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Dietary potential renal acid load and renal net acid excretion in healthy, free-living children and adolescents.

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BACKGROUND:

There is increasing evidence that acid-base status has a significant effect on high-intensity physical performance, urolithiasis, and calcium metabolism. Experimental studies in adults showed that renal net acid excretion (NAE) can be reliably estimated from the composition of diets.

OBJECTIVE:

We investigated whether a reasonable estimation of NAE is also possible from the dietary records of free-living children and adolescents.

DESIGN:

Healthy children (aged 8 y; n = 165) and adolescents (aged 16-18 y; n = 73) each collected a 24-h urine sample and completed a weighed diet record on the same day. Urinary NAE was analyzed (NAE(an)) and estimated (NAE(es)). Potential renal acid load (PRAL), the diet-based component of NAE(es), corrects for intestinal absorption of ingested minerals and sulfur-containing protein. A urinary excretion rate of organic acids (OAs) proportional to body surface area was assumed for the complete estimate (NAE(es) = PRAL + OA(es)).

RESULTS:

Significant ($P < 0.001$) correlations between NAE(es) and NAE(an) were seen in the children ($r = 0.43$) and the adolescents ($r = 0.51$). A simplified estimate based on only 4 components of dietary PRAL (protein, phosphorus, potassium, and magnesium) yielded almost identical associations. Mean simplified NAE(es) (32.6 ± 13.9 and 58.4 ± 22.0 mEq/d in the children and the adolescents, respectively) agreed reasonably with NAE(an) (32.4 ± 15.5 and 52.8 ± 24.3 mEq/d, respectively).

CONCLUSIONS:

Predicting NAE from dietary intakes, food tables, and anthropometric data is also applicable during growth and yields appropriate estimates even when self-selected diets are consumed. The PRAL estimate based on only 4 nutrients may allow relatively simple assessment of the acidity of foods and diets.