

Prenatal and postnatal exposure to persistent organic pollutants (POPs) and attention-deficit and hyperactivity disorder (ADHD): a pooled analysis of seven European birth cohort studies

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Abstract

Background

Attention-deficit/hyperactivity disorder (ADHD) is increasing worldwide for reasons largely unknown and environmental chemicals with neurotoxic properties, such as persistent organic pollutants (POPs), have been proposed to play a role. We investigated the association between prenatal and postnatal exposure to polychlorinated biphenyl-153 (PCB-153), p-p'-dichlorodiphenyldichloroethylene (p-p'-DDE) and hexachlorobenzene (HCB) and ADHD in childhood.

Methods

We pooled seven European birth cohort studies encompassing 4437 mother-child pairs from the general population with concentrations of PCB-153, p-p'-DDE and HCB measured in cord blood, maternal blood or milk. We then calculated prenatal (birth) and postnatal (3, 6, 12 and 24 months) POP concentrations using a pharmacokinetic model. The operational definition of ADHD varied across cohorts and ranged from doctor diagnosis obtained from patient registries to maternal or teachers reports. We used multilevel (mixed) logistic regression models to estimate the associations between exposure to POPs at birth, 3, 6, 12 and 24 months and ADHD.

Results

The global prevalence of ADHD in our study was 6%. The mean age at assessment of ADHD was 5.8 years (range: 3.8–9.5 years). We found no association between exposure to PCB-153, p-p'-DDE and HCB at any age point between birth and 24 months and ADHD, in the pooled analyses (pooled odds ratios ranging from 1.00 to 1.01). A number of sensitivity analyses gave basically the same results.

Conclusions

In the largest study to date of 4437 children in seven European birth cohorts, we did not observe any association between either pre- or postnatal exposure (up to 24 months) to PCB-153, p-p'-DDE and HCB and the risk of ADHD before the age of 10 years.