

# Vitamin K and Bone Health: An Updated Systematic Review and Meta-analysis

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## INTRODUCTION

• Previous research suggests some forms of vitamin K may prevent loss of bone mineral density (BMD), and possibly reduce fracture incidence<sup>1</sup>. Indeed, a recent systematic review and meta-analysis<sup>2</sup> showed a marked overall benefit for vitamin K2 supplementation in reducing fracture risk. However, the evidence is not conclusive, with some studies showing no effect of vitamin K on bone health<sup>3</sup>.

## AIMS

- The purpose of this study was to update the systematic review and meta-analysis that we published in 2007.
- This meta-analysis examined the effect of both vitamin K1 and vitamin K2 (menaquinone-4 and menaquinone-7) on bone turnover, BMD and fracture risk
- This update was undertaken in the light of key vitamin K supplementation studies completed in the last 30 months.

## METHODS

- The Cochrane Library (1994-2009) and EMBASE (1980-2009) databases were searched for all relevant cross-sectional, longitudinal and supplementation studies.
- Thirty three studies were included in the systematic review and seven in the meta-analysis.

## RESULTS

### Vitamin K1

#### Systematic Review

Results for vitamin K1 suggested a significant negative correlation with undercarboxylated osteocalcin (ucOC), but mixed results for total osteocalcin (OC), and bone resorption markers.

#### Meta-Analysis

- The meta-analysis of supplementation trials supported the above results, showing a significant effect of vitamin K1 supplementation on reducing ucOC ( $p < 0.00001$ ,  $Z = 15.59$ , weighted mean difference =  $-21.23$  95% CI ( $-23.90$  to  $-18.57$ )), but no significant effect on BMD at any site ( $P = 0.78$ ,  $Z = 0.28$ , weighted mean difference =  $0.00$ , 95% CI ( $0.00$  to  $0.01$ )).
- There was insufficient data to analyse fracture incidence, bone resorption or OC.

### Vitamin K2

#### Systematic Review

- Results for K2 showed a significant negative association of K2 with ucOC in intervention studies. These studies showed an effect of K2 supplementation on increased BMD and reduced fracture risk.

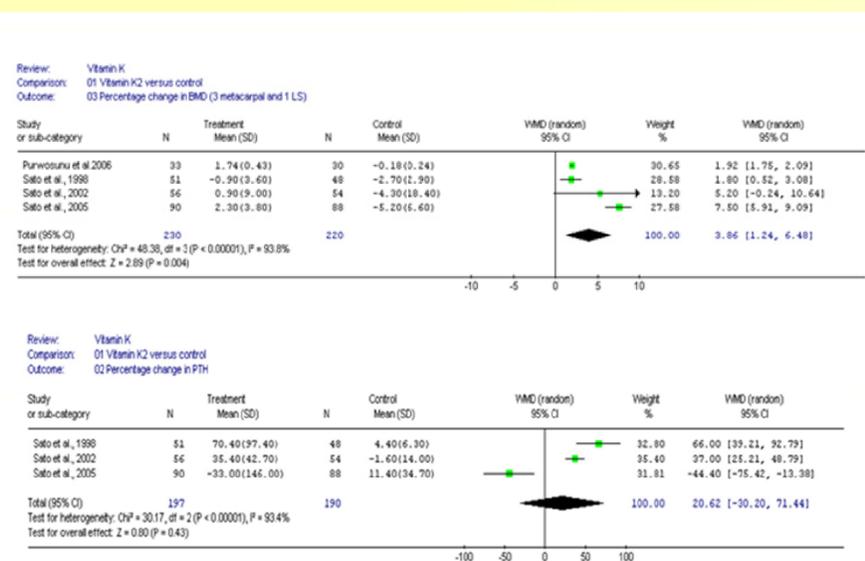
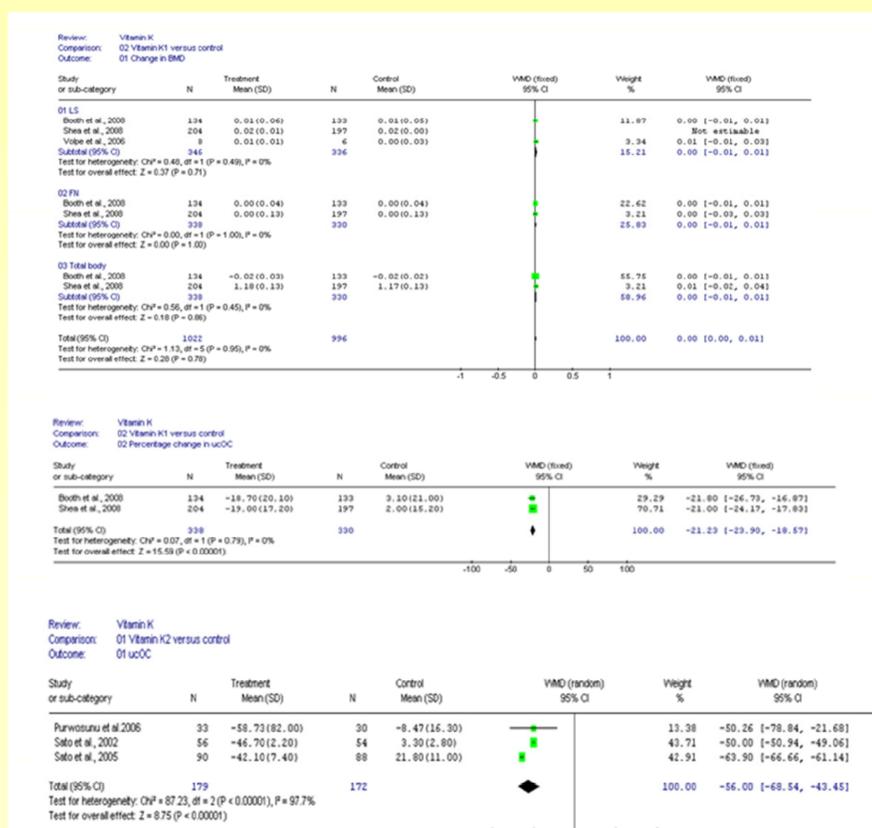
- However, no effect on bone resorption markers was found for any study type in this review.

#### Meta analysis

- These results were supported by the vitamin K2 supplementation studies meta-analysis which showed a reduction in ucOC ( $p < 0.00001$ ,  $Z = 8.75$ , weighted mean difference = 95% CI ( $-68.54$  to  $-43.45$ )) and increased BMD (combined sites) ( $p = 0.004$ ,  $Z = 3.86$ , weighted mean difference = 95% CI ( $1.24$ - $6.48$ )). Fracture risk could not be analysed here due to lack of complete data.

## DISCUSSION

- These findings suggest vitamin K may be beneficial for bone health, as it reduces ucOC, which is an independent risk factor for osteoporotic fracture.
- In this analysis, K2, but not K1 supplementation, was associated with increased BMD.
- However, the overall results from the studies were too conflicting to recommend routine supplementation of vitamin K.
- Further, higher quality and more homogenous studies are needed before any clear conclusions can be made about vitamin K and bone health.



## REFERENCES

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