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The effect of air pollution on kidney function in primary Glomerulonephritis patients

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Objectives: Previous research has indicated a potential association between exposure to air pollution and chronic kidney disease (CKD) development. However, the impact of air pollution on patients with primary glomerulonephritis (GN) remains under-investigated. Our study aimed to assess the effect of air pollutants on kidney function in patients with primary GN: focal segmental glomerulosclerosis (FSGS), immunoglobulin A nephropathy (IgAN), minimal change disease (MCD), membranous nephropathy (MN), and membranoproliferative glomerulonephritis (MPGN).

Methods: Among GN patients in the Korean GlomeruloNEphritis sTudy (KoGNET) cohort, we studied 1,842 enrolled between 2001 and 2017 at two hospitals, Seoul National University Hospital and Seoul National University Bundang Hospital. At the time of enrollment, these patients did not have a history of CKD or end-stage renal disease (ESRD). Over the follow-up period, which lasted up to 10 years, we estimated the individual annual average exposure of particulate matter with an aerodynamic diameter of less than ten μm (PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO). To determine the association between individual exposure to air pollutants and the development of CKD, we used a time-varying Cox proportional hazards model adjusted for potential confounders at the individual level.

Results: During the median follow-up of 4.65 years, the incidence of CKD was 29.5% (544/1842). Single-exposure models revealed that increments in the interquartile range of PM_{10}, SO_2, and CO were correlated with elevated risks of CKD, as evidenced by Hazard Ratios of 1.28 (95%CI: 1.15-1.42) for PM_{10}, 1.12 (1.01-1.24) for SO_2, and 1.19 (1.09-1.30) for CO. The two-exposure models demonstrated that the correlation between PM_{10} and CO and CKD persisted, while the correlation between SO_2 and CKD dissipated.

Conclusions: Exposure to elevated PM_{10}, SO_2, and CO levels was associated with the risk of developing CKD in GN patients. Further study on these associations will be needed depending on the specific pathologic diagnosis.