

Scratching the Surface: Exploring the Association between Prenatal Phthalate Exposure and Eczema in Boys

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Phthalate plasticizers are so ubiquitous that nearly everyone comes in daily contact with them through plastics, personal care products, and countless other consumer and industrial products.¹ Studies in laboratory animals and wildlife show that phthalates can cause a variety of reproductive and developmental problems in offspring, in part by disrupting normal hormonal functioning.^{2,3} The epidemiologic evidence is weaker by comparison, but some studies have reported associations with reproductive¹ and neurodevelopmental⁴ outcomes, as well as with asthma and allergic conditions.⁵ A study in *Environmental Health Perspectives* now reports that prenatal exposure to phthalates may elevate the risk of eczema in boys.⁶

“The associations between phthalate measures during pregnancy and childhood eczema were quite strong,” says study coauthor Carl-Gustaf Bornehag, a professor in the Department of Health

Sciences at Karlstad University, Sweden, and an adjunct professor at the Icahn School of Medicine at Mount Sinai in New York City.

Eczema is relatively common in children, with prevalence rates ranging from 3% to 37%, depending on geographic location.^{7,8} Many children recover as they grow older. Characterized by patches of dry, itchy skin that erupt into rashes when scratched, the causes of eczema remain unclear but likely depend on both genetic and environmental factors.⁹

For the present study, Bornehag and his colleagues relied on data from a prospective birth cohort called EDEN (Etude des Déterminants pré et post natals du développement de la santé de l’Enfant). The EDEN cohort includes only mother–son pairs—an advantage for conducting studies on potentially male-specific outcomes. Launched in 2003, the EDEN cohort enrolled 2,002 pregnant women from two cities in France.



According to the 2010 Global Burden of Disease survey, atopic eczema ranked highest among skin disorders in terms of disability-adjusted life years.¹⁰ The burden extends beyond the immediate physical symptoms; the pain and itching associated with eczema may cause difficulty sleeping or concentrating, poorer performance at school or work, depression or anxiety, and other adverse effects.¹¹ Image: © Eaa/Shutterstock.

Researchers are now assessing how maternal health status and environmental exposures during pregnancy relate to the boys' health as they get older.

The authors focused specifically on 604 boys born to mothers who supplied a single urine sample between weeks 24 and 28 of pregnancy. Urinary levels of a total of 11 metabolites from eight phthalates were assessed in relation to eczema incidence during the first five years of each boy's life. The researchers also measured the levels of immunoglobulin E (IgE) antibodies in the children's blood serum. High IgE levels are associated with an immunological condition known as atopy, which predisposes children to allergic diseases such as asthma, rhinitis, and atopic eczema.

The researchers classified eczema as early-onset if it occurred before 2 years of age or late-onset if it began at 2 years or older. They found statistically significant associations between both early- and late-onset eczema and the metabolites of two phthalates in particular: diisobutyl phthalate (DiBP) and diisononyl phthalate (DiNP). Moreover, the association between prenatal phthalate exposure and eczema was mainly found in boys with high IgE levels.

Joseph Braun, an assistant professor of public health and epidemiology at the Brown University School of Public Health, who was not involved in the study, says the findings "add to a small but growing body of literature showing that prenatal phthalate exposure may affect the risk of allergic diseases in children." The study's major strength, he says, is its large sample size.

However, Braun adds that associations between eczema and prenatal phthalate exposures might actually reflect effects of phthalate exposures during childhood. He explains that a mother's exposures to phthalates during pregnancy (through contact with personal care products, vinyl flooring, furniture, electronics, toys, and other everyday items) may be similar to her exposures after her child is born—and similar to her child's postnatal exposures if they share the same home. "So it is not clear if this study points to a unique window of heightened vulnerability during gestation or the effects of being exposed to phthalates during early childhood," he says.

Barbara Demeneix, a professor of comparative physiology at the Natural History Museum in Paris, says the study's exposure limitations work in the other direction as well, given that human embryos could be especially vulnerable to phthalates in early pregnancy, when organs are beginning to form. Ideally, prenatal exposures could be measured at multiple times during pregnancy, particularly during the first trimester. Demeneix was not involved in the new study.

Bornehag agrees on the need for first-trimester data and affirms that postnatal exposures may also play a role in eczema. He adds that phthalate levels might change over the course of pregnancy if a mother changes her lifestyle and that there may be sensitive time windows during early life for immunological development.

What Bornehag and his colleagues want to investigate now is whether prenatal phthalate exposures trigger an "atopic march," an allergic progression that begins with eczema during early childhood and then advances into asthma and rhinitis later. "That's one of the key questions," Bornehag says. "And we have to work on getting more prenatal exposure data for girls as well."

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