



The 13th European Nutrition Conference, FENS 2019, was held at the Dublin Convention Centre, 15–18 October 2019

Polyunsaturated fatty acids and their relationship with bone mineral density and markers of bone turnover in post-menopausal women

O. Feehan¹, M.M. Slevin¹, P.J. Allsopp¹, P.J. Magee¹, L.K. Pourshahidi¹, D.J. Armstrong² and E.M. McSorley¹

¹Nutrition Innovation Centre for Food and Health (NICHE), Ulster University, Coleraine, United Kingdom and

²Fracture Liaison and Osteoporosis Service, Altnagelvin Hospital, Western Health and Social Care Trust, Londonderry, United Kingdom

Abstract

Age-related bone loss leads to a significant decline in bone formation and an increase in bone resorption resulting in a marked negative effect on bone mineral density (BMD). This bone turnover cycle can be further disrupted by estrogen deficiency during menopause which can lead to a great net loss of bone in post-menopausal women. Evidence suggests that n-3 polyunsaturated fatty acids (PUFA) may have a beneficial effect on the inflammatory regulation of bone remodelling and thus reducing bone loss. This study investigated the relationship between PUFA status, total body bone mineral density (BMD) and bone turnover markers in a cohort of post-menopausal women in Northern Ireland. Total body T-score and BMD were measured using dual energy x-ray absorptiometry (DEXA) in 300 non-osteoporotic post-menopausal women (45–75 years). The bone turnover markers serum osteocalcin, alkaline phosphatase, C-terminal telopeptides of type 1 collagen (CTX) and urinary deoxypyridinoline (DPD) were quantified. Total n6 PUFA (LA + AA) and n3 PUFA (ALA + EPA + DPA + DHA) were measured in serum using gas chromatography mass spectrometry. Total n3:n6 ratio was calculated. Dietary intake and lifestyle factors were determined by 4 day food diary and questionnaire, respectively. Spearman rank correlation analysis were conducted to investigate the relationship between PUFA and total body BMD. Secondary analysis investigated the relationship between PUFA and the bone turnover markers. Median (IQR) age was 61 (10) years, body mass index 27 (6) kg/m², total body BMD, 1.3 (0.11) g/cm² and age at menopause was 50 (6) years. Total median (IQR) serum n-3 PUFA status was 0.231 (0.128) mg/mL, total n6 PUFA was 1.248 (0.477) mg/mL and the n6:n3 PUFA ratio was 5.82 (2.63). Median (IQR) daily fish consumption was 25 (46) grams, calcium 702 (364) mg and vitamin D 2.21 (2.3) µg. There was no significant correlation between markers of total n3, n6, n6:n3 ratio and total body T-score, BMD or bone mineral content. PUFA was not significantly associated with total body BMD. There was a significant negative correlation between the urinary bone resorption marker DPD and total n3 PUFA ($r = -0.137$, $P = 0.018$); EPA ($r = -0.150$, $P = 0.009$), and DPA ($r = -0.118$, $P = 0.042$). A significant negative correlation was observed between urinary CTX and the n-6 PUFA AA ($r = -0.121$, $P = 0.036$), the n3 PUFA ALA ($r = -0.123$, $P = 0.033$). PUFA were associated with less bone resorption therefore it is plausible that PUFA have a positive anti-inflammatory effect on bone resorption and warrants further investigation.

Conflict of Interest

There is no conflict of interest.