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Vitamin D and Calcium in Osteoporosis, and the Role of Bone Turnover Markers: A Narrative Review of Recent Data from RCTs

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Abstract

Osteoporosis is a common disease, defined primarily by a low measured bone density, which is associated with an increased risk of fragility fractures. Low calcium intake and vitamin D deficiency seem to be positively correlated with the prevalence of osteoporosis. Although they are not suitable for the diagnosis of osteoporosis, the biochemical markers of bone turnover can be measured in serum and/or urine, enabling the assessment of the dynamic bone activity and the short-term effectiveness of the osteoporosis treatment. Calcium and vitamin D are essential for maintaining bone health. The aim of this narrative review is to summarize the effects of vitamin D and calcium supplementation separately and in combination, on bone density and circulating serum and blood plasma vitamin D, calcium, parathyroid hormone levels, markers of bone metabolism concentrations, and clinical outcomes, such as falls and osteoporotic fractures. We searched the PubMed online database to find clinical trials from the last five years (2016-April 2022). A total of 26 randomized clinical trials (RCTs) were included in this review. The present reviewed evidence suggests that vitamin D alone or in combination with calcium increases circulating 25(OH)D. Calcium with concomitant vitamin D supplementation, but not vitamin D alone, leads to an increase in BMD. In addition, most studies did not detect significant changes in circulating levels of plasma bone metabolism markers, nor in the incidence of falls. Instead, there was a decrease in blood serum PTH levels in the groups receiving vitamin D and/or Ca supplementation. The plasma vitamin D levels at the beginning of the intervention, and the dosing regimen followed, may play a role in the observed parameters. However, further study is needed to determine an appropriate dosing regimen for the treatment of osteoporosis and the role of bone metabolism markers.

Keywords: PTH; bone density; bone turnover markers; calcium; falls; fractures; osteoporosis; vitamin D.

Figures

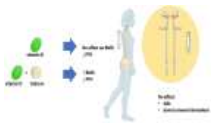

Figure 1 Summary of the main conclusions....

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