**Review: Vitamin D plus calcium is more effective than no therapy or calcium alone in corticosteroid-induced osteoporosis**


**Main results**

61 RCTs were identified, and 21 studies of 23 comparison regimens met the selection criteria. Meta-analysis showed that vitamin D plus calcium decreased loss of lumbar spine BMD more than no therapy or calcium alone ($P < 0.001$, 9 studies) (Table). Similar results were shown in a sensitivity analysis comparing 2 studies of vitamin D alone and 9 studies of vitamin D plus calcium with no therapy or calcium alone ($P < 0.001$) and in subgroup analyses comparing vitamin D plus calcium with no therapy ($P < 0.001$, 4 studies), vitamin D plus calcium with calcium alone ($P = 0.009$, 5 studies), active metabolites or analogues of vitamin D with no therapy or calcium alone ($P = 0.03$, 4 studies), or vitamin D that was not in the form of an active metabolite or analogue with no therapy or calcium alone ($P < 0.001$, 5 studies). Bisphosphonates decreased loss of lumbar spine BMD more than vitamin D ($P = 0.02$, 6 studies), as did fluoride ($P = 0.02$, 2 studies) (Table), but calcitonin did not ($P = 0.90$, 4 studies).

**Conclusion**

Vitamin D plus calcium is more effective than no therapy or calcium alone but is less effective than bisphosphonates or fluoride in decreasing loss of lumbar spine bone mineral density in corticosteroid-induced osteoporosis.

Sources of funding: National Institutes of Health; Arthritis Foundation; Merck Frosst Canada Incorporated.

For correspondence: Dr. S. Amin, The Arthritis Center, Boston University School of Medicine, 715 Albany Street, A203, Boston, MA 02118, USA. FAX 617-638-5239.

---

**Commentary**

About 50% of patients receiving long-term glucocorticoid therapy experience bone loss and fractures (1). Vitamin D may be an effective treatment for steroid-induced osteoporosis because it stimulates calcium absorption from the gut and decreases the secretion and production of parathyroid hormone (2).

This well-conducted meta-analysis concludes that patients receiving long-term corticosteroids should, at a minimum, receive calcium and vitamin D supplementation. However, several clinically important questions, which this meta-analysis could not address because of limited data, remain unanswered. First, are all vitamin D formulations equal? Second, what is the optimum dose of vitamin D to balance efficacy and toxicity? Third, do some subgroups of patients benefit from vitamin D more than others (e.g., those with low levels of vitamin D)?

The analyses showed that vitamin D, with or without calcium supplementation, is less effective than bisphosphonate therapy. The combination of calcium, vitamin D, and bisphosphonate has been shown to be safe and effective for the prevention and treatment of steroid-induced osteoporosis (1). However, it is unknown whether vitamin D enhances the effect.

On the basis of this meta-analysis, physicians should ensure that their patients receiving long-term glucocorticoids also receive calcium and vitamin D supplementation. A bisphosphonate should be considered for those with osteoporosis or those at high risk for developing the condition.

Sophie A. Jamal, MD
Women’s College Hospital
Toronto, Ontario, Canada

**References**