The D2-D3 Study: a randomised, double-blind, placebo-controlled food-fortification trial in women, comparing the efficacy of 15ug/d vitamin D2 vs vitamin D3 in raising serum 25OHD levels

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Poor vitamin D status (hypovitaminosis D) is a common problem in the UK; evidence shows prevalence is highest during the winter months, when serum 25OHD concentrations <25 and <40 nmol/l were found in 15·5% and 46·6% of the 1958 British birth cohort, compared to 3·2% and 15·4% respectively during the summer. As there are limited natural sources of vitamin D (diet & UVB rays) during the winter-time, supplementation and/or fortification of foods may be beneficial to proportions of the UK population. However, clarity on optimum type (vitamin D2 or D3) and dose of vitamin D required to maintain vitamin D status during the winter-time is urgently required.

The D2-D3 study aimed to examine and compare the efficacy of vitamin D2 vs. vitamin D3 in raising serum 25OHD levels, and to assess whether 15ug/d is sufficient to raise or maintain s25OHD levels above ‘deficiency’ or ‘insufficiency’ cut-offs (25 nmol/l and 40 nmol/l respectively) during the wintertime. In addition, the study aimed to compare the effect of two food vehicles on vitamin D bioavailability; orange juice and a biscuit.

A total of 335 healthy women aged 20–64yrs were recruited and randomised to receive either placebo (PL), vitamin D2 in orange juice (D2J), vitamin D2 in a biscuit (D2B), vitamin D3 in orange juice (D3J), or vitamin D3 in a biscuit (D3B) daily for 12-weeks during the wintertime.

At baseline, there were no significant differences in s25OHD levels between the five intervention groups. As shown in Table 1, after the 12-week intervention, all four vitamin D treatment groups showed a significant increase in s25OHD, whereas the placebo group had a significant decrease in s25OHD, as would be expected during the winter months. Food vehicle had no effect on the bioavailability of either vitamin D2 or vitamin D3.

When comparing between the D2 and D3 intervention groups, irrespective of the food vehicle, the D3 group demonstrated a significantly greater increase in s25OHD over the 12-week intervention period ($p < 0.0001$).

The present study provides conclusive evidence that food vehicle does not effect the bioavailability of vitamin D2 or vitamin D3, and that whilst both 15ug/d of vitamin D2 or D3 for 12-weeks are able to raise s25OHD levels during the wintertime, vitamin D3 is significantly more effective, facilitating a greater increase in s25OHD levels.

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