The effect of vitamin D supplement on cognitive outcomes: a systematic review and meta-analysis

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Background

The clinical studies for the effect of vitamin D on cognition have produced inconsistent results and studies dealing with specific cognitive domain were not incorporated. There has been no comprehensive analysis of how results are affected by the nature of the sample or the dosage and duration of supplementation intervention.

Aims & Objectives

Aim of the study is to investigate whether vitamin D supplementation had impacts on cognitive function and to analyse the possible effects on specific cognitive domains.

Methods

We conducted a systematic review and meta-analysis of randomized controlled trials (RCTs) comparing the effect of vitamin D with control on cognitive function. The PubMed, PsycINFO, Embase, and Cochrane Library databases were searched from database inception to January 31, 2021. The study was preregistered on PROSPERO database (CRD42021249908).

Results

The analysis covered 24 trials with a total of 3789 participants in intervention group while 3768 in control group. The meta-analysis revealed a significant effect of vitamin D on global cognition (Hedges's g = 0.128, 95% CI 0.034-0.222) but not in specific cognitive domains. Subgroup analysis showed that vitamin D had an increased effect size for vulnerable populations (Hedges's g = 0.414, 95% CI 0.175-0.653) and participants with baseline vitamin D deficiency (Hedges's g = 0.480, 95% CI 0.181- 0.779). There was no robust suggestion for dose or duration of vitamin D supplement, however, according to the subgroup analysis from study without flaw (Hedges's g = 0.5494, 95% CI 0.217-0.882), we suggested the intervention model should be applied for correcting the baseline vitamin D deficiency.

Discussion & Conclusion

Our results support the hypothesis that vitamin D supplementation had small but significant effect to improving cognition. Vulnerable participants, and participants with vitamin D deficiency, are most likely to benefit from supplementation, especially interventions aiming to correct the vitamin D deficiency. Existing trials were with high heterogeneity, thus interpreting the results should still be cautious.