

ARSENIC EXPOSURE AND PREVALENT DIABETES IN THE STRONG HEART STUDY

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Background and Aims: High-chronic exposure to inorganic arsenic has been associated with diabetes. At low-moderate levels, however, the epidemiologic evidence is inconsistent. In the Western US States, exposure to inorganic arsenic in drinking water is a concern for many populations who live in small communities. Our objective was to evaluate the association of arsenic exposure, as measured in urine, with diabetes prevalence in American Indians from rural communities in Arizona, Oklahoma and the Dakotas who participated in the Strong Heart Study in 1989-1991.

Methods: We studied 2,356 men and women 45 to 74 years of age with available urine arsenic measures. Total urine arsenic and urine arsenic species were measured using inductively coupled plasma-mass spectrometry (ICPMS) and high performance liquid chromatography (HPLC)-ICPMS, respectively. Diabetes was defined as fasting glucose ≥ 126 mg/dL, 2-h glucose ≥ 200 mg/dL, hemoglobin A1c $\geq 6.5\%$ or diabetes treatment. Multi-adjusted prevalence ratios were estimated using robust Poisson models.

Results: The median (interquartile range) urine concentrations were 14.7 (7.9, 25.3) $\mu\text{g/L}$ for total arsenic and 10.8 (6.1, 19.1) $\mu\text{g/L}$ for the sum of inorganic and methylated arsenic species. The prevalence of diabetes was 51.1%. After adjustment for demographics, body mass index, smoking, alcohol, hypertension medication, region and urine creatinine, the prevalence ratios (95% confidence interval) of diabetes for a 2-fold increase in total arsenic and the sum of inorganic and methylated arsenic species were 1.07 (1.03, 1.11) and 1.10 (1.05, 1.15), respectively. Without adjustment for urine creatinine the corresponding prevalence ratios were 1.04 (1.00, 1.07) and 1.05 (1.01, 1.08). The associations were consistent by region, although stronger in the Dakotas.

Conclusions: Exposure to inorganic arsenic, as measured in urine, was associated with the prevalence of diabetes in American Indian communities. Prospective evidence is needed to evaluate the temporality of the association between urine arsenic and diabetes development.