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Urinary phytate (IP6) excretion in South African stone-prone and stone-free population groups relative to its dietary intake

S. Fakier, A. Rodgers, D. Webber
University of Cape Town, Cape Town, South Africa

Objectives: In South Africa (SA), 15% of the white population are prone to urolithiasis whereas less than 1% of the black population are prone to this disease (Modlin 1967, Whalley et al 1998). A previous study has shown that in addition to the ingestion of inorganic phosphorous, the black group also had a significant intake of organic P derived from maize, beans and brown bread in the form of IP6 (an inhibitor of CaOx urolithiasis) (Modlin 1980). We undertook to compare the baseline urinary excretion of IP6 between healthy SA white (W) and black (B) males and their renal response to dietary IP6.
Materials and Methods: Baseline 24 hr urine samples were provided by W (n=17) and B (n=19) males. Urinary IP6 was determined using anion exchange chromatography followed by a colorimetric assay (Grases et al. 2012). A subset of the males, W (n=8) and B (n=12), participated in a 10-day dietary intervention in which IP6-containing foods were controlled. An IP6-poor breakfast was administered on days 1-3 and an IP6-rich breakfast (oats) on days 8-10. 24hr Urine samples were provided on day3 and day10.
Results: Baseline urinary IP6 was significantly higher in B (0.967 ± 0.11 µM) than W (0.568 ± 0.07 µM); p=0.0043. IP6 excretion increased significantly after IP6-rich (0.675 ± 0.07 µM) vs IP6-poor (0.389 ± 0.08 µM) ingestion (p = 0.02) in W. No change was observed in B. Inter-group comparisons showed that W had a significantly lower excretion of IP6 after both dietary interventions.
Conclusions: These results suggest that IP6 may play a contributory role in the modulation of urolithiasis in B. Furthermore, the renal handling of IP6 appears to be different between the two groups, perhaps suggesting that excretion of IP6 reaches a maximum plateau in B which cannot be exceeded by dietary loading thereof.
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