

Recommendations of scientific societies on calcium and vitamin D supplementation in osteoporosis

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INTRODUCTION

Calcium and vitamin D requirements for health in general and bone in particular are well established. While the medical community recommends maintaining serum levels of 25 hydroxy-vitamin D (25(OH)D) above at least 20 ng/ml, the calcemia should remain between 8.5 and 10.5 mg/dl. However, these amounts, which should be obtained naturally from diet (calcium) and sun exposure (vitamin D), are not attained by a high percentage of the population.

Calcium levels, so essential for the operation of multiple systems, are maintained thanks to the store that constitutes the bone. From this, the body obtains calcium to maintain its homeostasis if necessary, to the detriment, obviously, of the bone itself, which undergoes an increased resorption that, in turn, produces osteoporosis.

Vitamin D, for its part, lacking a storage system, sees its serum levels fall as sun exposure decreases. We know that the foods richest in calcium are dairy. The intake of these foods is very low in the general population, for different reasons. Furthermore, the risk of skin cancer causes sun exposure to be avoided "drastically", which prevents vitamin D production. Calcium and vitamin D supplements help people reach the appropriate levels in these situations and shore up deficiencies.

In this paper, we will discuss the recommendations made in various clinical guidelines. These are selective, given the limited space, but we believe they are representative and shed light on the usefulness of giving calcium and vitamin D supplements for the treatment of osteoporosis or to ensure bone health. The approach that different societies and institutions have made varies from the one carried out in the framework of the general treatment of osteoporosis to the specific one of such supplements, either only of vitamin D, of calcium alone, or of both.

The Spanish Society of Bone Research and Mineral Metabolism (SEIOMM)

In the 2014 update of its clinical practice guidelines in postmenopausal, glucocorticoid and male osteoporosis of 2008^{1,2}, the SEIOMM concludes that there are doubts regarding the efficacy of calcium or vitamin D given alone for the treatment of osteoporosis. They point out that "administered together they seem to have a certain degree of efficacy in preventing non-vertebral fractures, which is clearer in people with deficits in them, such as the case of elderly people living in residences. There is virtually no evidence of its effectiveness in preventing vertebral fractures. Regardless of the above, which refers to people not selected for osteoporosis, there is universal consensus that patients with this disease should receive calcium and vitamin D along with the main treatment of the disease." The recommended contribution is 1,000-1,200 mg/day of calcium and 800 IU/day of vitamin D, so if these figures are not reached with the diet, supplements should be added.

In 2011, a panel of experts from various Spanish scientific societies led by SEIOMM formulated a position paper on the needs and optimal levels of vitamin D³. In their recommendations, the optimal serum levels of vitamin D was considered to be between 30 and 75 ng/ml, and that levels below 20 ng/ml are clearly pathological. Regarding vitamin D requirements, it was recommended that for postmenopausal women they should be 600-800 IU/day, while in the elderly, patients with osteoporosis, fractured patients and patients receiving glucocorticoids the amounts should rise to 800-1,000 IU/day.

Based on the high prevalence of severe vitamin D deficiency in patients with osteoporotic hip fracture, the panel deemed it advisable to make a determination of vitamin D levels, and when not possible, the use of higher doses.



Focusing on the prevention of osteoporosis, it is pointed out that it must be carried out with good hygienic-dietary habits (adequate sun exposure, calcium-rich diet), and that the use of calcium and vitamin D supplements for this purpose is not indicated, except in cases where there is a situation that makes it difficult to obtain the optimum levels of these substances, which will be supplemented pharmacologically.

Regarding the treatment of osteoporosis, it is pointed out that there is no evidence that the exclusive treatment of calcium and vitamin D has anti-fracture efficacy, except in a certain population, such as the institutionalized elderly. However, they do consider it necessary to add vitamin D and calcium supplements together with other anti-osteoporotic drugs, although in those patients in whom adequate calcium intake is guaranteed through diet, it is not necessary to use supplements of this element.

Spanish Society of Endocrinology and Nutrition (SEEN)

In 2017, SEEN published a consensus document on vitamin D recommendations for the general population⁴, and regarding treatment with vitamin D supplements suggests:

- Use vitamin D3 (cholecalciferol) or 25(OH)D (calcifediol) to treat vitamin D deficiency.
- Calculate the required dose of vitamin D depending on the etiology and severity of the deficit, as well as the type of vitamin D that will be used to treat it.
- Monitor serum concentrations of 25(OH)D to assess the response to treatment at intervals every 3-4 months until adequate concentrations of 25(OH)D are reached, and then at intervals every 6 months.
- A vitamin D contribution of 800-1,000 IU/day in people over 65 and in institutionalized people to improve their bone health and reduce the risk of non-vertebral fracture.
- A contribution of vitamin D of at least 800 IU/day in adults over 50 years of age together with an adequate intake of calcium (1,000-1,200 mg/day) to improve bone health and reduce the risk of fractures.
- Not recommending systematic supplementation in all adults under 50 years of age to obtain improvement in bone health, given the lack of existing data.

On the other hand, regarding the effect on the incidence of falls from treatment with vitamin D supplements, it is recommended that patients with vitamin D deficiency and high risk of falls be treated with supplements.

American Association of Clinical Endocrinologists/ American College of Endocrinology

In its 2016 guidelines for the diagnosis and treatment of postmenopausal osteoporosis, the American Association of Clinical Endocrinologists and the American College of Endocrinology⁵ include among its recommendations the following referring to calcium and vitamin D supplements:

- Give vitamin D supplements if necessary to maintain optimal serum levels of 25(OH)D, for which doses of 1,000 to 2,000 IU daily are needed as sustained therapy.

- Higher doses may be necessary in the presence of certain factors, such as obesity, malabsorption, transplant patients, certain ethnicities, or in the elderly.

- Patients should be advised to maintain an adequate calcium intake of 1,200 mg/day for women over 50, which if not achieved by diet should be supplemented with supplements.

National Osteoporosis Society (NOS) (United Kingdom)

Although these guidelines are not established for the treatment of osteoporosis, the National Osteoporosis Society developed them in 2014 as guidelines for the management of vitamin D deficiency in adult patients with or at risk of developing bone disease⁶. In them, serum levels of 25(OH)D below 10 ng/ml (30 nmol/l) are established as vitamin D deficiency, and, recognizing that there is no consensus on this, they do support the majority in favor of consider as inappropriate values those that are between 20 and 30 ng/ml (at least in some populations), considering that levels above 30 ng/ml are sufficient.

They indicate that routinely testing vitamin D may be unnecessary in patients with osteoporosis or fragility fracture, who may be prescribed vitamin D supplements with antiresorptive therapy. As for the treatment of vitamin D deficiency, they recommend cholecalciferol (vitamin D3) better than ergocalciferol (D2) (although the latter can be used), and if what is needed is a rapid correction of the deficiency (for example, in the event of symptomatic disease or treatment with a potent antiresorptive), the recommended doses are in an initial shock regimen to provide a total of 30,000 IU of vitamin D (distributed in weekly or daily doses for 6-10 weeks); to continue with a maintenance regime consisting of doses of 800-2,000 IU daily (occasionally above 4,000 IU), given both daily and intermittently at higher doses. When the correction is less urgent, and when vitamin D supplements are prescribed with oral antiresorptive agents, the previous maintenance therapy can be performed without specifying the previous shock.

The Endocrine Society

The Endocrine Society published in 2011 its guidelines for the assessment, treatment and prevention of vitamin D⁷ deficiency. Its objective was similar to that marked 3 years later by the National Osteoporosis Society (NOS), which we have just discussed. They suggest that all adults over 50 require at least 600 IU (50 to 70 years) to 800 IU (>70 years) daily of vitamin D, although without knowing if these amounts are sufficient to provide all the benefits for musculoskeletal health associated with vitamin D; and that to raise blood levels of 25(OH)D above 30 ng/ml, at least 1,500-2,000 IU daily of vitamin D supplement may be

required. In this regard, they also recommend using vitamin D2 or D3. Finally, for the treatment of vitamin D deficiency in adults suggest doses of 50,000 IU once a week for 8 weeks, or its equivalent of 6,000 IU daily to reach levels of 25(OH)D above 30 ng/ml, following maintenance doses of 1,500-2,000 IU daily.

OTHER GUIDES

Other guides and position documents have been made for the management of vitamin D in the general population or for the treatment of osteoporosis⁸⁻¹³, but basically the recommendations coincide with those of the aforementioned guidelines, with slight

variations that They depend on the population to which they are directed.

CONCLUSIONS

While it is generally accepted that calcium and vitamin D supplements have not proven themselves effective for treating osteoporosis or preventing fractures (except in institutionalized elderly), if it is accepted that it is necessary to maintain adequate levels of calcium and vitamin D in the population for bone health. Such levels can preferably be acquired naturally, through diet and sun exposure, but when these are not adequate, supplementation is necessary.



Conflict of interests: The authors declare no conflict of interest.

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SELF ASSESSMENT TEST

1. For the National Osteoporosis Society (NOS) of the United Kingdom, vitamin D deficiency occurs when serum levels of 25 hydroxyvitamin D (25HCC) are lower than:

- a. 30 ng/mL
- b. 25 ng/mL
- c. 20 ng/mL
- d. 10 ng/mL

2. For the American Association of Clinical Endocrinologists/American College of Endocrinology, patients over 50 must maintain a daily calcium intake of at least:

- a. 800 mg
- b. 1,000 mg
- c. 1,200 mg
- d. 1,500 mg

3. For the Spanish Society of Bone Research and Mineral Metabolism, patients with osteoporosis should receive a daily intake of calcium and vitamin D from:

- a. 800 mg of calcium and 400 IU of vitamin D
- b. 1,000 mg of calcium and 800 IU of vitamin D
- c. 1,200 mg of calcium and 400 IU of vitamin D
- d. None of the above

4. For the Endocrine Society, adults over 50 must reach some serum values of 25(OH)D greater than:

- a. 30 ng/mL
- b. 25 ng/mL
- c. 20 ng/mL
- d. 10 ng/mL

5. One of the following recommendations of the (SEEN) on vitamin D is false:

- a. *The required dose of vitamin D should be calculated depending on the etiology and severity of the deficit.*
- b. *You should monitor serum concentrations of 25(OH)D to assess the response to treatment at intervals every 3-4 months until adequate concentrations of 25(OH)D are reached, and then at intervals every 6 months*
- c. *A vitamin D contribution of 800-1,000 IU/day in people over 65 and in institutionalized people to improve their bone health and reduce the risk of non-vertebral fracture*
- d. *Systematic supplementation is recommended in all adults under 50 years of age to obtain bone health improvement*

Correct answers can be found on pages 23 and 24