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Vitamin D status in school children in Northern Ireland

D.U. Glatt[1,2], M.M. Slevin[1], L. Beggan[1,3], L.K. Pourshahidi[1], E. McSorley[1], R. Revuelta Iniesta[4], J. McCluskey[2], N. Gleeson[2], D.F. Cobice[3], S. Dobbin[3] and P.J. Magee[1]

[1]*Nutrition Innovation Centre for Food and Health (NICHE), Ulster University, Coleraine, UK,*
[2]*Department of Dietetics and Nutrition, Queen Margaret University, Edinburgh, UK,*
[3]*Mass Spectrometry Centre, Biomedical Sciences Research Institute (BMSRI), Ulster University, Coleraine, UK and*
[4]*Department of Sports and Health Sciences, University of Exeter, Exeter, UK*

Vitamin D status in the UK is currently clinically defined by circulating 25-hydroxyvitamin D (25(OH)D) concentrations (deficient: <25 nmol/L, insufficient: 25–50 nmol/L, sufficient: >50 nmol/L) which are set to prevent rickets and osteocalcin[(1)]. Risk factors for vitamin D deficiency can include season, latitude, skin pigmentation, skin cover habits, socioeconomic factors, and body composition[(2)]. The most recent NDNS evidence (for England, Scotland, and Wales only) estimates that 19% of children (4 to 10 years) are vitamin D deficient by the end of the winter months, with circulating 25(OH)D at its lowest in January-March[(3)]. Currently there is no research investigating 25(OH)D concentrations in school children in Northern Ireland.

The primary aim of the D-VinCHI study was to investigate the vitamin D status of healthy school children (aged 4–11 years) in Northern Ireland. Healthy children were recruited between November 2019 and March 2020. Anthropometry was assessed (height, weight, body mass index (BMI), along with upper-arm muscle and fat area). Plasma 25(OH)D (nmol/L) (LCMS/MS) and parathyroid hormone (immunoassay) were determined. Dietary vitamin D intake was estimated using a food frequency questionnaire (FFQ)[(4)]. Participant's habits and behaviour was established via parent-completed questionnaires. Statistical differences were investigated using Mann-Whitney, Kruskal-Wallis or Chi-square tests as appropriate.

A total of 47 white Caucasian children (29 girls; 18 boys) were recruited from 31 families with a mean (SD) age of 8.1(2.1) years. Mean(SD) 25(OH)D was 49.17(17.04) nmol/L; 44.7% of the children were sufficient, 48.9% insufficient and 6.4% deficient. Mean(SD) dietary vitamin D intake was 6.4(5.6) μg/day (n = 44). Median vitamin D intake was significantly higher in children classified as insufficient when compared to children classified as deficient (4.6 vs 0.9 μg/day; $p = 0.008$) and the median number of vitamin D containing food groups consumed was significantly lower in deficient when compared to sufficient children (5 vs. 8 groups, $p = 0.032$). Dietary vitamin D intake was significantly higher in supplement users (17%, n = 8; median: 15.4μg/day) vs. non-supplement users (83%, n = 39; median: 3.8μg/day) ($p < 0.001$). Among supplement users, seven (88%) children were sufficient and one child (12%) was insufficient. Vitamin D status was significantly associated with taking supplements ($p = 0.028$) (children with a sufficient status were found to have higher supplement intakes) and with median weekly spring/summer hours spent outside ($p = 0.048$) (children with a sufficient status had more hours outside).

This study demonstrates that 55% (n = 26) of the children had a deficient or insufficient vitamin D status throughout the winter. Encouraging supplementation, the consumption of vitamin D rich foods, and the promotion of outdoor activities is important for optimal vitamin D status in children during the winter. This preliminary evidence supports the need for further research, including larger intervention studies, to inform future public health policy for the prevention of vitamin D deficiency in children.

References

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