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Increased dietary protein is strongly associated with reduced bone mineral density and bone mineral content at the femoral neck and lumbar spine in UK dwelling South Asian and Caucasian postmenopausal women

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There is a long standing controversy as to whether dietary protein is beneficial or detrimental to bone health. Dietary protein has known anabolic effects on bone via hormones (e.g. IGF1) and may increase Ca absorption[1], which could also benefit bone. However, high dietary-protein intake may also increase physiological acid load and thus may increase urinary excretion of Ca and bone resorption[2]. Therefore, dietary protein may also be detrimental to bone health. In addition, there is a considerable lack of research into the association between protein intakes and bone health in different ethnic groups, such as South Asians. In Autumn 2006, *n* 38 postmenopausal South Asian [mean age 58(SD 4) years] and *n* 138 postmenopausal Caucasian women [mean age 61(SD 4.5) years] took part in the D-FINES study (Vitamin D, Food Intake, Nutrition and Exposure to Sunlight in Southern England). A dual X-ray absorptiometry (DXA) scan (Hologic) was undertaken as well as completion of 4 d diet diaries (photographic-estimation method). Relevant anthropometric and lifestyle information and serum 25-hydroxyvitamin D (25-OHD) was also obtained.

Partial correlations were run using PASW 18.0 to examine associations between protein intake (adjusted per Kg body weight) and DXA bone indices. For the fully-adjusted model (model 2), in both the ethnic groups there was a significant ($P<0.05$) negative correlation between protein intake and femoral neck bone mineral density (FNBMD), lumbar spine bone mineral density (LSBMD) and femoral neck bone mineral content (FNBMC). There was also a borderline significant negative association with lumbar spine bone mineral content (LSBMC). In comparison, model 1 shows the data that were not fully adjusted for micronutrients, which were only statistically significant in Asians for FNBMC, and in Caucasians for FNBMD.

Partial correlations between protein intake (per Kg body weight) and DXA bone indices.

	Model 1*				Model 2†			
Asian *n* 21	FNBMD	FNBMC	LSBMD	LSBMC	FNBMD	FNBMC	LSBMD	LSBMC
R	−0.48	−0.64	−0.36	−0.36	−0.81	−0.99	−0.73	−0.62
P	0.07	0.01	0.19	0.19	0.005	<0.001	0.02	0.06
Caucasian *n* 123								
R	−0.21	−0.16	−0.16	−0.08	−0.26	−0.23	−0.26	−0.19
P	0.03	0.10	0.09	0.43	0.01	0.02	0.01	0.06

* Model 1, controlling for log age, log deprivation index, log physical activity, height, dietary Ca, log 25-OHD status and energy intake. † Model 2, controlling for log age, log deprivation index, log physical activity, height, dietary Ca, log 25-OHD status, energy intake, log dietary vitamin C, log dietary Na, log dietary K, dietary P and Mg.

This negative result is very surprising considering most epidemiological studies and a recent meta-analysis[3] have shown a positive association between dietary protein and indices of bone health. Also, contrary to expectations, controlling for dietary vitamin C, Na, K, P and Mg (model 2) actually strengthened the association, not weakened it. Overall the strong negative association between dietary protein and bone indices found here in this group of older Asian and Caucasian women was unexpected and has not been examined before in the literature to the authors' knowledge. Further analysis of this dataset is ongoing to investigate these results further, particularly given that the Asian women were severely vitamin D deficient.

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