Associations between Baseline Vitamin D Status, Dietary Intake of Vitamin D and Calcium on Bone Health in Caucasian and South Asian Women: Further analysis of the D2-D3 Study

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Vitamin D deficiency results in osteomalacia and leads to osteoporosis.(1,2) Hypo-vitaminosis D is prevalent in the UK and our D-FINES study has shown vitamin D deficiency to be more common in South Asian (SA) women than Caucasian (CA) women living in South England(3).

The aim of this study was to investigate the relationship between dietary vitamin D and calcium (Ca) intakes, vitamin D status and bone health indices among the women who took part in our D2-D3 study. The D2-D3 study was a vitamin D RCT previously reported(4) in which vitamin D status was measured by LC/MS and 4d food diaries were used to measure dietary intake. The specific cross-sectional analysis was on the baseline data of 260 women and the longitudinal analysis on 59 women in the placebo group.

Mean dietary vitamin D intakes in SA and CA women were 2·24 ± 2·0, 2·78 ± 2·3 µg, respectively. Mean dietary Ca intakes were 870 ± 261·5 mg in Caucasians and 703·5 ± 211·5 mg in South Asians. Vitamin D status of Caucasians (60·21 ± 25·6 nmol/l) was much higher than that of Asians (21·7 ± 18·1 nmol/l), (P < 0·001). Body weight and body fat in Asians and BMI in Caucasians were negatively correlated with serum 25-hydroxyvitamin D status (25OHD) (P < 0·05). In SA women, higher vitamin D intake was associated with higher vitamin D status (lowest vitamin D intake T1, 25(OH)D 16·35 nmol/l to highest vitamin D intake T3, 25(OH)D 35·08 nmol/l; F test for linearity, P = 0·017), remaining significant after adjusting for age and body size (P < 0·01). When Ca and vitamin D intakes were analysed together, increased combined intakes of Ca and vitamin D resulted in higher 25(OH)D (low Ca-low vitamin D, 25(OH)D 16·14 nmol/l to high Ca-high vitamin D, 25(OH)D 28·4 nmol/l; F test for linearity, P < 0·05), and this relationship remained significant after adjustments for body size (P < 0·05) in the SA women. As shown in the Figures below, increased Ca intakes resulted in higher BMC, in spite of the decreased vitamin D intakes (Medium Ca-High Vitamin D, BMC = 1·1613 g/cm to High Ca-Medium Vitamin D, BMC = 1·1613 g/cm; F test for linearity, P < 0·01) in POST-CA women. Women in the placebo group of the D2D3 study with vitamin D deficiency at baseline had a less pronounced decrease in vitamin D status during winter.

These results demonstrate the importance of dietary Ca to bone health and the synergistic beneficial effects of combined dietary Ca and vitamin D intakes on vitamin D status and bone health. Further work is required on endogenous and exogenous factors affecting longitudinal changes in vitamin D status throughout the year.

The D-FINES study was funded by the FSA (N05064) and the D2-D3 study by the BBSRC DRINC programme (BB/I006192/1).