

Prenatal fluoride exposure and attention deficit hyperactivity disorder (ADHD) symptoms in children at 6-12 years of age in Mexico City

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Environ Int. 2018 Oct 10;121(Pt 1):658-666.
doi: 10.1016/j.envint.2018.09.017.

Abstract

BACKGROUND:

Epidemiologic and animal-based studies have raised concern over the potential impact of fluoride exposure on neurobehavioral development as manifested by lower IQ and deficits in attention. To date, no prospective epidemiologic studies have examined the effects of prenatal fluoride exposure on behavioral outcomes using fluoride biomarkers and sensitive measures of attention.

OBJECTIVE:

We aimed to examine the association between prenatal fluoride exposure and symptoms associated with attention-deficit/hyperactivity disorder (ADHD).

METHOD:

213 Mexican mother-children pairs of the Early Life Exposures to Environmental Toxicants (ELEMENT) birth cohort study had available maternal urinary samples during pregnancy and child assessments of ADHD-like behaviors at age 6-12. We measured urinary fluoride levels adjusted for creatinine (MUFcr) in spot urine samples collected during pregnancy. The Conners' Rating Scales-Revised (CRS-R) was completed by mothers, and the Conners' Continuous Performance Test (CPT-II) was administered to the children.

RESULTS:

Mean MUFcr was 0.85 mg/L (SD = 0.33) and the Interquartile Range (IQR) was 0.46 mg/L. In multivariable adjusted models using gamma regression, a 0.5 mg/L higher MUFcr (approximately one IQR higher) corresponded with significantly higher scores on the CRS-R for DSM-IV Inattention (2.84 points, 95% CI: 0.84, 4.84) and DSM-IV ADHD Total Index (2.38 points, 95% CI: 0.42, 4.34), as well as the following symptom scales: Cognitive Problems and Inattention (2.54 points, 95% CI: 0.44, 4.63) and ADHD Index (2.47 points; 95% CI: 0.43, 4.50). The shape of the associations suggested a possible ceiling effect of the exposure. No significant associations were found with outcomes on the CPT-II or on symptom scales assessing hyperactivity.

CONCLUSION:

Higher levels of fluoride exposure during pregnancy were associated with global measures of ADHD and more symptoms of inattention as measured by the CRS-R in the offspring.