Efficacy of vitamin D3 supplementation in preventing fractures in elderly women: a meta-analysis

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CRD summary
This review concluded that vitamin D₃ supplementation reduced the incidence of osteoporotic non-vertebral fractures, hip fractures and non-vertebral-non-hip fractures in elderly women. These conclusions reflected the evidence presented, but a lack of details on study quality and other methodological concerns made it difficult to judge the reliability of these conclusions.

Authors' objectives
To assess the efficacy of vitamin D₃ (cholecalciferol) supplementation for the prevention of fractures in postmenopausal women.

Searching
MEDLINE and EMBASE were searched up to April 2007 for studies in English, French, German and Dutch. Search terms were reported. Reference lists of relevant publications were screened.

Study selection
Randomised controlled trials (RCTs) that compared cholecalciferol (alone or in combination with calcium) with placebo or calcium in women over 50 years old were eligible for inclusion. Studies of patients who had stroke, Parkinson's disease, organ transplantation or received steroid therapy were excluded. Eligible outcomes were change in bone mass density and incidence of non-vertebral fractures, hip fractures and non-vertebral-non-hip fractures.

Most of the included studies administered cholecalciferol in combination with calcium. Dose of cholecalciferol ranged from 700 IU to 800 IU daily. Treatment durations of included studies ranged from 18 to 60 months. Where reported, patient age in included studies ranged from 65 to 85 years.

The authors did not state how many reviewers assessed studies for inclusion.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Event rates were extracted to enable calculation of odds ratios (ORs) with 95% credibility intervals.

Two reviewers independently performed data extraction. Any disagreements were resolved by consensus.

Methods of synthesis
Studies were combined in meta-analyses using a Bayesian fixed-effect or random-effects model. Pooled odds ratios with 95% credibility intervals were calculated. Sensitivity analyses were performed by exclusion of studies of short treatment duration and studies with combined data for men and women. Publication bias was assessed using a funnel plot.

Results of the review
Eight RCTs were included in the review (n=12,658 participants).

Compared with placebo, cholecalciferol in combination with calcium supplementation was associated with a significant reduction in non-vertebral fractures (OR 0.77, 95% credibility interval 0.63 to 0.93; two RCTs) and hip fractures (OR 0.70, 95% credibility interval 0.53 to 0.90; three RCTs) and a non-significant reduction in non-vertebral-non-hip fractures.
fractures (OR 0.84, 95% credibility interval 0.67 to 1.04; three RCTs).

Compared with calcium supplementation alone, cholecalciferol in combination with calcium supplementation was associated with a significant reduction in non-vertebral-non-hip fractures (OR 0.64, 95% credibility interval 0.38 to 0.99; two RCTs) and a non-significant reduction in non-vertebral fractures (OR 0.68, 95% credibility interval 0.43 to 1.01; two RCTs). There was no significant difference in rate of hip fractures between the two groups.

Sensitivity analyses did not materially alter the results. There was no evidence of significant publication bias. Results for the outcome of femoral neck bone mineral density were reported.

Authors’ conclusions
Vitamin D₃ supplementation reduced the incidence of osteoporotic non-vertebral fractures, hip fractures and non-vertebral-non-hip fractures in elderly women.

CRD commentary
This review’s inclusion criteria were clear. Relevant databases were searched. Efforts were made to find published studies, but not unpublished studies, which introduced a risk of publication bias. Publication bias was assessed and little evidence of it was found. The decision to restrict the review to studies reported in several common languages meant that language bias could not be ruled out. Steps were made to minimise reviewer biases and errors in the process of data extraction; it was unclear whether study selection was performed in duplicate. No formal validity assessment was performed. Heterogeneity was investigated and appropriate methods were used to pool the results.

The authors’ conclusions reflected the evidence presented, but a lack of details on study quality and other methodological concerns made it difficult to judge the reliability of these conclusions.

Implications of the review for practice and research
Practice: The authors stated that the finding from this review supported the use of vitamin D₃ 800 IU daily to reduce the incidence of osteoporotic non-vertebral, hip and non-vertebral-non-hip fractures in elderly women.

Research: The authors did not state any implications for research.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.