Proceedings of the Nutrition Society (2016), **75 (OCE3)**, E165 doi:10.1017/S0029665116001804

Summer Meeting, 11–14 July 2016, New technology in nutrition research and practice

Dietary strategies for achieving adequate vitamin D and iron intakes in Irish pre-school children aged 1–4 years

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This abstract was awarded the student prize for best poster original communication.

Irish children have low intakes of vitamin D and iron and the main difference in intakes between high and low consumers of vitamin D and iron is attributable to fortified foods and nutritional supplements[1,2]. The objective of this study was to model the potential impact of a number of fortification/supplementation scenarios on vitamin D and iron adequacy in 1 to 4 year old children based on food consumption (4-day food diary) and composition data (UK and Irish Food Composition Tables) from the National Pre-School Nutrition Survey (NPNS) (2010–2011) (www.iuna.net). Five main simulation scenarios were investigated using DaDiet© Version 15·05: 1) Addition of a 5μg/d vitamin D supplement, 2) Fortification of all cows' milk (CM) with 2μg vitamin D/100 ml, 3) Replacing CM with growing-up milks (GUM) (1 & 2 year olds only), 4) Fortification of all CM plus a 5μg/d vitamin D supplement and 5) Replacing all CM with GUM plus a 5μg/d vitamin D supplement. Usual intakes of vitamin D and iron were calculated via the NCI-method[3] using SAS© Enterprise Guide.

Table 1. Proportion (%) with intakes of vitamin D below the EAR at baseline & for scenarios 1, 2, 3 & 4.

Age	Baseline	5μg/d vitamin D supplement	Vitamin D Fortified CM (2μg/100 ml)	Replace CM with GUM	Vitamin D Fortified CM & vitamin D supplement	Replace CM with GUM & vitamin D supplement
			% < EAR (10μg/d)			
1 year olds (12–23 months)	95·4	75·9	55·3	24·9	12·4	4·7
2 year olds (24–35 months)	97·1	86·7	67·9	39·0	23·5	11·5
3 year olds (36–47 months)	97·4	91·3	76·8	–	35·4	–
4 year olds (48–59 months)	97·2	89·1	79·1	–	36·4	–

Table 2. Proportion (%) with intakes of iron below the EAR at baseline & for scenario 5.

Age	Baseline	Replacing CM with GUM
	% <EAR (5 mg/d)	
1 year olds (12–23 months)	13·7	0·7
2 year olds (24–35 months)	7·1	0·3

At baseline 95–97 % of children had intakes of vitamin D below the estimated average requirement (EAR) of 10μg/d[4] while 14 % of 1 year olds and 7 % of 2 year olds had iron intakes below the EAR of 5 mg/d[5]. For vitamin D, the addition of a 5μg/d supplement to the diets of all children aged 1 to 4 years would result in a modest reduction in the prevalence of inadequate intakes (to 76–91 %). The fortification of CM with vitamin D or replacing all CM with GUM would result in a more substantial reduction in the proportion of the population with inadequate intakes of vitamin D (to 55–79 %) or (to 25–39 %) while the greatest reductions would result from a combination of a vitamin D supplement and vitamin D fortified CM (to 12–36 %) or a vitamin D supplement and replacement of CM with GUM (to 5–12 %). For iron, replacing CM with GUM would reduce the proportion of 1 and 2 year old children with inadequate intakes to <1 %. These analyses provide valuable information that will aid in the development of dietary strategies to improve intakes of vitamin D and iron in Irish pre-school children.

The project was funded by the Irish Department of Agriculture, Food and the Marine under the Nutridata Project 13 F 542; 2014–2016.

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