



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

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Hyperuricemia and Chronic Kidney Disease: A Translational Systematic Review Linking Epidemiological Risk and the Renoprotective Potential of *Orthosiphon aristatus*.

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Objectives : Hyperuricemia has been increasingly recognized as a potential modifiable contributor to chronic kidney disease (CKD). Elevated serum uric acid has been associated with renal microvascular dysfunction, oxidative stress, endothelial injury, and activation of inflammatory pathways. However, clinical trials of conventional urate-lowering therapies have shown inconsistent renoprotective effects, highlighting the need for alternative approaches targeting metabolic pathways involved in kidney injury. *Orthosiphon aristatus* (kumis kucing), a medicinal plant widely used in Southeast Asia for urinary disorders, has recently gained attention for its potential uricosuric, antioxidant, and anti-inflammatory properties. This translational systematic review aimed to integrate epidemiological and mechanistic evidence by evaluating the association between serum uric acid and CKD risk and exploring the renoprotective potential of *O. aristatus*.

Methods : Systematic searches were conducted in PubMed, Scopus, and Embase up to January 2026. Longitudinal cohort studies evaluating the association between serum uric acid and incident CKD or CKD progression were included. Experimental animal studies and pharmacokinetic investigations evaluating *O. aristatus* as a single intervention and reporting uric acid or renal outcomes were also included. A random-effects meta-analysis estimated pooled CKD risk per 1 mg/dL increase in serum uric acid.

Results : Thirteen cohort studies comprising 577,334 participants were included. Meta-analysis demonstrated a significant association between serum uric acid and incident CKD, with a pooled relative risk of 1.15 (95% CI 1.10–1.21) per 1 mg/dL increase. Two studies evaluated *O. aristatus*. Preclinical findings showed enhanced GLUT4 translocation and improved metabolic signaling, while pharmacokinetic analysis identified 92 phytochemicals, including compounds detected in renal tissue with preferential cortical distribution.

Conclusions : Hyperuricemia is significantly associated with CKD risk, and *Orthosiphon aristatus* contains bioactive compounds capable of reaching renal tissue and potentially modulating metabolic pathways involved in kidney injury. Further studies are needed to determine its clinical renoprotective potential.