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Urinary Molybdenum Levels and Chronic Kidney Disease: National Health and Nutrition Examination Survey (1999–2016)

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Objectives: Molybdenum is both a metal and a micronutrient needed for enzymatic reactions in the carbon, sulfur, and nitrogen metabolism. However, their effects on kidney functions are not well investigated. We aimed to investigate the association of urinary molybdenum levels with chronic kidney disease (CKD) according to increased urinary albumin-to-creatinine ratio (ACR), decreased glomerular filtration rate (GFR), and composite outcomes.

Methods: Population-based cohort study. A total of 16,294 adult aged above 18 years old participants, who participated in the NHANES surveys over 18 years, were enrolled. We used multivariable linear regression adjusting age, sex, ethnicity, diabetes mellitus, hypertension, and body mass index to analyze the association between log-transformed standardized (standard deviation converted to 1) urinary molybdenum levels and urinary ACR and GFR. The association between log-transformed standardized urinary molybdenum levels and CKD was investigated by multivariable logistic regression methods. CKD was defined as three categories; urinary ACR above 30 mg/g (CKD_ACR30), GFR below 60 ml/min/1.73m2 (CKD_GFR60), and composite of CKD_ACR30 or CKD_GFR60 (CKD_ACR30GFR60).

Results: Mean age of participants was 47.1 ± 19.3 years old, and male participants were 7,978 (49.0%). Mean urinary ACR was 42.6 ± 326.5 mg/g and GFR was 94.4 ± 24.7 ml/min/1.73m^2. Diabetic patients were 2,162 (13.3%) and participants with hypertension were 6,314 (38.8%). Number of patients with CKD_GFR60, CKD_ACR30, and CKD_ACR30GFR60 was 1,401 (8.6%), 1,983 (12.2%), and 2,922 (17.9%). Log-transformed standardized urinary molybdenum levels were significantly associated with the GFR (β = 3.093, P-value < 0.001), but not with urinary ACR (β = 2.761, P-value = 0.289). Prevalence of CKD_GFR60 and CKD_ACR30GFR60 decreased significantly according to the increased urinary molybdenum levels (P-value < 0.001 and 0.03, respectively)

Conclusions: Urinary molybdenum levels are positively correlated with GFR, risk of CKD (CKD_GFR60 and CKD_ACR30GFR60) decreased according to the increased urinary molybdenum levels.