

Calcium and vitamin D reduced non-vertebral fractures and bone loss in the elderly

Dawson-Hughes B, Harris SS, Krall EA, et al. *Effect of calcium and vitamin D supplementation on bone density in men and women 65 years of age or older. N Engl J Med* 1997 Sep 4;337:670-6.

Objective

To assess the effectiveness of combined oral calcium and vitamin D supplementation in reducing non-vertebral fractures and bone loss in elderly people living in the community.

Design

3 year randomised, double blind, placebo controlled trial.

Setting

Community based study in the USA.

Participants

445 healthy people living in the community who were ≥ 65 years of age (55% women) were enrolled and 389 (mean age 71 y) were included in the intention to treat analysis. Exclusion criteria were current cancer or hyperparathyroidism; a kidney stone in the past 5 years; renal disease; bilateral hip surgery; bisphosphonate, calcitonin, oestrogen, tamoxifen, or testosterone use in the past 6 months; fluoride use in the past 2 years; low femoral neck bone mineral density; dietary calcium intake exceeding 1500 mg per day; and laboratory evidence of kidney or liver disease. Follow up was 87%.

Intervention

Participants, stratified by sex, race, and decade of age, were assigned to elemental calcium (calcium citrate malate), 500 mg/day, and vitamin D (cholecalciferol), 700 IU/day, or to placebo. Participants maintained their usual diet during the trial. Intention to treat analysis included 187 participants allocated to calcium and vitamin D and 202 participants allocated to placebo.

Main outcome measures

Non-vertebral fractures verified by radiographs or hospital

records, and bone mineral density at the femoral neck, spine, and total body measured every 6 months.

Main results

Among all participants, ≥ 1 non-vertebral fracture occurred in 11 participants (5.9%) who received calcium and vitamin D and in 26 participants (12.9%) who received placebo ($p=0.02$) (table). Of these 37 participants (32 women), 28 had osteoporotic fractures. Intention to treat analysis showed more bone loss in the placebo group compared with the calcium and vitamin D group at the total body ($p<0.001$), femoral neck ($p=0.02$), and spine ($p=0.04$) at 3 years. Active treatment analysis showed increases in bone mineral density in the calcium and vitamin D group at all sites at 1 year ($p\leq 0.05$ for all comparisons), but only increases in total body bone mineral density at 3 years ($p<0.001$).

Conclusion

Calcium and vitamin D supplementation decreased the risk of non-vertebral fractures and moderately reduced bone loss in elderly people living in the community.

Calcium and vitamin D v placebo*

Outcome at 3 years	Calcium and vitamin D EER	Placebo CER	RRR (95% CI)	ARR [EER-CER]	NNT (CI)
Non-vertebral fracture	5.9%	12.9%	54.3% (12 to 77)	7.0%	15 (8 to 12)

*Abbreviations in table defined in glossary; RRR, ARR, NNT, and CI calculated from data in article.

Sources of funding: National Institutes of Health and the Jean Mayer US Department of Agriculture Human Nutrition Research Center on Aging, Tufts University.

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Adapted from an abstract published in ACP Journal Club 1998 Mar-Apr;128:44.

Commentary

The study by Dawson-Hughes *et al* contributes to the growing evidence that older people can benefit from the correction of calcium imbalance. The study is particularly useful because it shows that after taking oral supplements for a period of only 1 year, bone density can increase; however, with intake at the usual dietary levels, bone density loss will continue. A similar study and 2 reviews support these findings.¹⁻³ One review points to the need for an economic evaluation, which the current study did not conduct.²

The participants in the study were all healthy and mobile older people living independently in the community, who were advised to continue with their usual diet. The study did not describe in detail

variability in the participants' usual diets and did not include participants with a range of abnormal conditions often found in older people.

The findings from the study are useful for nurses working with older people, particularly in community care settings such as nursing homes, those working in orthopaedics, and clinical nurse specialists in nutritional care. The findings from the study add to our knowledge about the importance of nutritional assessment for older people. Nutritional problems are not only associated with increased mortality and morbidity but also with poor quality of life, for example reduced personal confidence and decreased mobility resulting from falls and fractures.

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- 3 Marshall D, Johnell O, Wedel H. Meta-analysis of how well measures of bone mineral density predict occurrence of osteoporotic fractures. *BMJ* 1996;312:1254-9.