

Urinary pH is an indicator of dietary acid-base load in a population: results from the EPIC-Norfolk cohort study

AILSA WELCH, SHEILA A. BINGHAM, KAY-TEE KHAW

Department of Public Health and Primary Care, University of Cambridge,
Strangeways Research Laboratory, Cambridge, UK

email: ailsa.welch@phpc.cam.ac.uk

Introduction: Dietary acid-base load is thought to be important to bone health and may also be related to other conditions (1-4). Previously, dietary acid load, measured as PRAL (potential renal acid load), has been associated with pH measured in 24-hour urine collections (5). Also small-scale intervention studies found increases in blood and urine pH with increased dietary base load (6). In a previous validation study (n=363) we found significant associations between dietary PRAL, estimated from Food Frequency Questionnaires (FFQ), and urinary pH measured in casual and 24-hour urine samples (7).

Objective and design: We investigated the relationship between dietary PRAL (estimated using the EPIC-Norfolk FFQ) and pH measured in casual urine samples in a cross-sectional population study of 22,038 men and women, aged 39-78 years, from the Norfolk area of the UK (8,9). Urine pH was measured using AMES multiple reagent strips. Dietary PRAL was divided into gender specific quintiles for analysis and also adjusted for age, height, weight, physical activity, smoking habit, diagnosed high blood pressure, alcohol consumption, diuretic medication and the presence of urinary protein.

Results: Mean PRAL intake was -4.51 mEq/d in men and -7.22 mEq/d in women. Mean urine pH was 6.0 units in both men and women. There was a difference of 0.2 of a unit of pH in both men and women between quintiles 1 and 5 of PRAL intake, which was significant both before and after adjustment for covariates (P for trend < 0.001).

Conclusion: Despite the physiological influences determining urine pH and the potential error associated with using a casual urine sample, dietary acid-base load was associated with a measurable difference in urine pH within this population.

References

- 1 New SA, MacDonald HM, Campbell et al. AJCN 2004;79:131-8
- 2 Alexy U, Remer T, Manz F et al. AJCN 2005;82:1107-14
- 3 Welch AA, Bingham SA, Reeve J, Khaw KT. AJCN 2006 (submitted)
- 4 McCarty MF. Med Hypotheses 2005;64:380-384
- 5 Michaud DS, Troiano RP, Subar AF et al. JADA 2003;103:1001-1007
- 6 Buclin T, Cosma M, Appenzeller M et al. OI 2001;12:493-9
- 7 Welch AA, Runswick S, Mulligan A et al. Proc Nut Soc 2005;65:80A
- 8 Welch AA, Luben R, Khaw KT et al. J Hum Nutr Diet 2005;18:99-116
- 9 Remer T, Manz F. JADA 1995;95:791-7.