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KSN-17-P221

Low Urinary Potassium Excretion is Associated with Progression of Chronic Kidney Disease: The Results from the KNOW-CKD

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Objectives : Low urine potassium excretion is known as a risk factor for death and cardiovascular events. However, there have been conflicting results about whether urinary potassium excretion is associated with chronic kidney disease (CKD) progression and the predictive value of urinary potassium excretion is still unknown. Thus, this study aimed to explore the relationship between urinary potassium excretion and CKD progression and to compare predictive ability among three measurements of potassium excretion in a nationwide prospective cohort.

Methods : Among 2,238 patients from the KoreaN cohort study for Outcome in patients With Chronic Kidney Disease (KNOW-CKD), a total of 1,748 patients were included in the analysis after excluding patients who had missing values (n=490). Urinary potassium excretion was determined by spot urine potassium (UK) and spot urine potassium-to-creatinine ratio (UKCr). Patients were categorized into 4 groups according to quartiles of each index of urinary potassium excretion. We further conducted a sensitivity analysis in 921 patients who measured 24h urinary potassium excretion (24UK). The study endpoint is a composite of a >50% decrease of in estimated GFR (eGFR) from baseline values, or end-stage renal disease (ESRD).

Results : At baseline, the median age was 55.0 (interquartile range [IQR], 45.0–63.0) years, 60.1% were male, and 11.0% had a history of any cardiovascular disease (CVD). Primary outcome occurred in 275 patients during a median follow-up period of 38.7 (IQR, 20.7–57.1) months. In a multivariable Cox analysis after adjustment of confounding factors, the lowest quartile of spot UK was significantly associated with a 1.95-fold increased risk of composite renal outcome as compared to the highest quartile (hazard ratio [HR], 1.95; 95% confidence interval [CI], 1.05 to 3.61; p=0.033). This association was also found in a spot UKCr-based model (HR, 1.60; 95% CI, 1.08 to 2.37; p=0.019).

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In a sensitivity analysis using 24UK, a HR for primary outcome was 2.42 (95% CI, 1.08 to 5.42; $p=0.032$) in the lowest quartile as compared to the highest quartile. We found consistent results when each measure of urinary potassium excretion was entered in the Cox model as a continuous variable. Receiver operating characteristic (ROC) curve analysis and C-statistics analysis showed that predictability for CKD progression was comparable between three indices of potassium excretion.

Conclusions : This study showed that low urinary potassium excretion was significantly associated with an increased risk of adverse renal outcome. In addition, all three measures of urinary potassium excretion equally predicted CKD progression. Our robust findings suggest that urinary potassium excretion can be useful for risk stratification in patients with CKD.

Keywords : KNOW-CKD; Urinary Potassium Excretion; CKD progression;