KSN 2022
SEOUL, KOREA MAY 26 - 29

Abstract Submission No. : 1374

The effects of air pollution on mortality of chronic kidney disease according to statin usage

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Objectives: Long-term exposure to air pollutants significantly increases the morbidity and mortality in patients with chronic kidney disease (CKD). Statin therapy improves CKD outcome. However, little is known about the effect of air pollution on CKD according to statin use.

Methods: We collected 6,319 chronic kidney disease (CKD) patients in Dongguk University Ilsan Hospital between 2005 and 2019. Cox time-varying hazard model adjusted by sex, age, drink, smoke, hypertension and diabetes was used to investigate the association between long-term exposure to air pollution (particles < 10 μm [PM_{10}], nitrogen dioxide [NO_2], sulfur dioxide [SO_2], and carbon monoxide [CO]) and mortality. Survival time was computed from date of CKD diagnosis to censoring date (2019-12-31) or death date confirmed by Korea Statistics. We conducted stratified analyses to assess the effects of air pollution on mortality according to usage of statin.

Results: During the mean 5.85 years of follow-up years, more the half of the total patients was female (58%), and the mean age was 57.8 years. We observed 1131 deaths (17%) and 1,756 patients (28%) used statin within 1 year after CKD diagnosis. The average long-term exposure to PM_{10}, NO_2, SO_2, and CO was 54.4 μg/m^3, 26.8 ppb, 5.24 ppb, and 0.55 ppm, respectively. A hazard ratio (HR) of mortality associated with exposure to PM_{10}, NO_2, SO_2, and CO was 1.15 (95% confidence interval [CI] 1.04–1.28), 1.26 (95% CI 1.15–1.38), 1.23 (95% CI 1.15–1.33), and 1.16 (95% CI 1.06–1.26), respectively. When stratified by statin usage, HR of those who used statin was 1.16 (95% CI 0.94–1.42) while the 13% increased risk of mortality associated with PM_{10} exposure was found in subjects who did not use statin (95% CI 1.00–1.28).

Conclusions: The use of statins may reduce the effect of air pollution on mortality in CKD patients.