



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

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Combined Association of Serum Uric Acid and High-Sensitivity C-Reactive Protein with Chronic Kidney Disease Prevalence: A Nationwide Population-Based Study

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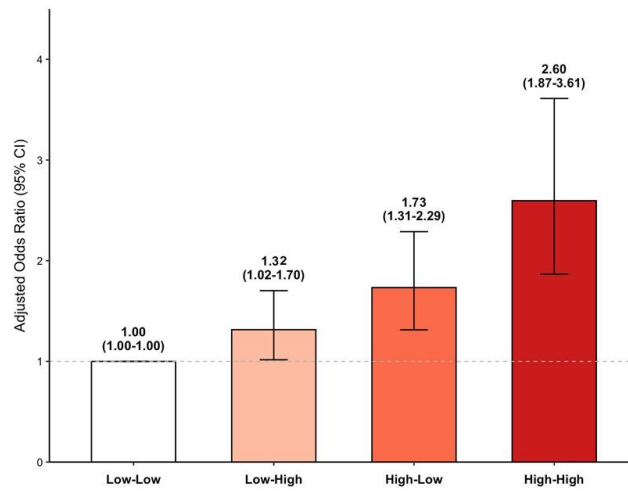
Objectives : Chronic kidney disease (CKD) is a major public health burden. While serum uric acid (UA) and high-sensitivity C-reactive protein (hsCRP) are known individual predictors of renal impairment, their combined effect on CKD remains underexplored. This study aimed to examine the independent and combined associations of serum UA and hsCRP with CKD prevalence in the general population.

Methods : We analyzed data from 9,116 adults (aged ≥ 19 years) using the Korea National Health and Nutrition Examination Survey 2022–2023. Participants were categorized into four groups based on highest quartile cutoffs for UA (≥ 5.9 mg/dL) and hsCRP (≥ 1.1 mg/L): Low-Low, Low-High, High-Low, and High-High. CKD was defined as an estimated glomerular filtration rate < 60 mL/min/1.73m² or a urine albumin-to-creatinine ratio ≥ 30 mg/g. Adjusted odds ratios (aORs) were calculated using multivariable logistic regression.

Results : Elevated UA and hsCRP were independently associated with CKD. When combined, the odds of prevalent CKD increased progressively. Compared with the Low-Low reference group, the High-High group exhibited the highest odds of CKD (aOR, 2.60; 95% confidence interval, 1.87–3.61). In subgroup analyses, this combined association was significantly more pronounced in older adults (≥ 65 years), women, and individuals with pre-existing hypertension or dyslipidemia (all P for interaction < 0.05).

Conclusions : The concomitant elevation of serum UA and hsCRP is cumulatively associated with a higher prevalence of CKD, reflecting a significant interplay between metabolic and inflammatory pathways. Integrative monitoring of both biomarkers may facilitate early identification of individuals with increased likelihood of CKD and support targeted preventive strategies.

Figure_UA & CRP on CKD.jpg



Figure_UA & CRP on CKD.jpg

Table 2. Associations of uric acid and hsCRP with chronic kidney disease

Variables	Unweighted Total no.	Unweighted Event no.	Weighted % (SE)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Serum uric acid						
Low (Q1–Q3)	6,896	464	5.9 (0.4)	1 (Reference)	1 (Reference)	1 (Reference)
High (Q4)	2,220	269	8.6 (0.6)	1.52 (1.27–1.82)	1.96 (1.57–2.44)	1.86 (1.49–2.33)
hsCRP						
Low (Q1–Q3)	6,927	476	5.8 (0.4)	1 (Reference)	1 (Reference)	1 (Reference)
High (Q4)	2,189	257	9.5 (0.7)	1.72 (1.41–2.08)	1.62 (1.32–1.98)	1.44 (1.17–1.78)
Combined status						
Low-Low	5,452	326	5.2 (0.4)	1 (Reference)	1 (Reference)	1 (Reference)
Low UA/High hsCRP	1,444	138	8.3 (0.8)	1.63 (1.28–2.07)	1.48 (1.15–1.89)	1.32 (1.02–1.70)
High UA/Low hsCRP	1,475	150	7.3 (0.8)	1.42 (1.12–1.81)	1.82 (1.38–2.39)	1.73 (1.31–2.29)
High-High	745	119	11.5 (1.2)	2.35 (1.79–3.08)	2.88 (2.09–3.97)	2.60 (1.87–3.61)
P value				<0.0001	<0.0001	<0.0001

Values are presented as odds ratios (ORs) with 95% confidence intervals (CIs).

Uric acid cutoff value: Q1–Q3 (0.5–5.8 mg/dL), Q4 (5.9–11.9 mg/dL), hsCRP cutoff value: Q1–Q3 (0.2–1.0 mg/L), Q4 (1.1–85.7 mg/L)

Model 1: Unadjusted

Model 2: Adjusted for age and sex

Model 3: Adjusted for age, sex, household income, BMI, smoking status, alcohol consumption, physical activity, diabetes mellitus, hypertension, and hypercholesterolemia