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Dietary patterns and bone mineral status in young adults: the Young Hearts Project, Northern Ireland

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The most extensive research in bone health has focused on Ca and/or vitamin D, with beneficial effects also shown from other nutrients and dietary components such as K, Mg, vitamin K and fruit and vegetable intake. Given these findings and the complexity of bone structure, it is likely that a wide range of nutrients are needed for its maintenance. Dietary pattern analysis is now widely used in nutritional epidemiology. Such approaches are said to better reflect the complex interactions between nutrients or foods that are not adequately accounted for when examining isolated nutrients⁽¹⁾. The aim of the present study was to examine the relationship between bone mineral status and dietary patterns in young adults who participated in the Young Hearts (YH) Project, Northern Ireland.

The YH Project is a longitudinal observational study initially designed to investigate coronary risk factors in 12–15-year olds⁽²⁾. The current findings are based on Young Hearts 3 (YH3)⁽³⁾, a follow-up study carried out between 1997 and 1999 (48.2% response rate; $n = 489$, 51% male) when the participants were aged 20–25 years old. Ethical approval was obtained from the Research Ethics Committee, Queen's University Belfast, and written informed consent was obtained from all participants. Bone mineral density (BMD) and bone mineral content (BMC) were measured at lumbar spine (L2–L4) and femoral neck by dual-energy X-ray absorptiometry (DXA). Diet was assessed using a 7-d diet history and analysed using a computerised dietary analysis programme. To perform the dietary pattern analysis, the individual foods and food ingredients from the diet histories were aggregated into 31 food groups based on food types and macronutrient content, and examined using principal component analysis (PCA). Associations between dietary patterns (categorised into quintiles) and bone mineral status were assessed using multivariate linear regression, adjusting for the confounding factors BMI, age, smoking status, physical activity and mean energy intake.

PCA was conducted separately for men and women, but produced four similar dietary patterns and were named according to the food groups which loaded most highly in each: (1) healthy, (2) traditional, (3) refined and (4) social for men and women. Women who adhered most closely to a refined dietary pattern had significantly greater femoral neck BMD ($P = 0.041$) and BMC ($P = 0.022$) after adjusting for confounding factors. In contrast, men who adhered most closely to this dietary pattern had significantly lower femoral neck BMC ($P = 0.036$) following adjustments. However, femoral neck BMC was significantly greater in men ($P = 0.031$) who closely followed a social dietary pattern; this finding was not observed in women.

Little is known about the relationship between PCA-derived dietary patterns and bone health. This research indicates that dietary patterns with high factor loadings for red meat, meat dishes, poultry, vegetables and nuts may be associated with greater bone mineral status in young adults. An exploration of the longitudinal data from this cohort may help to better explain the relationship between these dietary patterns and bone health over time.

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