Exposure to ambient PM10 and NO2 and the incidence of attention-deficit hyperactivity disorder in childhood

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Abstract

Background
Epidemiological studies have implicated air pollution in the causation of neurodevelopmental disorders, including attention-deficit hyperactivity disorder (ADHD), but definitive evidence of this linkage is lacking.

Objectives
We examined the association between cumulative exposure to air pollutants from birth to diagnosis, particularly particulate matter of < 10 μm (PM10) and nitric dioxide (NO2), and childhood ADHD.

Methods
We used the National Health Insurance Service-National Sample Cohort (2002 – 2012), a population-wide health insurance claims dataset. A total of 8936 infants (age 0) born between January 2002 and December 2002 were followed-up for a 10-year period (2003 – 2012). ADHD was defined as per ICD-10 code F90.0. Exposure levels of PM10 and NO2 were extrapolated using geographic information systems and collated with the subjects’ administrative district code, and individual exposure levels assigned. Hazard ratios (HRs) were calculated for the development of ADHD, after adjusting for gender, metropolitan area, income, and history of diseases.

Results
During the study period, ADHD occurred in 314 subjects (3.5%). With the increase in 1 μg/m3 of air pollutants, the HRs of childhood ADHD were 1.18 (95% CI: 1.15–1.21) in case of PM10 and 1.03 (95% CI: 1.02–1.04) in case of NO2. Compared with infants with the lowest tertile of PM10 or NO2 exposure, those with the highest tertile of PM10 (HR = 3.88; 95% CI, 2.87–5.23) or NO2 (HR = 2.10; 95% CI, 1.54–2.85) exposure had a 2 to 3 fold increased risk for ADHD.

Conclusion
Exposure to PM10 and NO2 was associated with the incidence of ADHD in childhood.