Effect of diet composition on acid-base balance in adolescents, young adults and elderly at rest and during exercise.


BACKGROUND:

Diets rich in animal protein and cereal grains and deficient in vegetables and fruits may cause low-grade metabolic acidosis, which may impact exercise and health. We hypothesized that (1) a normal-protein diet with high amount of vegetables and fruits (HV) induces more alkaline acid-base balance compared with a high-protein diet with no vegetables and fruits (HP) and (2) diet composition has a greater impact on acid-base balance in the elderly (ELD).

SUBJECTS/METHODS:

In all, 12-15 (adolescents (ADO)), 25-35 (young adults (YAD)) and 60-75 (ELD)-year-old male and female subjects (n=88) followed a 7-day HV and a 7-day HP in a randomized order and at the end performed incremental cycle ergometer tests. We investigated the effect of diet composition and age on capillary (c-pH) and urine pH (u-pH), strong ion difference (SID), partial pressure of carbon dioxide (pCO2) and total concentration of weak acids (Atot). Linear regression analysis was used to examine the contribution of SID, pCO2 and Atot to c-pH.

RESULTS:

In YAD and ELD, c-pH (P≤0.038) and u-pH (P<0.001) were higher at rest after HV compared with HP. During cycling, c-pH was higher (P≤0.034) after HV compared with HP at submaximal workloads in YAD and at 75% of VO2max (maximal oxygen consumption) in ELD. The contribution of SID, pCO2 and Atot to c-pH varied widely. Gender effects or changes in acid-base balance of ADO were not detected.