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Association between Short-Term Air Pollution Exposure and Risk of Asthma Exacerbations in Primary Care: East London Cohort Study

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Extended Abstract

Background

Multiple interacting factors including demographic and lifestyle [1], genetic predisposition [2,3], and environmental factors [4,5], influence asthma prevalence and severity. In primary care, air pollution is increasingly recognised as an important environmental factor influencing patterns of morbidity and mortality. Research indicates that there is a risk of increased adverse respiratory symptoms in adults and children even in areas with relatively low levels of pollution [6–8]. Numerous studies have explored the link between air pollution with asthma mortality and hospital admissions. Fewer have explored other significant morbidities such as asthma exacerbation managed in the community. Here we investigated this relationship in adults (18-80 years) living in London between March 2019 and February 2023, a period of considerable change in traffic related pollution emissions due to combined action of multiple policies, including London's Ultra Low Emission Zone, and the impact of traffic restrictions during the COVID-19 lockdown periods.

Methods

Considering the substantial health and economic impacts of less severe exacerbations treated in the primary care setting, our study aimed to investigate the relationship between these exacerbations and short-term air pollution exposure (NO_2, $PM_{2.5}$ and PM_{10}, and O_3). We selected a cohort of asthma-registered adults in East London (71,620 out of population of 5,791,542 individuals registered to GPs) and extracted their medical records over four years. using oral corticosteroid courses (OCS) as a marker of asthma exacerbations. To investigate the effects of the COVID-19 pandemic, we defined a time varying variable with three levels: pre-COVID (1st March 2019 – 28th Feb. 2020), peri-COVID (1st March 2020 – 28th Feb. 2022), and post-COVID (1st March 2022 – 28th Feb. 2023). We also investigated seasonal and day-of-week effects.

Results

Our findings indicated that for every IQR increase in preceding weeks pollutant exposure the risk of OCS prescription increased by 5%, 2% and 2%, for ambient NO_2, PM_{10} and $PM_{2.5}$ respectively. Estimated IRRs for seasonal effects of spring, summer and winter on daily OCS prescription were similar in the four single-pollutant models for NO_2, PM_{10}, $PM_{2.5}$ and O_3; during summer the risk of asthma exacerbation decreased (for example IRR, 0.96; 95% CI, 0.94-0.097 in NO_2 model) compared to the spring, while it increased during winter (IRR, 1.28; 95% CI, 1.25-1.31 in NO_2 model). Risks for OCS prescription were 2% lower during the COVID-19 period, and 28% higher in the post-COVID-19 period, compared to the pre-COVID-19 period.

Conclusion

In conclusion, our study sheds light on the intricate relationship between short-term air pollution exposure and mild asthma exacerbations treated in primary care settings. We found notable associations between increased levels of NO_2, PM_{10}, and $PM_{2.5}$ and heightened risks of asthma exacerbations. These findings underscore the urgency of implementing targeted interventions and policies to reduce air pollution, particularly those derived from traffic.

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