



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

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Heat-Associated Acute Kidney Injury Risk in Chronic Kidney Disease: A Nationwide Cohort Study

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Objectives : Chronic kidney disease (CKD) is highly susceptible to environmental stressors, yet evidence on short-term heat exposure and acute kidney injury (AKI) risk remains limited. The aim of this study is to investigate the association between extreme ambient heat exposure and risk of AKI differently by CKD status.

Methods : We analyzed medical data of 1,145,237 CKD patients and matched non-CKD control from National Health Insurance Service (NHIS) database. Using daily district-level mean temperatures, associations with AKI were estimated with distributed lag nonlinear models (DLNMs; lags 0–6) within conditional logistic regression. Effects, summarized as odds ratios (ORs), compared the 99th percentile temperature (extreme heat) to the 75th percentile temperature (moderate heat). Subgroup and sensitivity analyses assessed effect modification and robustness.

Results : During the follow-up period, 34,395 and 6,211 AKI occurred in the CKD group and non-CKD group, respectively. Extreme heat exposure was associated with higher risk of AKI in the CKD group, (Odd ratio (OR) 1.205; 95% CI 1.096–1.324; $p < 0.01$), and the risk was attenuated in older adults, women, and those without albuminuria compared with non-CKD group. Within the CKD group, individuals with hypertension exhibited significantly higher heat-associated AKI odds compared with those without hypertension (relative OR 1.454; 95% CI 1.061–1.992; interaction $p < 0.01$).

Conclusions : Short-term extreme heat exposure is associated with increased AKI risk in CKD patients, and vulnerability is more pronounced in specific subgroups. These findings support targeted preventive strategies and inform public health policies to mitigate heat-induced kidney injury, particularly in high-risk CKD populations.

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