

ORIGINAL RESEARCH COMMUNICATION

More acidic dietary acid-base load is associated with reduced calcaneal broadband ultrasound attenuation in women but not in men: results from the EPIC-Norfolk cohort study^{1,2,3}

Ailsa A Welch, Sheila A Bingham, Jonathan Reeve and KT Khaw

¹ From the Department of Public Health and Primary Care, University of Cambridge, Strangeways Site, Cambridge, United Kingdom (AAW); Medical Research Council Dunn Human Nutrition Unit, Cambridge, United Kingdom (SAB); and the Strangeways Research Laboratory (JR) and Clinical Gerontology Unit (KTK), Department of Medicine, University of Cambridge, Cambridge, United Kingdom

Background: Dietary patterns that promote mild metabolic acidosis may have a negative effect on bone density.

Objective: We investigated the relation between a measure of dietary acid-base load, potential renal acid load (PRAL), and calcaneal broadband ultrasound attenuation (BUA) after adjustment for confounders and also compared the results with different estimates of acid-base load.

Design: A cross-sectional study was conducted in 14 563 men and women aged 42–82 y living in Norfolk, United Kingdom, in which measures of calcaneal BUA and dietary PRAL were estimated by using the European Prospective Investigation into Cancer and Nutrition Norfolk (EPIC-Norfolk) food-frequency questionnaire.

Results: A more acidic dietary intake (high PRAL) was significantly associated with lower calcaneal BUA in women but not in men; there was a difference of $\approx 2\%$ in BUA between the highest and lowest quintiles of PRAL, independent of age, body mass index, smoking habit, physical activity, diagnosed osteoporosis, and history of fracture, and (in women) hormone replacement therapy. No relation was observed between history of fracture or incident fracture and PRAL. Those with the greatest PRAL had higher intakes of meat, fish, eggs, and cereal and cereal products and lower intakes of fruit and vegetables, tea, and coffee.

Conclusion: PRAL was inversely associated with bone ultrasound measures in women, but the magnitude of the association was relatively small compared with other known risk factors. Further longitudinal studies are required to establish whether, in the long term, these small effects are important in overall fracture risk in populations.

Key Words: Acid-base balance • diet • broadband ultrasound attenuation • BUA • bone density • potential renal acid load • PRAL • European Prospective Investigation into Cancer and Nutrition Norfolk • EPIC-Norfolk

This article has been cited by other articles:

This Article

- ▶ [Full Text](#)
- ▶ [Full Text \(PDF\)](#)
- ▶ [Purchase Article](#)
- ▶ [View Shopping Cart](#)
- ▶ [Alert me when this article is cited](#)
- ▶ [Alert me if a correction is posted](#)
- ▶ [Citation Map](#)

Services

- ▶ [Similar articles in this journal](#)
- ▶ [Similar articles in PubMed](#)
- ▶ [Alert me to new issues of the journal](#)
- ▶ [Download to citation manager](#)
- ▶ [Get Permissions](#)

Citing Articles

- ▶ [Citing Articles via HighWire](#)
- ▶ [Citing Articles via Google Scholar](#)

Google Scholar

- ▶ [Articles by Welch, A. A](#)
- ▶ [Articles by Khaw, K.](#)
- ▶ [Search for Related Content](#)

PubMed

- ▶ [PubMed Citation](#)
- ▶ [Articles by Welch, A. A](#)
- ▶ [Articles by Khaw, K.](#)

Agricola

- ▶ [Articles by Welch, A. A](#)
- ▶ [Articles by Khaw, K.](#)



E. Wynn, S. A. Lanham-New, M.-A. Krieg, D. R. Whittamore, and P. Burckhardt

Low Estimates of Dietary Acid Load Are Positively Associated with Bone Ultrasound in Women Older Than 75 Years of Age with a Lifetime Fracture

J. Nutr., July 1, 2008; 138(7): 1349 - 1354.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



R. P Heaney and D. K Layman

Amount and type of protein influences bone health

Am. J. Clinical Nutrition, May 1, 2008; 87(5): 1567S - 1570S.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)