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Maternal hair arsenic and risk of gestational diabetes

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Background and hypothesis: Epidemiologic studies are generally consistent with an increased risk of type 2 diabetes in populations with high arsenic exposure. No studies have been conducted in pregnant women; gestational diabetes (GD) is a major potential complication of pregnancy with an estimated prevalence of 4-8%. We hypothesized that arsenic exposure would be associated with an increased risk of GD.

Methodology: We studied 87 women living proximate to the Tar Creek Superfund Site (Oklahoma USA) to determine if arsenic exposure, as measured in maternal hair, is associated with impaired glucose tolerance during pregnancy. Maternal blood glucose was measured at 28 weeks gestation after a 1-hour glucose tolerance test (GTT). Maternal hair, representing arsenic exposure in the second half of pregnancy, was collected at delivery (+/- 12 hours).

Results: Arsenic concentrations ranged from <DL to 227 ppb (mean 26 +/- 37). Impaired glucose tolerance (>140 mg/dL) was observed in 10% of mothers; 1-hour glucose ranged from 72-192 mg/dL (mean 108 +/- 27). Adjusting for maternal age, race/ethnicity, pre-pregnancy weight, and smoking and alcohol use during pregnancy, women in the highest quartile of arsenic exposure had a 2.68 higher odds of impaired GTT than women in the lowest quartile of exposure (NS). There was a statistically significant trend in risk of impaired GTT by increasing quartile of exposure ($p < 0.01$).

Implications: Among this population of pregnant women, arsenic exposure was associated with increased risk of an impaired GTT at 28 weeks gestation and, therefore, may be associated with increased risk of GD.