THE KOREAN SOCIETY OF NEPHROLOGY
APCN & KSN 2024
June 13(Thu) - 16(Sun), 2024 Coex, Seoul, Korea
Promoting Sustainable Kidney Health: The Asia-Pacific and Beyond

Abstract Submission No.: A-0639

Correlation Between Air Pollutant Concentration and Renal Function Impairment

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Objectives : Recently, as the air pollutant concentration increases, interest in the association between various health indicators and air pollution is growing. However, the relationship between air pollutant and kidney disease is not elucidated yet.
Methods : Using large cohort study data of the KoGES (Korean Genome and Epidemiology Study) linked to air pollution data conducted by the Korea Centers for Disease Control and Prevention from 2001, we extracted data from the third survey in 2005 to the eighth survey in 2016. We conducted linear regression and logistic regression analyses to explore the correlation between air pollutant concentrations (PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, and O_3) and eGFR reduction. In logistic regression, eGFR under 90 ml/min/1.73m^2 was considered as the development of renal insufficiency. Additional analysis were conducted to examine whether there were differences in the risk of renal insufficiency based on sex, age, and the presence of hypertension and diabetes.
Results : Among the 891 participants with baseline and follow-up eGFR data, 60.5% were male, and their baseline eGFR was 96.4±5.2. In adjusted linear regression analysis, an elevation of the average 6-month or 1-year PM_{10}, $PM_{2.5}$, SO_2, NO_2, and CO showed a significant association with a decrease in eGFR. On the other hand, O_3 showed a positive relationship with eGFR, where an elevation of O_3 correlated with an elevated eGFR in follow-up. In adjusted logistic regression, a similar result was shown with linear regression. All air pollutants except O_3 showed an association with an elevated risk of renal insufficiency development, while O_3 showed a decreased risk of renal insufficiency.
Conclusions : Some air pollutants, namely PM_{10}, $PM_{2.5}$, SO_2, NO_2, and CO, showed a significant association with eGFR reduction and the development of renal insufficiency. Further validation studies will be needed.