

Eur J Clin Nutr. 2015 Mar;69(3):399-404.

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

Hietavala EM, Stout JR, Hulmi JJ, Suominen H, Pitkänen H, Puurtinen R, Selänne H, Kainulainen H, Mero AA.

**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 (pCO<sub>2</sub>) and total concentration of weak acids (Atot). Linear regression analysis was used to examine the contribution of SID, pCO<sub>2</sub> and Atot to c-pH.

**RESULTS:**

In YAD and ELD, c-pH ( $P \leq 0.038$ ) and u-pH ( $P < 0.001$ ) were higher at rest after HV compared with HP. During cycling, c-pH was higher ( $P \leq 0.034$ ) after HV compared with HP at submaximal workloads in YAD and at 75% of VO<sub>2</sub>max (maximal oxygen consumption) in ELD. The contribution of SID, pCO<sub>2</sub> and Atot to c-pH varied widely. Gender effects or changes in acid-base balance of ADO were not detected.