

Differences in Vitamin D Status in Caucasian and Asian Women Following Ultraviolet Radiation (UVR) Exposure

Authors : O. Hakim, K. Hart, P. McCabe, J. Berry, L. E. Rhodes, N. Spyrou, A. Alfuraih, S. Lanham-New

Abstract : It is known that skin pigmentation reduces the penetration of ultraviolet radiation (UVR) and thus photosynthesis of 25(OH)D. However, the ethnic differences in 25(OH)D production remain to be fully elucidated. This study aimed to investigate the differences in vitamin D production between Asian and Caucasian postmenopausal women, in response to a defined, controlled UVB exposure. Seventeen women; nine white Caucasian (skin phototype II and III), eight South Asian women (skin phototype IV and V) participated in the study, acting as their controls. Three blood samples were taken for measurement of 25(OH)D during the run-in period (nine days, no sunbed exposure) after which all subjects underwent an identical UVR exposure protocol irrespective of skin colour (nine days, three sunbed sessions: 6, 8 and 8 minutes respectively with approximately 80% of body surface exposed). Skin tone was measured four times during the study. Both groups showed a gradual increase in 25(OH)D with final levels significantly higher than baseline ($p < 0.01$). 25(OH)D concentration mean from a baseline of 43.58 ± 19.65 to 57.80 ± 17.11 nmol/l among Caucasian and from 27.03 ± 23.92 to 44.73 ± 17.74 nmol/l among Asian women. The baseline status of vitamin D was classified as deficient among the Asian women and insufficient among the Caucasian women. The percentage increase in vitamin D3 among Caucasians was 39.86% (21.02) and 207.78% (286.02) in Asian subjects respectively. This greater response to UVR exposure reflects the lower baseline levels of the Asian subjects. The mixed linear model analysis identified a significant effect of duration of UVR exposure on the production of 25(OH)D. However, the model shows no significant effect of ethnicity and skin tone on the production of 25(OH)D. These novel findings indicate that people of Asian ethnicity have the full capability to produce a similar amount of vitamin D compared to the Caucasian group; initial vitamin D concentration influences the amount of UVB needed to reach equal serum concentrations.

Keywords : ethnicity, Caucasian, South Asian, vitamin D, ultraviolet radiation, UVR

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