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Long-term exposure to low perceived temperature in winter increases the risk of death in CKD patients

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Objectives: Global warming is not only making the Earth hotter, but also colder. Perceived temperature (PT) is defined as a temperature that reflects the actual effect of temperature on the human body by considering the wind speed, amount of clouds, and humidity information. Due to the insufficiency of data on the health effects of long-term exposure to low temperature in chronic kidney disease (CKD) patients, we aimed to analyze the effect of PT in winter on the overall mortality among CKD patients.

Methods: 32,870 CKD patients in Seoul participated in a retrospective cohort at three medical centers. PT was calculated by the Staiger's equation, using the temperature of a nearby automated weather station, dew point temperature, wind velocity, and cloud amount. PT is interpolated using Kriging method and mortality was assessed by using the time-varying Cox proportional hazard model. The Cox regression model was used to assess the PT corresponding to the temperature for cold wave watch or warning.

Results: During the 6.14 ± 3.96 years of follow-up, 6,147 (18.7%) deaths were observed Since 2000, maximal and average PT had not significantly been changed. In multivariable analysis, the hazard ratio (HR) of maximum PT was 1.090 (95% confidence interval (CI) 1.072-1.108, p-value $0.<0001$), and HR of average, minimal PT were 1.041 (CI 1.018-1.065, p-value 0.0004), 1.036 (CI 1.022-1.049, p-value <0.0001) respectively. The maximum PT had the highest C-index for mortality (0.783), followed by the risk of average and minimum PT (0.780). In addition, each PT for cold wave watch and warning were -21.86°C , -25.63°C . The cold wave warning at a PT of -25.63°C indicated the risk of death as HR 1.837 (CI 1.764-1.914, p-value <0.0001) and c-index 0.792.

Conclusions: Exposure to lower perceived temperature during winter season could increase the risk of mortality among CKD patients.