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## EVIDENCE ON VITAMIN D SUPPLEMENTATION IN HEALTHY ADULTS: A LITERATURE REVIEW

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**Abstract: Introduction:** Vitamin D deficiency or insufficiency is considered a global public health problem due to its implications in the development of various diseases. Historically, rickets was one of the first diseases associated with vitamin D deficiency, the cause of which was only clarified centuries after the first reports. The main source of vitamin D is endogenous synthesis by the skin after exposure to ultraviolet B radiation, while the diet contributes a smaller fraction. Current guidelines indicate screening for vitamin D deficiency only in people at high risk, with supplementation adjusted according to individual needs. Cholecalciferol (vitamin D3) is the most widely used metabolite for supplementation, and is preferred to ergocalciferol (vitamin D2) due to its greater efficacy and longer half-life. **Method:** This study is a narrative review which analyzed the literature on the benefits of vitamin D supplementation in healthy adults. Articles were selected from the BIREME, PubMed and Cochrane databases, using the keywords “healthy adults”, “supplementation” and “vitamin D”. Inclusion criteria included articles in English and Portuguese, published in the last 10 years, focusing on individuals aged between 19 and 64. Studies with unclear methodology or no relevance to the topic were excluded. In total, 7 articles were selected and analyzed. **Results and Discussion:** The results indicate that although vitamin D is essential for bone health and calcium metabolism, the evidence on its benefits in other conditions, such as immunity, cardiovascular disease and cancer, is inconclusive. Studies suggest that indiscriminate supplementation in non-deficient individuals may be unnecessary and, in some cases, harmful, increasing the risk of hypercalcemia and kidney complications. In specific populations, such as the elderly or people with chronic diseases, supplementation may be beneficial, but there is no justification for recommen-

ding universal supplementation. Randomized clinical trials show variations in the results, with limited benefits for conditions unrelated to the liver, bone metabolism. **Conclusion:** The review reinforces the importance of vitamin D for bone health and calcium metabolism, but highlights the lack of solid evidence on the benefits of supplementation for the prevention of other chronic diseases in healthy adults. Supplementation should only be directed at individuals with deficiencies or risk factors for hypovitaminosis. Excessive and indiscriminate use of vitamin D can pose serious health risks, reinforcing the need for an individualized and conscious approach to supplementation.

## INTRODUCTION

Currently, vitamin D deficiency or insufficiency is seen as a global public health issue, due to its consequences in the onset of various diseases (SCHUCH et. al, 2009).

Since the first reports of suspected rickets, mentioned by Soranus and Galen, around eighteen centuries passed before the cause of the disease was clarified. The outbreak of rickets observed in England in the 17th century led to the condition being known at the time as “English disease,” the first detailed description of which was made by Francis Glisson (MARTINS; SILVA, 2007).

The main source of vitamin D comes from endogenous synthesis in the skin after exposure to ultraviolet B radiation. The diet, although a secondary and less efficient source, supplying only around 20% of the body's needs, becomes more relevant in the elderly, institutionalized people and individuals living in temperate climate regions (MARQUES et. al, 2010).

The most recent Endocrine Society guidelines recommend screening for vitamin D deficiency only in individuals at risk, and not in the entire population. For these patients, it is

recommended to measure circulating serum 25(OH)D levels using a reliable analytical method. Vitamin D deficiency is characterized by 25(OH)D values below 20 ng/ml (50 nmol/l). In people at risk, it is suggested to consume vitamin D through the diet, adjusted according to age and special situations, such as pregnancy, breastfeeding, obesity and concomitant use of medication (ALVES et. al, 2013).

In our context, the most accessible form of vitamin D for treatment and supplementation is cholecalciferol. Ergocalciferol, or vitamin D<sub>2</sub>, can also be used as a supplement, but studies indicate that, due to its slightly shorter half-life than D<sub>3</sub>, dosage should preferably be daily. Treatment doses vary according to the degree of deficiency and the goal to be achieved (MAEDA et. al, 2014).

## METHOD

The study is a narrative review carried out in six stages: selection of the topic and elaboration of the research question; establishment of the inclusion and exclusion criteria for the search; evaluation and critical analysis of the included studies; analysis and synthesis of the included studies with interpretation of the results; and presentation of the review.

This article is a narrative review aimed at analyzing the existing literature on the benefits of vitamin D supplementation in healthy adults. The research was conducted through the Regional Library of Medicine (BIREME) using the Virtual Health Library (VHL) and included databases such as PUBMED (National Library of Medicine) and Cochrane.

Using the keywords “healthy adults”, “supplementation” and “vitamin D”, without restricting any criteria, 1133 articles were found in the following databases: PubMed (n=1121) and Cochrane (n=10). When conducting the search, the inclusion criteria were: English and Portuguese languages, published in the last 10 years, complete and

free articles and articles with patients aged between 19 and 64 years and the exclusion criteria were: publications in PowerPoint (PPT), those without a date, editorials, letters to the reader, letters to the editor without case reports, articles with unclear methodology, publications that did not fit the desired focus and articles with patients aged under 19 and over 64 years. After applying the inclusion and exclusion criteria, 1126 articles were excluded.

After excluding the aforementioned publications, we selected 7 scientific articles for analysis. Based on this selection, we classified, compiled and directed the articles according to the objectives of the final article. Subsequently, we synthesized the results found, taking into account the similarity of content.

## RESULTS AND DISCUSSION

This article sought to analyze the literature's approach to the real evidence on vitamin D supplementation in healthy adults. Through a cautious survey of the literature on the subject, it was possible to note that vitamin D is fundamental for bone health and calcium metabolism, but some studies suggest that it may have a broader role, impacting immunity, cardiovascular disease and cancer risk. However, the evidence on the benefits of calciferol supplementation for these conditions is not consistent and randomized clinical trials on the subject show variations. In many studies, the benefits were limited and, in some cases, non-existent for conditions unrelated to bone metabolism. Studies suggest that low levels of the vitamin are not a major cause of many chronic diseases, which raises questions about the true need for supplementation in non-deficient individuals (BOUILLION et. al, 2023).

According to the systematic review by Bjelakovic et. al, 2014, it can be concluded that although vitamin D plays a crucial role in health, especially in immune function and bone health, the evidence on its effectiveness

in reducing overall mortality is inconsistent. It is important to reinforce that supplementation can be beneficial for specific groups, especially those with deficiencies, but does not justify generalized recommendations for healthy adults. Thus, more research is needed to identify in which contexts supplementation may actually be effective, suggesting a more individualized approach to vitamin D recommendations.

Reduced vitamin D levels are significantly associated with an impaired metabolic profile, including increased insulin resistance, hypertension and dyslipidemia. Thus, vitamin D deficiency may play a relevant role in metabolic regulation, suggesting the importance of monitoring and supplementing this vitamin to promote proper metabolic health (CHERYN DING et. al, 2020).

According to Saeidlou et. al, 2024, in the longitudinal study carried out, it was observed that vitamin D supplementation in individuals with adequate levels of no at the beginning of the study, although it did not raise serum levels above 50 ng/mL, it did improve the lipid profile. At the end of 12 months of supplementation with 50,000 IU, these individuals showed reductions in LDL-C, total cholesterol and triglyceride levels, indicating a beneficial effect of vitamin D on cardiovascular health, even in people with ideal initial levels. However, this is a single study, with a small sample of participants and no criteria for randomizing the groups analyzed, which reinforces the need for further clinical studies, preferably controlled and randomized, to confirm this benefit in healthy adults.

Maintaining adequate levels, above 30 ng/mL, is sufficient for bone health, and additional supplementation can result in hypercalcemia and other adverse effects. In addition, the authors point out that high levels of vitamin D, especially in non-deficient individuals, may be associated with an increased risk of

diseases such as soft tissue calcification and kidney complications. Thus, careful monitoring is recommended in at-risk populations, such as the elderly and patients with chronic diseases, to avoid both deficiency and excess, preventing bone and metabolic complications (GÓMEZ et. al, 2024).

Furthermore, vitamin D supplementation in individuals with normal calciferol levels is not supported by solid evidence for cancer prevention. Adding supplements to people who already have normal levels does not show significant benefits in reducing cancer risk. Thus, supplementation should be directed primarily at those who are deficient, suggesting that indiscriminate interventions in people without hypovitaminosis are not justified and may be ineffective. This perspective highlights the importance of an individualized approach to vitamin D supplementation, based on each patient's specific needs and exposure to the sun (BJELAKOVIC et. al, 2014).

Vitamin D supplementation can improve immunological markers, such as the response of T cells, which are fundamental to the body's defense, especially in cases of mild nutrient deficiency. However, the long-term effects and clinical relevance of these findings are not yet known, but supplementation may be a promising strategy for preventing infections and combating the disease immune decline that occurs naturally throughout life (FANTACONE et. al, 2020).

## CONCLUSION

This literature review reinforces the importance of vitamin D in bone health and calcium metabolism. However, the importance of this vitamin in combating chronic metabolic diseases is still questionable and little evidence is available. Excessive supplementation, especially in patients who are not deficient, poses a serious health risk, such as hypercalcemia and kidney complications.

The evidence suggests that supplementation should only be carried out in individuals with hypovitaminosis, with risk factors for vitamin D deficiency and in a conscious and individualized manner.

It is therefore essential to reinforce the recommendations of medical organizations against unnecessary supplementation, warning of the significant risks that vitamin D overdoses can cause and also of the waste of resources that improper supplementation can cause.

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