Evidence Statement

The benefit of vitamin D and/or calcium supplementation on fracture prevention has been extensively assessed in numerous clinical trials with varying protocols, with a significant number of systematic reviews and meta-analyses reporting different conclusions.[29,33–35] A Cochrane review of vitamin D in postmenopausal women and older men,[36] as well as several other reviews,[29,31,33,34,37] concluded that although vitamin D alone is unlikely to prevent fractures in the doses and formulations tested so far in older people, supplements of vitamin D with calcium may prevent hip or other type of fracture. A 2022 comprehensive umbrella review assessing reasons for the discrepancies among systematic reviews/meta-analyses of trials (generally of less than five years) on vitamin D supplementation concluded that although calcium and vitamin D supplements together reduce the risk of hip and other fractures, this seemed largely due to data from institutionalised individuals, despite there being no significant differences in relation to residency in subgroup analyses.[31] Overall, the reductions in fracture risk with vitamin D and calcium from these trials are small in absolute terms with relatively large numbers of people needed to be treated to prevent fractures. Only the Cochrane review[37] was deemed by the umbrella review to be of moderate quality.[31]

A recent ancillary study of the randomised controlled Vitamin D and Omega-3 Trial (VITAL) involving 28,871 participants with mean age of 67 years reported that vitamin D3 supplementation (2000 IU per day) alone did not result in a significantly lower risk of fractures than placebo among generally healthy mid-life and older adults with generally good vitamin D status.[38] These recent findings importantly question the health benefits of vitamin D supplements alone in the general population of older adults, although as the authors of the VITAL study state, the study was not designed to investigate people with low vitamin D status and there were not enough participants with low vitamin D to draw any conclusions for them.[38] RCTs are necessarily conducted over a few years only and with limited exceptions, such as those involving subjects in aged care facilities, generally enrol people of good enough health and mobility to participate in the trial process. Vitamin D and calcium are both threshold ‘nutrients’, meaning that giving more to people who already have enough, however defined, cannot be expected to have a benefit.[28]

A recent study regarding improving nutrition in aged care settings that included increasing calcium and protein intake levels in people who were vitamin D replete have shown benefits such as fall and fracture reduction.[16]

A very large body of evidence, including the 662-page 2011 Institute of Medicine report[8] and other reviews,[28] points to a causal role of vitamin D and calcium for bone health. Severe vitamin D and/or calcium deficiency is the cause of most cases of rickets and osteomalacia.[8,28] Deficiency of either calcium or vitamin D can accelerate bone loss and osteoporosis in older people due to increases in parathyroid hormone and secondary hyperparathyroidism.[8,17,28]