

The 13th European Nutrition Conference, FENS 2019, was held at the Dublin Convention Centre, 15–18 October 2019

Response to vitamin D supplementation in different latitudes: results from two parallel placebo-controlled randomized controlled trials

Marcela Mendes¹, Kathryn Hart¹, Patrícia Botelho^{2,3} and Susan Lanham-New¹

¹University of Surrey, Guildford, United Kingdom,

²University of Brasília, Brasília, Brazil and

³University of Goiás, Goiania, Brazil

Abstract

Vitamin D is vital to bone health and prolonged severe deficiency can lead to rickets in children and osteomalacia/osteoporosis in adults. Vitamin D is an exceptional nutrient in that its main source is exposure of the skin to UV rays, whilst it can also be ingested through diet. This study aimed to investigate the relative contribution of vitamin D supplementation and individual sunlight exposure in raising vitamin D levels, throughout winter, in ethnically identical adult women living in opposite latitudes. Within two parallel placebo-controlled randomized controlled trials (RCT), with identical study designs, 135 Brazilian women, (England, n = 56, 51°N; Brazil, n = 79, 16°S), were randomized to receive daily 15 µg vitamin D₃ supplements or placebo, for 12 weeks. Oral vitamin D supplementation of 15 µg daily was effective at raising 25-hydroxyvitamin D [25(OH)D] concentrations over winter, regardless of latitude, and the response was dependent on baseline vitamin D status. In both latitudes, supplementation prevented the seasonal concomitant increase in plasma parathyroid hormone (PTH) levels. Additionally, the individual UV radiation level was strongly correlated with 25(OH)D concentrations. The research also showed: 1) an optimal vitamin D status for bone health around 70–80 nmol/l; 2) the required UV radiation to achieve this status was 1.5 SED; 3) the vitamin D dietary intakes required to achieve these serum levels were 4.5 µg/d at a low latitude (16°S) and 37 µg/d at high latitude (51°N). The strength of these results is the novel analysis that directly links human *in vivo* individual sunlight radiation, increased vitamin D intake and 25(OH)D status, within two parallel RCTs in opposite latitudes. This study demonstrated that a daily supplement of 15 µg vitamin D₃ was an effective strategy to significantly raise vitamin D status throughout the winter months in adult females, with important implications for bone health through the simultaneous lowering of PTH, regardless of latitude. Our data gives a two-fold contribution to the vitamin D field: firstly it will help raise awareness of the risk for vitamin D deficiency in low latitude regions such as most countries in South America as well as amongst South-Americans living in higher latitudes, particularly in the UK; secondly it provides key data for setting appropriate vitamin D recommendations for Brazil (which currently follows US recommendations) as well as for similar latitudes.

Conflict of Interest

There is no conflict of interest.