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Effect of vitamin D₂ supplementation on 25-hydroxyvitamin D₃ status: a systematic review and meta-analysis of randomised controlled trials

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There are known differences in biological functionality between vitamin D₂ and D₃. It is suspected from randomised control trial (RCT) data that vitamin D₂ supplementation causes a reduction in serum 25-hydroxyvitamin D₃ (25(OH)D₃) concentrations⁽¹⁾, but the size of the effect has yet to be fully assessed across multiple studies. The aim of this study was to undertake a systematic review and meta-analysis of the effect of vitamin D₂ supplementation on serum 25(OH)D₃ concentrations.

PUBMED was searched for publications from 1st January 1975 to 1st February 2023. Of the 182 papers retrieved, 29 were included in the systematic review, and of those, 18 were suitable for meta-analysis.

The meta-analysis found significant reductions in serum D₃ after vitamin D₂ supplementation compared with control, for both end of trial between groups data (weighted mean difference (WMD)_(random) = -13.51 nmol/L; 95% CI: -20.14, -6.89; P < 0.0001) and absolute change over the trial (WMD_(random) = -9.25 nmol/L; 95% CI: -14.40, -4.10; P = 0.0004). Similar results were found when D₂ supplementation was compared to D₃ supplementation, although as expected, the magnitude of the difference was larger, with WMD_(random) = -46.20 nmol/L (95% CI: -60.80, -31.60; P < 0.00001) for end of trial data, and WMD_(random) = -56.23 nmol/L (95% CI: -69.17, -43.28; P < 0.00001) for absolute change.

Overall, we found that vitamin D₂ supplementation produces significant reductions in serum 25(OH)D₃ concentrations, when compared to either control or vitamin D₃ supplementation. An inverse relationship between vitamin D₂ and D₃ concentrations has been proposed in the literature⁽²⁾. A regulatory mechanism that disposes of 25(OH)D after an increase in vitamin D concentrations could explain our results⁽³⁾. Moreover, supplementation with vitamins D₂ and D₃ has differential effects on gene expression⁽⁴⁾. However, longer-term research is needed to establish whether clinical advice should recommend vitamin D₃ supplements over vitamin D₂ supplements, where appropriate.

References

1. Stephensen CB, Zerofsky M *et al.* (2012) *J Nutr* **142**, 1246–1252.
2. Hammami MM, Abuhdeeb K *et al.* (2019) *BMC Endocr Disord* **19**, 1–10.
3. Hammami MM & Yusuf A (2017) *BMC Endocr Disord* **17**, 1–14.
4. Durrant LR, Bucca G *et al.* (2022) *Front Immunol* **13**, 1–16.

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