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Factors associated with vitamin D status in Australian women

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Vitamin D can be sourced from food and produced from skin exposure to sunlight.(1) In Australia and worldwide, vitamin D deficiency is highly prevalent. Data shows that 23% of the Australian population are considered to be vitamin D insufficient (25(OH)D < 50 nmol/L), increasing to 36% during the winter.(2) Current estimated average intakes do not meet dietary recommendations.(3) A lack of vitamin D, and thus reduced absorption of calcium, results in leaching of calcium stored in the bones leading to poor musculoskeletal health.(1) The aim of this study is to determine the impact that latitude, skin type, diet and sun exposure have on vitamin D status of healthy Australian women and to explore the rates and potential causes of deficiency. This cross-sectional study was conducted in Wollongong, Australia (34.42°S) during winter 2020 and spring 2021 with 100 women (> 18 years, pre- or post-menopausal). Skin types were self-defined. Serum 25(OH)D was measured through liquid chromatography mass spectrometry, dietary intake through a 4-day food record analysed using FoodWorks 10, bone density through dual energy x-ray absorptiometry and sun exposure through a polysulphone film badge worn for 4 days. Participants were aged 41.4 ± 15.5 years and 98 women had valid serum 25(OH)D measurements. Of these, $n = 1$ (1.0%) was deficient (< 25 nmol/L), $n = 14$ (14.3%) were insufficient (25–50 nmol/L) and $n = 41$ (41.8%) were sufficient (> 50 nmol/L), while $n = 42$ (42.9%) had an optimal status (> 75 nmol/L) of vitamin D. The mean 25(OH)D was significantly different across skin type groups (white compared to moderate brown skin types) ($F(4,93) = 2.6$, $p = 0.04$), whilst average sun exposure (SED) of 1.1 ± 1.0 was on the borderline of significantly predicting 25(OH)D levels ($F(1, 92) = 3.74$, $p = 0.06$). A significant positive correlation existed between 25(OH)D and total bone mineral density ($r(96) = 0.27$, $p < 0.001$). Mean vitamin D intake ($n = 94$) was 3.1 ± 3.0 µg/day, with the majority of participants (86.2%) having intakes below.(3) Logistic regression, controlling for age, showed that an increase in reported calcium intake (OR = 1.0, 95% CI [1.0, 1.0], $p = 0.01$), average SED (OR = 0.0, 95% CI [0.0, 1.3], $p < 0.001$) and having a lighter skin type (OR = 7.0, 95% CI [1.1, 43.3], $p = 0.04$) were significantly associated with reduced odds of deficiency/insufficiency. Serum 25(OH)D was found to be higher than reported in previous Australian data,(2) which is favourable given the essential role vitamin D plays in calcium homeostasis and musculoskeletal health. However, reported dietary vitamin D intakes were low. Given the increased risk of melanoma from excessive sun exposure, targeted advice towards vitamin D-rich food sources may be helpful for those individuals with poorer vitamin D status.

References

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