ECHO
Environmental influences on Child Health Outcomes
A program supported by the NIH

Study Summary

Prenatal Exposure to Air Pollution Associated with Higher Risk for Autism-related Outcomes, ECHO Study Finds

Authors: Heather Volk, Akhgar Ghassabian, et al.

Who sponsored this study?

The Environmental influences on Child Health Outcomes (ECHO) Program, Office of the Director, National Institutes of Health supported this research.

Why was this study needed?

Air pollution is a significant environmental health concern and contributes to many illnesses and early deaths worldwide. Ambient air pollution can have detectable effects on the brain. Recent studies show that being exposed to air pollution during pregnancy and early life can affect how a child's brain develops. This can happen through several pathways, such as causing inflammation in the brain, disrupting hormones, or changing how genes work. Previous research has suggested potential links between air pollution and neurodevelopmental disorders, but the relationship between exposure to air pollution, even at low levels, during pregnancy and ASD has been unclear. This study examined the associations between prenatal air pollution exposure and autism spectrum disorder (ASD) in children.

What were the study results?

The study team observed that higher prenatal exposure to ozone was associated with autism-related traits and increased risk of ASD diagnosis. Exposure to fine particulate matter ($PM_{2.5}$) and nitrogen dioxide was also associated with a higher risk of autism, but associations varied by geographical regions. There was little evidence for differences between boys and girls in the association between prenatal air pollution exposure and autism outcomes.

Footnote: Results reported here are for a single study. Other or future studies may provide new information or different results. You should not make changes to your health without first consulting your healthcare professional.

What was the study's impact?

The study's findings suggest that even low levels of air pollution exposure during pregnancy might be associated with autism-related outcomes. This highlights the importance of understanding the risks associated with air pollution exposure during pregnancy and its effects on child neurodevelopment.

Who was involved?

The study involved 8,035 mother-child pairs from 44 ECHO study sites across the United States. This sample included over 1,000 child participants who were potentially at higher risk for ASD due to being born preterm or having siblings with autism. The remaining participants were recruited from samples representative of the general population.

What happened during the study?

This study looked at scores from the Social Responsiveness Scale (SRS), a parent-report tool that measures autism-related traits in children, with higher scores indicating higher autism-related traits. During the study, researchers estimated daily exposure to particulate matter, nitrogen dioxide, and ozone at the residential addresses of pregnant women. They then analyzed the associations between these air pollutants and autism-related traits using the Social Responsiveness Scale (SRS) and physician-diagnosed ASD.

What happens next?

The study results suggest that even small changes in prenatal air pollution exposure could have a significant impact on child neurodevelopment. Future studies are needed to understand why these connections exist and to look at the impact of specific air pollution components.

Where can I learn more?

Access the full journal article, titled “Prenatal Air Pollution Exposure and Autism Spectrum Disorder in the ECHO Consortium,” in *Environmental Health Perspectives*.

The content is the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.