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The effect of supplementation with alkaline potassium salts on bone metabolism: a meta-analysis.

Lambert H, Frassetto L, Moore JB, Torgerson D, Gannon R, Burckhardt P, Lanham-New S.

The role of acid-base metabolism in bone health is controversial. In this meta-analysis, potassium bicarbonate and potassium citrate lowered urinary calcium and acid excretion and reduced the excretion of the bone resorption marker NTX. These salts may thus be beneficial to bone health by conserving bone mineral.

INTRODUCTION:

The role of acid-base homeostasis as a determinant of bone health and the contribution of supplemental alkali in promoting skeletal integrity remain a subject of debate. The objective of this study was, therefore, to conduct a meta-analysis to assess the effects of supplemental potassium bicarbonate (KHCO₃) and potassium citrate (KCitr) on urinary calcium and acid excretion, markers of bone turnover and bone mineral density (BMD) and to compare their effects with that of potassium chloride (KCl).

METHODS:

A total of 14 studies of the effect of alkaline potassium salts on calcium metabolism and bone health, identified by a systematic literature search, were analysed with Review Manager (Version 5; The Cochrane Collaboration) using a random-effects model. Authors were contacted to provide missing data as required. Results are presented as the standardised (SMD) or unstandardized mean difference (MD) (95 % confidence intervals).

RESULTS:

Urinary calcium excretion was lowered by intervention with both KHCO₃ (P = 0.04) and KCitr (P = 0.01), as was net acid excretion (NAE) (P = 0.002 for KHCO₃ and P = 0.0008 for KCitr). Both salts significantly lowered the bone resorption marker NTX (P < 0.00001). There was no effect on bone formation markers or BMD. KHCO₃ and KCitr lowered calcium excretion to a greater extent than did KCl.

CONCLUSIONS:

This meta-analysis confirms that supplementation with alkaline potassium salts leads to significant reduction in renal calcium excretion and acid excretion, compatible with the concept of increased buffering of hydrogen ions by raised circulating bicarbonate. The observed reduction in bone resorption indicates a potential benefit to bone health.