

Impacts of Antenatal Exposure to a Mixture of Endocrine Disruptors on Cognitive and Neuromotor Functions in Preschool Children

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Keywords

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Objective

The effects of prenatal exposure to endocrine-disrupting chemicals (EDCs) on neurodevelopment remain inconsistent, and few studies have specifically examined cognitive processes. Additionally, toxicants are often analysed individually, without considering their combined effects. This study aimed to investigate the impact of prenatal exposure to a mixture of persistent organic pollutants (POPs) on neuromotor and cognitive development in preschool-aged children.

Method

Between 2014 and 2016, 62 children were recruited into a longitudinal cohort study. Cord serum samples were analysed for one organochlorine pesticide, four polychlorinated biphenyls (PCBs), and seven per-fluoroalkyl substances (PFASs). At six years of age, children underwent neuropsychological assessments evaluating intelligence, attention, memory, and executive functioning, as well as standardized tests for motor skills, language, and arithmetic abilities. Associations between POP mixtures and these outcomes were analysed using the principal component approach and weighted quantile sum regression, accounting for sex differences.

Result

Higher prenatal exposure to POP mixtures was significantly associated with lower attentional, neuromotor, and language scores when boys and girls were analysed together. In sex-stratified analyses, negative associations with attentional and neuromotor functions remained significant but were observed only in boys. Additionally, boys with higher prenatal exposure to POP mixtures exhibited lower scores in full-scale intelligence quotient (FSIQ), fluid reasoning index, working memory, and planning abilities. In contrast, prenatal exposure to a mixture of EDCs in girls was associated with reduced behavioural regulation, particularly inhibition control. Regarding language development, exposure to POP mixtures was associated with lower receptive language abilities in boys, whereas expressive language was more affected in girls. No significant association was found with arithmetic abilities.

Conclusion

These findings support negative associations between prenatal exposure to a mixture of endocrine disruptors and specific cognitive functions in children. Our study highlights a sex-specific effect, contributing to a better understanding of trends described in the literature.

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