

URINARY ARSENIC AS A BIOMARKER OF IN UTERO EXPOSURE VIA MATERNAL DRINKING WATER AND DIET: RESULTS FROM A US PREGNANCY COHORT

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Background and Aims: Emerging data indicate that in addition to drinking water contamination, rice consumption may lead to substantial inorganic arsenic exposure (As). Here, we report urinary arsenic excretion in 193 pregnant women in a region of the United States with elevated well water arsenic concentrations.

Methods: We enlisted pregnant women who reported using a private water system at their home, through clinics in the state of New Hampshire. At a six-month prenatal visit, we collected and analyzed a urine sample and a three-day dietary record for water, fish/seafood, and rice and rice products. We also tested women's home tap water for As, which we combined with tap water consumption to estimate exposure through water.

Results: 15% of women were consuming drinking water above the current WHO standard (10 µg As/L). Rice intake averaged 11.73 g/d (range = 0-111.58 g/d (dry mass)). The median total urinary arsenic concentration (sum of inorganic As, monomethylarsonic acid and dimethylarsinic acid) was 3.99 µg/L (range = 0.45-38.84 µg/L). After adjusting for age and urinary dilution using creatinine, both rice consumption (g/d) and arsenic exposure through water (µg/d) were significantly associated with natural log-transformed total urinary arsenic in general linear models ($\beta = 0.0095$, $P < 0.0001$; $\beta = 0.0295$, $P < 0.0001$, respectively). Arsenobetaine levels were lower than those observed in non-pregnant women in our state (0.8 µg/L) reflecting fish/seafood avoidance by pregnant women.

Conclusions: We estimate consuming 1.1 cups of cooked rice/d is associated with urinary arsenic concentrations comparable to 2 liters/d of 10 µg As/L water. Given the potential adverse health consequences of arsenic even at low levels, exposure through rice consumption may need to be considered when designing strategies for reducing arsenic exposure among US pregnant women.