

Concurrent Session 2

Vitamin D status and its relationship with bone mass in healthy adolescent girls in China

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Background - There is little known about the influence of vitamin D status on the growth of bone mass in Chinese children and adolescents.

Objectives - To investigate the relationship between vitamin D status and bone mass in 301 apparently healthy Chinese adolescent girls aged 15 ± 0.4 years in Beijing, China (40°N).

Design - Serum 25 hydroxyvitamin D [25(OH)D] was determined by radioimmunoassay during late winter, 2004, and bone mineral content (BMC) and bone area (BA) for the whole body and the distal and proximal forearm were measured by dual energy X-ray absorptiometry (DXA).

Outcomes - Mean body weight and height were 55.1 ± 9.9 kg and 1.6 ± 0.1 m, respectively, and 98% of the subjects were in late pubertal Tanner stages IV and V. Mean serum 25(OH)D concentration was 34.0 nmol/L [95% CI: 32.1 – 35.9]. Approximately 49.2% and 39.9% of the subjects, respectively, had either vitamin D deficiency (serum 25(OH)D <25 nmol/L) or vitamin D insufficiency (serum 25(OH)D between 25 and 50 nmol/L). Only about 11.0% of the subjects had adequate vitamin D status (>50 nmol/L). Partial correlation analysis showed a significant positive association between *log* serum 25(OH)D concentration and bone mineral content (BMC) and also between vitamin D status and the areal bone mineral density (aBMD) for the total body, and the distal and proximal forearm, after adjusting for potential confounders. When these bone measurements were compared with vitamin D status it was found that those girls with adequate status had significantly higher BMC in the whole body ($P < 0.001$), distal forearm ($P < 0.001$) and proximal forearm ($P < 0.01$) than those with poorer vitamin D status, after adjusting for body weight, height, handgrip strength, physical activity and dietary intake of calcium and vitamin D. No association was found between body mass index and vitamin D status ($P > 0.05$).

Conclusions - The adolescent girls with adequate vitamin D status had significantly higher BMC for the whole body, distal forearm and proximal forearm compared with those with poor vitamin D status although there was no difference in bone size. This finding suggests that good vitamin D status during adolescence is important for bone mass and may contribute to attaining an optimal peak bone mass.

Low fat milk fortified with calcium and vitamin D₃ prevents bone loss in older men

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Background - Osteoporosis and its related problems are now recognised as an increasing public health problem in men. This highlights the importance of identifying lifestyle interventions that are effective at maintaining bone mass in men.

Objective - The aim of this study was to examine the effect of milk fortified with additional calcium and vitamin D₃ on bone mineral density [BMD] in ambulatory community living men aged 50 to 87 years.

Design - This was a two year randomized controlled study in which 167 men [mean age \pm SD; 61.9 ± 7.7 years] were assigned to receive either 400 mls per day [2 x 200 ml tetra packs] of reduced fat [$\sim 1\%$] UHT milk containing 1000 mg of calcium plus 800 IU of vitamin D₃ or to a control group receiving no additional milk. Primary endpoints were changes in BMD, serum vitamin D [25(OH)D] and parathyroid hormone [PTH] concentrations.

Outcomes - A total of 149 men completed the study [milk compliance averaged 88%]. Baseline characteristics between the groups were no different; mean dietary calcium and serum 25(OH)D levels were 941 ± 387 mg per day and 77 ± 23 nmol/L, respectively. After two years, the mean percent change in BMD at the femoral neck, total hip and ultra-distal radius was 0.9 to 1.6% less in the milk compared to control group [$P < 0.05$ to < 0.001]. No differences were detected for lumbar spine BMD after two years. Serum 25(OH)D levels increased and PTH decreased in the milk relative to control group after one year [$P < 0.001$], and these differences remained after two years. Body weight remained unchanged in both groups.

Conclusion - In conclusion, supplementing the diet of men aged over 50 years with reduced fat, calcium and vitamin D₃ enriched milk may represent a simple, nutritionally sound and cost effective strategy to reduce age-related bone loss at several skeletal sites at risk of fracture.