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Urinary Sodium-to-potassium Ratio and CKD Progression in Non-dialysis-dependent CKD Patients: Results from the KNOW-CKD study

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Objectives: Dietary modification of sodium and potassium has been established to be essential in the management of chronic kidney disease (CKD). We hypothesized that urinary sodium-to-potassium (Na/K) ratio reflects status of sodium and potassium intake and that high Na/K ratio is associated with CKD progression.

Methods: In this observational Korean Cohort Study for Outcome in Patients with CKD (KNOW-CKD), 1607 non-dialysis-dependent CKD patients were analyzed. Single spot urinary sodium-to-potassium ratio was categorized into quartile groups. The primary outcome was a composite of renal outcome consisting of a 50% reduction in estimated glomerular filtration rate (eGFR) or initiation of renal replacement therapy, whichever occurred first. Using Fine-Gray subdistribution hazard model, the association between the urinary sodium-to-potassium ratio and the primary outcome was analyzed. The sensitivity analyses of single 24-hr urine, multiple 24-hr urine, and multiple spot urine were also performed.

Results: During a median follow-up of 6.1 (4.2-7.9) years, the primary composite renal outcome occurred in 587 (36.5%) patients within a median of 3.0 (1.8-4.9) years. Fully adjusted multivariable subdistribution hazard model revealed that higher quartile groups of spot urinary sodium-to-potassium ratio had increased risks for CKD progression; the hazard ratios for quartiles 1, 2, and 3 compared with quartile 4 were 1.28 (95% confidence interval [CI], 1.00-1.64), 1.26 (95% CI, 0.99-1.61), and 1.46 (95% CI, 1.14-1.88), respectively. The analyses of single 24-hr urine and multiple spot urine showed similar results. The inverse relationship was observed in urinary potassium excretion with CKD progression in both spot urine and 24-hr urine, whereas the positive correlation between urinary sodium excretion and CKD progression was observed in single spot urine analysis only.

Conclusions: High urinary sodium-to-potassium ratio measured by single spot urine was closely associated with CKD progression in non-dialysis-dependent CKD patients.