

## **Low pH: A Novel Feature of the Metabolic Syndrome**

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**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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