Prenatal PBDE exposure & neurodevelopment in children 7 years old & younger: A systematic review & meta-analysis

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TOPIC/TARGET AUDIENCE: Environmental & Occupational Epidemiologists, Child Development

ABSTRACT: Background: Prenatal PBDE exposure effects on neurodevelopment is controversial due to conflicting research results.
Objective: Prenatal PBDE exposure effects on neurodevelopment summarized with systematic review, meta-analysis.

Methods: Eligible birth cohort studies located through PubMed, Web of Science or Google Scholar, reported PBDE concentration in cord blood, maternal blood or colostrum; assessed neurodevelopment at <7 years (Jan-1996-Feb-2017). Comprehensive Meta-Analysis (v.3.3.070, 20-Nov-2014) calculated summary effect. Covariates: age-category (< 2, 3-5, 6-7 years), region, latitude, time-period. Power and publication-bias calculated.

Results: Six studies included in random effects comparison model. Prenatal PBDE exposure significantly correlated with decreased cognitive function (npooled=804; k=6; =-0.237; [95%CI: -0.441, -0.010]; p=0.041), decreased motor function (npooled=794; k=5; =-0.350; [95%CI: -0.610, -0.022]; p=0.037), and increased behavior problems (npooled=307; k=3; =0.393; [95%CI: 0.133, 0.602]; p=0.004). Significant covariates: biomarker type, age category. Colostrum effect-size like cord blood; maternal blood effect-size smaller. Largest age-category effect-size: < 2 years (cognitive, motor function); 6-7 years (behavior problems). Number of studies needed to achieve 0.80 power: 23 (cognitive function), 19 (motor function), and 10 (behavior problems). Low likelihood of publication bias effect on result.

Conclusion: Prenatal PBDE exposure adversely affected neurodevelopment. Pooled samples offset low power. Behavior studies used maternal blood only; effect-size may be underestimated.

OBJECTIVE(S): Identify study eligibility criteria for a systematic review; summarize and the effect size of eligible studies using meta-analysis; compare effect of covariates on summary effects.

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