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The Association Between Ambient High Temperature and Hospitalizations for Acute Kidney Injury: A Time-Series Study Utilizing Regional Healthcare Big Data

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Objectives : In the context of climate change, extreme hot events have become increasingly frequent. This study aims to establish the exposure-response relationship between high temperature and the risk of hospitalizations for AKI during the hot season using data from the electronic health information system in Yinzhou District, Ningbo, China.
Methods : Hospitalization records with multiple serum creatinine test results between January 1, 2017, and December 31, 2020 were extracted from the regional healthcare data platform. Hospitalizations for AKI were then identified based on the serum creatinine change according to the Kidney Disease: Improving Global Outcomes (KDIGO) guidelines. Daily temperature data in the study area was extracted through ERA5-Land dataset. Distributed lag nonlinear model was conducted to analyze the association between high temperature and the risk of hospitalizations for AKI during the hot season. Additionally, the attributable fraction of AKI hospitalizations related to high temperatures during the study period was calculated.
Results : During the hot season (June-September) from 2017 to 2020, a total of 1,939 AKI hospitalizations were extracted. The results showed that a significant positive association between temperature and risk of AKI hospitalization began to emerge when the daily average temperature was higher than 29°C, and the association showed an approximately linear trend. When the daily average temperature was higher than 29°C, the cumulative relative risk of AKI hospitalization was 1.207 (95% CI: 1.061-1.373) at lag 0-3 days for each 1°C increase in daily average temperature. The attributable fraction of heat-related AKI hospitalizations during the study period was 4.07%.
Conclusions : The results highlight the importance of early prevention of AKI against the adverse effects of high temperatures during hot weather. These findings could also provide evidence to support the development of the early warning system for heat-related AKI risk.