteocalcin [5].

In the kidney, The receptor of vitamin D is robustly expressed in the kidney, and acting through it, 1,25-D stimulates renal proximal phosphate reabsorption and maintenance of normal calcium reabsorption. At the renal level, vitamin D stimulates the tubular reabsorption of calcium.

The assessment of vitamin D status is done by measuring 25 OH vitamin D, which is considered a good indicator of vitamin D reserves. The level is currently set at a minimum of 20 ng/ml for children [4]. The determination of the active form: 1-25-OH2 vitamin D3 or calcitriol is only indicated as a second-line test.

In Morocco, according to data from the Health Ministry in 2008, the prevalence of vitamin D deficiency in children aged between 3 and 5 years was of 6% [5]. In our study, vitamin D deficiency was more important with a prevalence of 51%. This can be explained by the fact that the assay was performed in patients hospitalized for disorders that could be related to a vitamin D deficiency.

Vitamin D deficiency is common but is particularly important in the pediatric population with the risk of rickets, hence the importance of integrating a vitamin D supplementation in the national child nutrition program [6].

CONCLUSION

For a long time limited to its role in the phosphocalcic metabolism, vitamin D is now considered an important pillar of global health and a vitamin with multiple prospects. The prevalence of hypovitaminosis D in the pediatric population remains important in Morocco requiring the implementation of a vitamin supplementation in order to guarantee a normal growth and an optimal state of health.

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