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Effects of Air Pollutants on Mortality of Patients with Chronic Kidney Disease Living in Green Spaces in Seoul, Korea: A Large Observational Study

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Objectives: Owing to increasing air pollution, the association between green spaces and health outcomes has become a global health concern. The relationship between air pollution and the survival of patients with chronic kidney disease while considering residential greenness remains to be elucidated.

Methods: Time-varying survival analysis was conducted to investigate the association between long-term exposure to air pollutants ($PM_{2.5}$, PM_{10}, NO_2, SO_2, CO, and O_3) and mortality in 29 602 chronic kidney disease patients living in residential environments with low and high green infrastructure. Low and high green infrastructure was defined as continuous (0.3, 0.35, and 0.4) and percentile (50%, 75%, and 90%) thresholds using satellite data derived average normalized difference vegetation index within 250 m and 1 250 m around the residence.

Results: During the average 6.14 ± 3.96 observation period, 3 863 (14%) deaths occurred. The effect of exposure to air pollution on mortality was stronger in the low index group compared to the high index group. Particularly, SO_2 was significantly associated with increased mortality risk in the low index group regardless of the threshold. Consistent results were observed in the co-pollutant models.

Conclusions: Exposure to high greenery significantly reduced the mortality risk associated with air pollution. Our results emphasize the need for creating environmental infrastructure considering green spaces.