Proceedings of the Nutrition Society (2012), **71 (OCE2)**, E150 doi:10.1017/S0029665112002078

Summer Meeting hosted by the Irish Section, 16–19 July 2012, Translational nutrition: integrating research, practice and policy

Determinants of bone mineral density in postmenopausal women in Northern Ireland

M. M. Slevin[1], P. Allsopp[1], P. J. Magee[1], M. E. Duffy[1], J. M. W. Wallace[1], M. P. Bonham[2], J. J. Strain[1] and E. M. McSorley[1]

[1]*Northern Ireland Centre for Food and Health, University of Ulster, Coleraine, BT52 1SA, UK and*
[2]*Department of Nutrition and Dietetics, Monash University, Faculty of Medicine, Nursing and Health Sciences, 246 Clayton Road, Clayton, VIC 3168 Australia*

Postmenopausal osteoporosis is a chronic disease characterized by decreased bone mass, increased bone turnover and increased fracture risk(1). Bone mineral density (BMD) is routinely used as the gold standard determinant of fracture risk and ultimately osteoporosis(2). Numerous risk factors, including age, body composition, lifestyle factors and bone turnover markers (BTM), which impact on BMD have been identified. Nevertheless, there is conflicting evidence with regard to certain determinants, in particular, BTM(3) and body composition(4) of BMD in postmenopausal women. The aim of this study therefore, was to assess BMD in Northern Irish postmenopausal women and to examine potential determinants of BMD.

Non-osteoporotic postmenopausal women ($N = 300$) (45–75 years) were recruited between October 2008 and June 2009, as part of a larger intervention study (REC/08/0083). Total body T-score and body composition were measured using a dual energy x-ray absorptiometry (DEXA) scan. Osteocalcin, deoxypyridinoline crosslinks, C-terminal crosslaps, 25-hydroxy vitamin D and parathyroid hormone (PTH) were measured. Dietary calcium intake and lifestyle factors were determined by questionnaire. Multiple linear regression was performed to identify independent predictors of BMD. Model 1 included age, body mass index (BMI), percent fat (FM) and fat free mass (FFM); model 2 encompassed the variables from model 1 in addition to; number of years postmenopausal, parity, smoking status, statin use, vitamin D status, PTH status and dietary calcium intake; and model 3 included all of the above variables in addition to BTM.

Model 1 explained 37% of the variance in total body T-score, $F(4, 253) = 39.43$, $p<0.001$. Model 2 explained a further 3% of the variance, $F(11, 246) = 16.28$, $p<0.001$. Model 3 explained a further 1% of the variance, $F(15, 242) = 13.00$, $p<0.001$. The main variables which explained most of the variance in total body T score were increasing age, which was associated with lower BMD ($\beta = -0.26$; $p = 0.001$), higher percentage body fat, which was associated with higher BMD ($\beta = 0.225$; $p = 0.048$), higher fat free mass (FFM), which was associated with higher BMD ($\beta = 0.385$; $p<0.001$) and current smoking which was negatively associated with BMD ($\beta = -0.163$; $p = 0.001$).

Within this cohort, BTM did not explain any of the variance in BMD, albeit the obvious risk factors of increasing age and smoking were associated with a lower total body BMD, whereas weight (FM and FFM) were associated with a higher BMD. Similar findings have been reported recently by others(4,5). In conclusion, findings from this study indicate that there is a relationship between FFM and BMD, suggesting that muscle weight has an additional predictive value over fat mass and, together with exercise, may potentially help to prevent osteoporosis.

1. Massé PG, Dosy J, Tranchant CC *et al*. (2004) *J Hum Nutr Dietet* **17**, 121–132.
2. World Health Organisation (1994) Technical Report Series 843. Geneva: WHO.
3. Civitelli R, Armamento-Villareal R & Napoli N (2009) *Osteoporos Int* **20**, 843–851.
4. Ho-Pham LT, Nguyen ND, Lai TQ *et al*. (2010) BMC *Musculoskeletal Disorders* **11**, 59.
5. Park JH, Song YM, Sung J *et al*. (2012) *Bone* **50**(4): 1006–1011.