

DIETARY CALCIUM AND FOREARM BONE DENSITY IN YOUNG ADULT WOMEN

M. COCHRAN*, V. FAZIO**, E. GIBSON*, K. WARD*, G. ALLEN*, B.E.C. NORDIN***

We previously reported (Fazio and Cochran 1984) that dietary calcium in adult women had a bimodal distribution, and analysis of urinary calcium levels suggested that approximately one quarter had a suboptimal calcium intake. In this study we have measured the forearm bone mineral density (BMD) in 42 women aged between 20 and 44 (mean 32 ± 8.9) years, obtained a diet history and analysed a 24 hour urine sample from each to determine what factors, if any, could be identified as influencing skeletal mass. Diet histories using the food frequency method were analysed by the CSIRO Division of Human Nutrition. The BMD was measured by a Molsgaard type scanner at the distal radius. Urine analysis was carried out by standard autoanalyser methods. Dietary intakes of calcium, protein, phosphorus and alcohol, are shown in the accompanying table.

Dietary intake (mean \pm SD) estimated by food frequency method in 42 women			
Calcium	g/day	0.99	0.510
Protein	g/day	85.5	22.4
Phosphorus	g/day	1.39	0.424
Alcohol	g/day	5.62	6.01

Forearm BMD ranged from 374 to 534 (mean 459 ± 51) mg/cc, urine calcium ranged from 0.63 - 9.40 mmol/day and the 24 hour urine Ca/Cr ratio from 0.11 - 0.76. A weak significant positive relation was found between bone mineral density and protein intake ($P < 0.05$). No relation, positive or negative, was found between BMD and either the alcohol or phosphorus intake. There was no overall relation between BMD and calcium intake, but inspection of the data showed that women with calcium intakes > 0.8 g/day had values for BMD below the mean value for the whole group in only 6 of 18 cases, whereas in women with calcium intakes < 0.8 g/day, the BMD was below the mean in 13 of 24 subjects. Therefore, when women were separated into two populations, according to calcium intakes above and less than 0.8 g/day, there was a strong suggestion of a difference in the distribution of the bone mineral density, but this did not reach statistical significance ($T 1.37, p < 0.1$). When the women with calcium intakes < 0.8 g/day were considered, the mean BMD for the population was 446 mg/cc. Those with values below the mean had higher dietary phosphate intakes, higher alcohol intakes, higher urinary sodium excretion rates and higher calcium excretion rates than the subjects with BMD values greater than the mean. Despite these trends, the difference for each of the parameters between the two groups did not reach statistical significance.

The data indicate that young healthy women are able to compensate for a low calcium diet, thus preventing obvious bone loss. However, there is suggestive evidence that at these low calcium intakes, a relatively high urinary calcium excretion, associated with a high sodium and/or alcohol intake may lead to a suboptimal bone mass.

FAZIO, V.A. and COCHRAN, M. (1984). Proc. Nutr. Soc. Aust. 9: 124

* Flinders Medical Centre, Bedford Park, South Australia 5042

** Alfred Hospital, Prahran, Victoria 3181

*** The Royal Alfred Hospital, South Australia 5000