Dietary vitamin D consumption, sunlight exposure, sunscreen use and parental knowledge of vitamin D sources in a cohort of children aged 1–6 years in North West England

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Hospital admission for children with rickets in England has dramatically increased, from <1 child per 100,000 in the early 1990’s to 4–78 (4.58–4.99) per 100 000 between 2007 and 2011(1). The re-emergence of rickets thus suggests poor vitamin D status(2). Additionally, there has been a plethora of publications associating low vitamin D status with many adverse health outcomes other than the classical role of vitamin D in the development, maintenance and function of a healthy skeleton(3). Vitamin D is a fat lipophilic steroid pro hormone obtained from few foods in the diet. However, the majority (90–95%) of vitamin D is synthesised from exposure of bare skin to sunlight(4), and casual sunlight exposure has been considered adequate for the majority of the population. Consequently, there is no reference nutrient intake (RNI) for ages 4–65 yrs(5). With modern indoor lifestyles, cautious sun screen usage and changes in food habits, sunlight exposure may no longer be sufficient to maintain adequate vitamin D status. To avoid vitamin D deficiency, supplementation and fortification may need to play a more prominent role in everyday lives(6).

The aim of the present study was to investigate vitamin D dietary intake in children, parents’ knowledge of vitamin D sources, children’s outdoor habits and sun screen application practices. A retrospective, cross sectional study approach was utilised. Parents of children (n = 42) aged between 1 and 6 yrs completed a semi-validated food frequency questionnaire, a sources of vitamin D knowledge questionnaire, and a sunlight exposure and sunscreen use questionnaire, in Adlington, N.W. England (latitude 55°N) during May 2013.

Children’s mean (±SD) dietary vitamin D intake was 4.4 ± 2.5 μg/d, significantly lower than 7μg/d (P = < 0.001, for comparison 7μg/d, the RNI for ages 3 months-4 yrs was used). As expected, children taking supplements had a significantly higher mean (±SD) vitamin D intake (8.49 ± 1.78 μg/d) compared to those that did not supplement (3.34 ± 1.23 μg/d, P < 0.001). The greatest contribution to dietary vitamin D intake from food was from butter and spreads (0.028μg/d), followed by cakes, biscuits & scones (0.023μg/d). Parents’ knowledge of food sources was poor, with a mean (±SD) incorrect response of 76% ±112. Contrasting, 93% correctly identified sunlight exposure as a potential source of vitamin D. Eighty nine percent of participants played outdoors daily for 1 hour or more, 81% used sunscreen with an SPF ≥30 and only 2% rarely applied sunscreen.

This study revealed that children’s diet in the NW England is lacking sufficient vitamin D content, in line with larger surveys(7,8). Parents’ knowledge regarding vitamin D dietary sources was poor but 93% of parents knew that sunlight was the non-dietary source of vitamin D. Outdoor play indicated sufficient exposure time to produce endogenous vitamin D but sunscreen usage may have potentially diminished epidermal UVB exposures.

Further research is needed using biomarkers to confirm vitamin D insufficiency, and public health strategies should be implemented to promote existing recommendations regarding supplementation and consumption of vitamin D rich foods. Additionally, guidelines for safe sun exposure and sunscreen use are required.


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