Effects of school meals with weekly fish servings on vitamin D status in Danish children: secondary outcomes from the OPUS (Optimal well-being, development and health for Danish children through a healthy New Nordic Diet) School Meal Study

Children's vitamin D intake and status can be optimised to meet recommendations. We investigated if nutritionally balanced school meals with weekly fish servings affected serum 25-hydroxyvitamin D (25(OH)D) and markers related to bone in 8- to 11-year-old Danish children. We conducted an explorative secondary outcome analysis on data from 784 children from the OPUS School Meal Study, a cluster-randomised cross-over trial where children received school meals for 3 months and habitual lunch for 3 months. At baseline, and at the end of each dietary period, 25(OH)D, parathyroid hormone (PTH), osteocalcin (OC), insulin-like growth factor-1 (IGF-1), bone mineral content (BMC), bone area (BA), bone mineral density (BMD), dietary intake and physical activity were assessed. School meals increased vitamin D intake by 0.9 (95 % CI 0.7, 1.1) μg/d. No consistent effects were found on 25(OH)D, BMC, BA, BMD, IGF-1 or OC. However, season-modified effects were observed with 25(OH)D, i.e. children completing the school meal period in January/February had higher 25(OH)D status (5.5 (95 % CI 1.8, 9.2) nmol/l; P = 0.004) than children completing the control period in these months. A similar tendency was indicated in November/December (4.1 (95 % CI -0.12, 8.3) nmol/l; P = 0.057). However, the effect was opposite in March/April (-4.0 (95 % CI -7.0, -0.9) nmol/l; P = 0.010), and no difference was found in May/June (P = 0.214). Unexpectedly, the school meals slightly increased PTH (0.18 (95 % CI 0.07, 0.29) pmol/l) compared with habitual lunch. Small increases in dietary vitamin D might hold potential to mitigate the winter nadir in Danish children's 25(OH)D status while higher increases appear necessary to affect status throughout the year. More trials on effects of vitamin D intake from natural foods are needed.

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