

Acid/Base and Electrolyte Disorders

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Low pH: A Novel Feature of the Metabolic Syndrome

Naim M. Maalouf^{*,†}, Mary Ann Cameron^{*,†}, Orson W. Moe^{*,†}, Beverley Adams-Huet^{†,‡}, and Khashayar Sakhaee[†]

^{*} *The Charles and Jane Pak Center for Mineral Metabolism and Clinical Research and Departments of † Internal Medicine and ‡ Clinical Sciences, University of Texas Southwestern Medical Center, Dallas, Texas*

Address correspondence to: Dr. Naim M. Maalouf, 5323 Harry Hines Boulevard, Dallas, TX 75390-8885. Phone: 214-648-0394; Fax: 214-648-2526; E-mail: naim.maalouf@utsouthwestern.edu

Background and Objectives: The metabolic syndrome is associated with alterations in renal function. An overly acidic urine has been described as a renal manifestation of the metabolic syndrome in patients with kidney stone disease. This study examined the association between the metabolic syndrome and urine pH in individuals without a history of nephrolithiasis.

Design, Setting, Participants, & Measurements: A total of 148 adults who were free of kidney stones were evaluated in this outpatient cross-sectional study. Height, weight, BP, fasting blood, and 24-h urine chemistries were obtained. Urine pH was measured by pH electrode. The following features of the metabolic syndrome were evaluated: BP; body mass index; and serum triglyceride, glucose, and HDL cholesterol concentrations. The degree of insulin resistance was assessed by the homeostasis model assessment of insulin resistance.

Results: Participants with the metabolic syndrome had a significantly lower 24-h urine pH compared with participants without the metabolic syndrome. Mean 24-h urine pH, adjusted for age, gender, creatinine clearance, and 24-h urine sulfate, decreased from 6.15, 6.10, 5.99, 5.85, to 5.69 with increasing number of metabolic syndrome abnormalities. An association was observed between 24-h urine pH and each metabolic feature. After adjustment for age, gender, creatinine clearance, urine sulfate, and body mass index, a significant inverse relationship was noted between 24-h urine pH and the degree of insulin resistance.

Conclusions: An unduly acidic urine is a feature of the metabolic syndrome and is associated with the degree of insulin resistance.

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Clin. J. Am. Soc. Nephrol. 2007 2: 869-871