Abstract

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Vitamin D and multiple health outcomes: umbrella review of systematic reviews and meta-analyses of observational studies and randomised trials.

Theodoratou E, Tzoulaki I, Zgaga L, Ioannidis JP.

Centre for Population Health Sciences, University of Edinburgh, Edinburgh EH8 9AG, UK.

OBJECTIVE: To evaluate the breadth, validity, and presence of biases of the associations of vitamin D with diverse outcomes.

DESIGN: Umbrella review of the evidence across systematic reviews and meta-analyses of observational studies of plasma 25-hydroxyvitamin D or 1,25-dihydroxyvitamin D concentrations and randomised controlled trials of vitamin D supplementation.

DATA SOURCES: Medline, Embase, and screening of citations and references.

ELIGIBILITY CRITERIA: Three types of studies were eligible for the umbrella review: systematic reviews and meta-analyses that examined observational associations between circulating vitamin D concentrations and any clinical outcome; and meta-analyses of randomised controlled trials assessing supplementation with vitamin D or active compounds (both established and newer compounds of vitamin D).

RESULTS: 107 systematic literature reviews and 74 meta-analyses of observational studies of plasma vitamin D concentrations and 87 meta-analyses of randomised controlled trials of vitamin D supplementation were identified. The relation between vitamin D and 137 outcomes has been explored, covering a wide range of skeletal, malignant, cardiovascular, autoimmune, infectious, metabolic, and other diseases. Ten outcomes were examined by both meta-analyses of observational studies and meta-analyses of randomised controlled trials, but the direction of the effect and level of statistical significance was concordant only for birth weight (maternal vitamin D status or supplementation). On the basis of the available evidence, an association between vitamin D concentrations and birth weight, dental caries in children, maternal vitamin D concentrations at term, and parathyroid hormone concentrations in patients with chronic kidney disease requiring dialysis is probable, but further studies and better designed trials are needed to draw firmer conclusions. In contrast to previous reports, evidence does not support the argument that vitamin D only supplementation increases bone mineral density or reduces the risk of fractures or falls in older people.

CONCLUSIONS: Despite a few hundred systematic reviews and meta-analyses, highly convincing evidence of a clear role of vitamin D does not exist for any outcome, but associations with a selection of outcomes are probable.

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