

Abstract Type : Oral

Abstract Submission No. : OR-1306

Association between transtubular potassium gradient and progression of chronic kidney disease

Seon Yeong Lee¹, Young Su Joo², Jung Tak Park¹, Tae-Hyun Yoo¹, Shin-Wook Kang¹, Kyu Hun Choi¹, Kook-Hwan Oh³, Curie Ahn³, Seung Hyeok Han¹

¹Department of Internal Medicine-Nephrology, Severance Hospital, Korea, Republic of

²Department of Internal Medicine-Nephrology, Myongji Hospital, Korea, Republic of

³Department of Internal Medicine-Nephrology, Seoul National University Hospital, Korea, Republic of

Objectives: Transtubular potassium gradient (TTKG) reflects the function of potassium secretion of kidney by the cortical collecting duct. However, association of tubular potassium secretory function and clinical outcomes in chronic renal disease has not been established. Therefore, we investigated the relationship between TTKG and chronic kidney disease (CKD) progression.

Methods: Data were retrieved from the KoreaN Cohort Study for Outcome in Patients With Chronic Kidney Disease (KNOW-CKD) cohort. Among 2,238 participants, a total of 1,770 patients were included in this analysis after excluding patients without follow up data (n=59) or with missing data for baseline urinary osmolality and electrolyte level (n=189), urinary sodium < 25mEq/L (n=66), and urine osmolality < serum osmolality (n=154). The study endpoint was CKD progression, defined as a composite of more than 50% decrease in eGFR from baseline values, or end stage renal disease.

Results: During a median follow-up of 3.5 years (6,264 person-year), 460 participants reached the renal endpoint. CKD progression events occurred in 219 (37.1%), 163 (27.6%), and 78 (13.2%) patients in the lowest, middle, and highest TTKG tertile groups, respectively. In cause-specific competing risk analysis, the highest tertile was associated with significantly lower risk of adverse renal outcome compared to the lowest tertile (HR, 0.70; 95% CI, 0.53-0.92; P=0.010). When TTKG was treated as a continuous variable, 1 increase in TTKG was associated with a 6% lower risk of CKD progression (HR, 0.94; 95% CI, 0.89-0.99; P=0.011). This association was consistent across subgroups by age, sex, eGFR, proteinuria, and BMI.

Conclusions: This study shows that higher TTKG is associated with a significantly lower risk of CKD progression, suggesting that it may be used as a predictor of adverse kidney outcome.

Table 1. Cause-specific competing risk analysis for 50% decline of eGFR or doubling of Cr according to transtubular potassium gradient

Table 1. Cause-specific competing risk analysis for 50% decline of eGFR or doubling of Cr according to transtubular potassium gradient

TTKG group	Model 1		Model 2		Model 3		Model 4	
	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value
Low	Reference		Reference		Reference		Reference	
Middle	0.68 (0.55-0.83)	<0.001	0.83 (0.67-1.02)	0.071	0.88 (0.71-1.09)	0.245	0.91 (0.73-1.14)	0.410
High	0.29 (0.23-0.38)	<0.001	0.43 (0.33-0.56)	<0.001	0.68 (0.52-0.89)	0.006	0.70 (0.53-0.92)	0.010

Model 1: Unadjusted

Model 2: Adjusted for age, sex, CCI, systolic blood pressure, BMI, and smoking history

Model 3: Model 2 + serum albumin, log-CRP, eGFR and UPCR

Model 4: Model 3 + RAS blocker, diuretics use, and statin use

Abbreviations: TTKG, Transtubular potassium gradient; HR, hazard ratio; CI, confidence interval; CCI, Charlson comorbidity index; BMI, body mass index; CRP, C-reactive protein; eGFR, estimated glomerular filtration rate; UPCR, urine protein to creatinine ratio; RAS, renin-angiotensin system

Table 2. Cause-specific competing risk analysis for renal outcome according to transtubular potassium gradient as a continuous variable

Table 2. Cause-specific competing risk analysis for renal outcome according to transtubular potassium gradient as a continuous variable

TTKG (1 per increase)	Model 1		Model 2		Model 3		Model 4	
	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value
	0.79 (0.75-0.83)	<0.001	0.85 (0.81-0.89)	<0.001	0.93 (0.89-0.98)	0.007	0.94 (0.89-0.99)	0.011

Model 1: Unadjusted

Model 2: Adjusted for age, sex, CCI, systolic blood pressure, BMI, and smoking history

Model 3: Model 2 + serum albumin, log-CRP, eGFR and UPCR

Model 4: Model 3 + RAS blocker, diuretics use, and statin use

Abbreviations: TTKG, Transtubular potassium gradient; HR, hazard ratio; CI, confidence interval; CCI, Charlson comorbidity index; BMI, body mass index; CRP, C-reactive protein; eGFR, estimated glomerular filtration rate; UPCR, urine protein to creatinine ratio; RAS, renin-angiotensin system