Vitamin D status of older adults

Older adults are at increased risk of poor vitamin D status due to reduced exposure to sunlight, decreased synthesis in the skin, reduced dietary intake, impaired intestinal absorption, and impaired hydroxylation in the liver and kidneys.[1,2] A person 70 years of age exposed to the same amount of sunlight as a 20 year old person makes approximately 25% of the vitamin D that the 20-year-old person can make,[3] placing them at higher risk of vitamin D insufficiency.

A UK study has shown that only 16% of men and 13% of women ≥65 years have serum 25(OH)D levels ≥75 nmol/l.[4] The 2014 National Diet and Nutrition Survey shows that year round in the UK, up to a quarter of people aged ≥65 years have a serum 25(OH)D concentration <25 nmol/l. This figure increases to almost a third during the winter months.[5]

The Department of Health recommends that people aged ≥65 years should take a daily supplement containing 400 IU (10 µg) of vitamin D.[6] The Reference Nutrient Intake (RNI) for vitamin D for adults ≥65 years is also 400 IU.[7] However, there is emerging evidence that a higher level of daily supplementation of 700-1000 IU would be beneficial for older adults.[8.9.10]

The impact of poor vitamin D status on the health of older people is well established, and includes an increased risk of falls and fractures[11] and future nursing home admissions.[12] In hip fracture patients aged ≥65 years, 80% appear to have 25(OH)D levels below 50 nmol/l. Less than 5% have serum levels of 75 nmol/l, considered by some as the level required for optimal fracture reduction.[1] Vitamin D deficiency is also associated with poor muscle strength and weakness,[11] and poorer physical performance, as measured by the walking test, chair stands and tandem stand, and with a greater decline in physical performance over time in older men and women.[13] Finally, lower serum 25(OH)D concentrations in older people may be associated with an increased risk of mortality.[12]

Vitamin D supplementation in vitamin D deficient older people has been shown to improve muscle strength, improve functional ability and lead to fewer falls and fractures.[2]

The beneficial effects of reducing falls and fractures in older adults by providing supplemental vitamin D appear to be dose-related. In the clinical publications discussed as part of this review, only subjects receiving 700-1000 IU vitamin D daily experienced a significantly reduced risk of falling,[9] and only those receiving between 482–770 IU each day had a reduced risk of fractures.[14]

A study by Zhu *et al*., 2010 investigated the effects of supplementation with vitamin D on muscle strength and mobility in 302 community-dwelling women aged 70-90 years with vitamin D insufficiency. After daily supplementation of 1000 IU vitamin D, the vitamin D group had significantly higher serum 25(OH)D levels than the control group. The same study found that for subjects in the experimental group with baseline values in the lowest tertile, vitamin D improved muscle strength, and the 'Timed Up and Go Test' (TUAG) by 17.5%.[8]

A review which examined the relationship between vitamin D deficiency, muscle function and falls concluded that vitamin D supplementation in vitamin D deficient older people can improve muscle strength, walking distance and functional ability, and leads to a reduction in falls and nonvertebral fractures.[2]

A meta-analysis of randomised controlled trials found that a daily dose of 700-1000 IU supplemental vitamin D reduced falls by 19% in those with a mean age of 65 years and over,[9] and a randomised, multiple-dose study in nursing home residents found that those receiving 800 IU vitamin D for 5

months daily had a 72% lower falls rate than the control group (who received no vitamin D supplementation).[10]

In 2009, Bischoff-Ferrari *et al*. performed a meta-analysis on the efficacy of oral vitamin D supplementation in preventing nonvertebral and hip fractures in older adults (≥65 years) and found that 482–770 IU/day of supplemental vitamin D reduced nonvertebral fractures by 20% and hip fractures by 18%.[14]

In 2011, EFSA concluded that 'a cause and effect relationship has been established between the intake of vitamin D and a reduction in the risk of falling.' The EFSA state that in order to obtain the claimed effect, 800 IU of vitamin D should be consumed daily. The target population is people ≥60 years of age.[15]

This is supported by other sources. Venning, 2005 states that supplementation with 800 IU of vitamin D daily is needed to have an effect on falls,[11] and Brouwer-Brolsma *et al*., 2013 concluded that to reach a serum 25(OH)D level of 50 nmol/l, older adults aged ≥65 years are recommended to meet a mean daily vitamin D intake of 20 μg (800 IU).[1]

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