

Prenatal exposure to pollution especially dangerous for children with asthma

May 20 2012

The link between prenatal exposure to air pollution and childhood lung growth and respiratory ailments has been established by several studies in recent years, and now a new study suggests that these prenatal exposures can be especially serious for children with asthma.

The study will be presented at the ATS 2012 International Conference in San Francisco.

"In this study, we found that prenatal exposures to [airborne particles](#) and the pollutant [nitrogen dioxide](#) adversely affect [pulmonary function](#) growth among [asthmatic children](#) between 6 and 15 years of age," said study lead author Amy Padula, PhD, post-doctoral fellow at the University of California, Berkeley. "This analysis adds to the evidence that [maternal exposure](#) to ambient air pollutants can have persistent effects on [lung function](#) development in children with [asthma](#)."

The study was conducted as part of the Fresno Asthmatic Children's Environment Study (FACES) - Lifetime Exposure initiative, which examines the influence of [prenatal exposure](#) to a number of ambient air pollutants on the growth of lung function during childhood and teen years in a high pollution area.

For this analysis, the researchers included repeated evaluations of 162 asthmatic children between the ages of 6 and 15 and their mothers. To determine prenatal exposure levels to pollution, the mothers' residences during pregnancy were geocoded and pollutant concentrations were

obtained from the Aerometric Information Retrieval System supported by the U.S. Environmental Protection Agency (EPA). Monthly average pollutant concentrations were assigned from 24-hour averages obtained at a central site monitor and summaries of the entire pregnancy and each trimester were calculated. The researchers looked at several pollutants, including carbon monoxide, nitrogen dioxide, ozone and particulate matter.

To calculate lung function growth, which is determined primarily by changes in lung capacity as a child grows, the researchers used spirometry, a technique which measures the volume and speed of air as it is exhaled from the lungs. For this study, multiple lung function tests were performed and significant changes were noted in four measurements: the FVC, or forced vital capacity, which reflects the volume of air that can be blown out after fully inhaling; the FEV1, or forced expiratory volume in 1 second, which is the volume of air that can forcibly be blown out in one second, after fully inhaling; the FEF, or forced expiratory flow, which reflects the flow of air coming out of the lungs during the middle portion of a forced exhalation; and the PEF, or peak expiratory flow, which is the maximal flow achieved when air is forcibly exhaled immediately after being inhaled.

Measurement models were performed separately for boys and for girls, and were adjusted for height, age, race and socioeconomic status.

At the conclusion of the study, the researchers found that exposure to nitrogen dioxide during the first and second trimesters was associated with lower pulmonary function growth in both girls and boys in childhood. Among girls, exposure to nitrogen dioxide during the first trimester was associated with lower FEV1 growth and exposure to nitrogen dioxide during the second trimester was associated with lower FEF growth. Among boys, nitrogen dioxide exposure during the first and second trimesters of pregnancy was associated with lower FVC growth.

Exposure to particulate matter during the first trimester was associated with lower FEV1 and FVC growth in girls; similar exposures during the third trimester were associated with lower PEF and FEF growth among boys.

"This finding adds to the evidence that current air pollution levels continue to have adverse effects on human health," Dr. Padula said. "Few studies have examined prenatal exposure to air pollution and subsequent lung function in childhood. These results suggest that we need to be doing a better job to reduce traffic-related air pollution.

Dr. Padula said she and her colleagues hope to conduct future studies on the role of genetic susceptibility to air pollution.

"Currently, our studies are examining the associations between prenatal air pollution and adverse birth outcomes," she noted. "It would be useful to know what makes some people more or less susceptible to the adverse affects of [air pollution](#) so we might be able to provide more targeted public health advice."

More information: "Exposure To Air Pollution During Pregnancy And Pulmonary Function Growth In The FACES LiTE Cohort" (Session A49, Sunday, May 20, 2012, Area A, Moscone Center; Abstract 31611)

Provided by American Thoracic Society

Citation: Prenatal exposure to pollution especially dangerous for children with asthma (2012, May 20) retrieved 3 July 2023 from <https://medicalxpress.com/news/2012-05-prenatal-exposure-pollution-dangerous-children.html>

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