



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

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Serum sodium level within normal range and risk of clinical outcomes in older adults with chronic kidney disease

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Objectives : Sodium imbalance is a common electrolyte abnormality in patient with chronic kidney disease (CKD). Emerging evidence suggests that even small variations in serum sodium levels within the normal range may be associated with adverse clinical outcomes in older populations. Therefore, we aimed to investigate the association between serum sodium levels and clinical outcomes in older adults with CKD.

Methods : This study included 746 older adults with non-dialysis CKD enrolled in the Korean Society of Geriatric Nephrology prospective cohort from 17 centers in South Korea. Patients were categorized into two groups according to baseline serum sodium levels: 135-139 mmol/L (low-normal) and 140-145 mmol/L (high-normal). The primary outcome was all-cause mortality and secondary outcomes were the incidence of end-stage kidney disease (ESKD) and cardiovascular disease (CVD).

Results : The mean age was 78 years and 40.5% was female. During a median follow-up of 3.3 years, patients in the high-normal group had significantly lower risk of mortality compared with those in the low-normal group (hazard ratio [HR], 0.62; 95% confidence interval [CI], 0.40-0.96; $p=0.034$). In addition, this association remained significant after correcting serum sodium levels for fasting glucose. In a time-varying Cox proportional hazards model, each 1 mmol/L increase in serum sodium was associated with a 7% lower hazard of mortality (HR, 0.93; 95% CI, 0.87–0.99; $p=0.027$). However, serum sodium levels were not significantly associated with the risk of ESKD or CVD.

Conclusions : Higher serum sodium levels within the normal range were associated with a lower risk of mortality in older adults with CKD. These findings suggest that variations in serum sodium levels, even within the normal range, may have prognostic significance in this population.

Table1_Sodium.jpg



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Table 1. Association between serum sodium level and risk of clinical outcomes

Clinical outcomes	Na $\geq$ 140 vs. Na<140	HR (95% CI) (baseline)	P	HR (95% CI) (continuous time-varying)	P
Death	Unadjusted	0.59 (0.39–0.89)	0.013	0.93 (0.88–0.98)	0.007
	Model 1	0.56 (0.36–0.86)	0.008	0.92 (0.87–0.97)	0.003
	Model 2	0.61 (0.39–0.95)	0.028	0.92 (0.86–0.98)	0.007
	Model 3	0.62 (0.4–0.96)	0.034	0.93 (0.87–0.99)	0.027
ESKD	Unadjusted	0.93 (0.62–1.39)	0.711	0.93 (0.88–0.98)	0.010
	Model 1	0.88 (0.58–1.33)	0.533	0.94 (0.89–0.99)	0.024
	Model 2	0.92 (0.60–1.40)	0.693	0.95 (0.88–1.01)	0.101
	Model 3	0.85 (0.55–1.3)	0.448	0.98 (0.92–1.05)	0.630
CVD	Unadjusted	1.12 (0.68–1.85)	0.657	0.94 (0.89–1.00)	0.038
	Model 1	0.96 (0.56–1.63)	0.875	0.93 (0.88–0.99)	0.023
	Model 2	0.87 (0.50–1.50)	0.619	0.94 (0.88–1.01)	0.073
	Model 3	0.83 (0.48–1.45)	0.519	0.92 (0.84–1.01)	0.093

Conventional and time-varying Cox proportional hazard regression analyses were performed for these associations.

Model 1: adjusted for age, sex, BMI, systolic blood pressure, smoking status

Model 2: Model 1 + history of DM, HTN, cardiovascular disease, and cancer, and the use of statin and diuretics

Model 3: Model 2 + hemoglobin, potassium, and eGFR

Abbreviations: HR, hazard ratio; ESKD, end-stage kidney disease; CVD, cardiovascular disease; BMI, body mass index; DM, diabetes mellitus; HTN, hypertension; eGFR, estimated glomerular filtration rate.