

Dietary Sodium and Osteoporosis: Literature Research on PubMed

Role of dietary sodium in osteoporosis.....	1
Dietary intake, blood pressure and osteoporosis	2
Comparison between dietary assessment methods for determining associations between nutrient intakes and bone mineral density in postmenopausal women	2
Nutrition and lifestyle in relation to bone health and body weight in Croatian postmenopausal women	3
Relationship between nutrient intake and vitamin D status in osteoporotic women	3
Sodium and bone health: impact of moderately high and low salt intakes on calcium metabolism in postmenopausal women	4
Adverse effects of sodium chloride on bone in the aging human population resulting from habitual consumption of typical American diets.....	4
Relationship and interaction between sodium and potassium.....	5
Effects of a low sodium diet on bone metabolism	5

Role of dietary sodium in osteoporosis

[J Am Coll Nutr. 2006 Jun;25\(3 Suppl\):271S-276S.](#) Heaney RP.
Creighton University, Omaha, Nebraska 68178, USA. rheaney@creighton.edu

Sodium, in the form of sodium chloride, elevates urinary calcium excretion and, at prevailing calcium intakes, evokes compensatory responses that may lead to increased bone remodeling and bone loss. The calciuria is partly due to salt-induced volume expansion, with an increase in GFR, and partly to competition between sodium and calcium ions in the renal tubule. Potassium intakes in the range of current recommendations actually reduce or prevent sodium chloride-induced calciuria. At calcium intakes at or above currently recommended levels, there appear to be no deleterious effects of prevailing salt intakes on bone or the calcium economy, mainly because adaptive increases in calcium absorption offset the increased urinary loss. Such compensation is likely to be incomplete at low calcium intakes. Limited evidence suggests equivalent bone-sparing effects of either salt restriction or augmented calcium intakes. Given the relative difficulty of the former, and the ancillary benefits of the latter, it would seem that the optimal strategy to protect the skeleton is to ensure adequate calcium and potassium intakes.

In conclusion, the articles in the supplement provide an up-to-date summary on the relation of dietary sodium and mineral nutrition to human health and the process to make dietary guidelines. While great strides have been made over many decades to improve our knowledge in these areas, significant gaps still exist. For those who make public policy recommendations it is vitally important to know whether a low sodium diet improves health outcomes (in terms of survival, function and quality of life) in the general population and does not place physically active people at risk. Better identification of individuals who are sensitive to the blood pressure effects of salt will permit more efficient targeting of interventions. For health care providers the development of better methods to measure electrolyte intake reliably is a crucial step to overcome nutrient deficiencies in the American diet. A greater understanding of the interactive effects of potassium and calcium on sodium metabolism may provide new insights on ways to reduce the burden of suffering from

cardiovascular and non-cardiovascular diseases. Until better information is available, evidence supports a public health dietary policy that focuses on improving diet quality in the entire population and recommends different target intake levels for sodium based on individual susceptibility to salt.

Dietary intake, blood pressure and osteoporosis

[J Hum Hypertens. 2009 Jul;23\(7\):451-5.](#) Epub 2008 Dec 18. Woo J, Kwok T, Leung J, Tang N. Department of Medicine and Therapeutics, The Chinese University of Hong Kong, NT, Hong Kong. jeanwoowong@cuhk.edu.hk

Both hypertension and osteoporosis have common underlying nutritional aetiology, with regards to dietary cations intake. We tested the hypothesis that sodium intake reflected in urinary Na/Cr and blood pressure would be negatively associated with bone mineral density (BMD), whereas other cations may have opposite associations. Subjects were part of a study of bone health in 4000 men and women aged 65 years and over. A total of 1098 subjects who were not on antihypertensive drugs or calcium supplements and who provided urine samples were available for analysis. Logistic regression was used to examine associations between total hip and lumbar spine BMD, age, gender, body mass index (BMI), urinary Na/Cr, K/Cr, calcium and magnesium intake, systolic blood pressure and diastolic blood pressure. Total hip BMD was inversely associated with age, being female and urinary Na/Cr, and positively associated with BMI, urine K/Cr and dietary calcium intake. Lumbar spine BMD was inversely associated with being female and urinary Na/Cr, and positively associated with BMI, dietary calcium intake and SBP.

We conclude that sodium intake, reflected by urinary Na/Cr, is the major factor linking blood pressure and osteoporosis as shown by the inverse relationship with BMD. The findings lend further emphasis to the health benefits of salt reduction in our population both in terms of hypertension and osteoporosis.

Comparison between dietary assessment methods for determining associations between nutrient intakes and bone mineral density in postmenopausal women

[J Am Diet Assoc. 2009 May;109\(5\):899-904.](#) Farrell VA, Harris M, Lohman TG, Going SB, Thomson CA, Weber JL, Houtkooper LB. Department of Nutritional Sciences, University of Arizona, Shantz 118, PO Box 210038, Tucson, AZ 85721, USA. Stanford@u.arizona.edu

It is important to identify the role of nutrition in the treatment and prevention of osteoporosis. The goal of this study was to compare the equivalency of nutrient intakes assessed by diet records and the Arizona Food Frequency Questionnaire and the associations of these nutrients with bone mineral density (BMD). This is a secondary analysis of cross-sectional data that was analyzed from six cohorts (fall 1995 to fall 1997) of postmenopausal women (n=244; 55.7+/-4.6 years) participating in a 12-month, block-randomized, clinical trial. One-year dietary intakes were assessed using 8 days of diet records and the Arizona Food Frequency Questionnaire. Participants' BMD was measured at the lumbar spine (L2-L4), femur trochanter, femur neck, Ward's triangle, and total body using dual-energy x-ray absorptiometry. Linear regression analyses ($P < \text{or} = 0.05$) were adjusted for the effects of exercise, hormone therapy use, body weight at 1 year, years post menopause, and total energy intake. Significant correlations ($r=0.30$ to 0.70 , $P < \text{or} = 0.05$) between dietary assessment methods were found with all dietary intake variables. Iron and magnesium were consistently and significantly positively associated with BMD at all bone sites regardless of the dietary assessment method. Zinc, dietary calcium, phosphorous, potassium, total calcium, and fiber intakes were positively associated with BMD at three or more of the same bone sites regardless of the dietary assessment method. Protein, alcohol, caffeine, sodium, and vitamin E did not have any similar BMD associations. Diet records and the Arizona Food Frequency Questionnaire are acceptable dietary tools used to determine the associations of particular nutrients and BMD sites in healthy postmenopausal women.