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

Study Summary

Exposure to Flame-retardant Chemicals During Pregnancy Associated with Differences in Child Growth Patterns

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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?

Organophosphate esters (OPEs) are chemicals widely used as flame retardants and plastic softeners in a variety of household and industrial products. Pregnant women are commonly exposed to these chemicals. While prior studies have examined the effects of OPE exposure during pregnancy on birth outcomes, less is known about how prenatal exposure to these chemicals affects children's growth patterns beyond infancy. Understanding how early-life environmental exposures are associated with child growth trajectories is important because childhood growth rates can be linked to later risk of obesity and heart disease. This study specifically examined the relationship between OPE exposure during pregnancy and child height, weight, and body mass index (BMI).

What were the study results?

The study found that exposure to specific OPEs during pregnancy was associated with differences in child growth rates between ages 2 and 10 years. Higher prenatal exposure to bis (1,3-dichloro-2-propyl) phosphate (BDCPP) was associated with faster increases in weight and height during early childhood (ages 2–5). In mid-childhood (ages 6–10), higher prenatal exposure to diphenyl phosphate (DPHP) was associated with faster increases in body mass index and weight. In contrast, prenatal exposure to bis(1-chloro-2-propyl) phosphate (BCPP) was associated with slower growth across multiple periods. Some associations differed by child sex and by maternal pre-pregnancy body mass index.

What was the study's impact?

These findings suggest that exposure to certain flame-retardant chemicals during pregnancy may be associated with children's growth patterns. Because growth trajectories are linked to future obesity and metabolic health, these results underscore the importance of understanding and potentially reducing exposure to these widely used chemicals during pregnancy.

Who was involved?

The study included 4,566 mother-child pairs from 14 ECHO Cohort Study Sites across the United States. Researchers collected exposure data during pregnancy and collected growth data from ages 2 to 10 years.

What happened during the study?

Researchers measured nine chemical markers of OPE exposure in urine samples collected from pregnant participants. They later collected child weight and height measurements between ages 2 and 10 years, which were used to calculate each child's BMI. The researchers then used statistical models to examine how prenatal OPE exposure was associated with rates of change in weight, height, and BMI.

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 happens next?

Future studies could help researchers better understand the biological mechanisms linking prenatal OPE exposure to child growth and examine whether reducing exposure during pregnancy could improve long-term child health outcomes. Additional studies may also explore the combined effects of multiple environmental chemical exposures during pregnancy and early childhood on the patterns of child growth patterns.

Where can I learn more?

Access the full journal article, titled "Gestational exposure to organophosphate ester flame retardants and child growth in weight, height, and body mass index at age 2-10 years: the Environmental influences on Child Health Outcomes Program" in *Environmental Research*.