Association between consume of nitrate-contaminated water and time to pregnancy (TTP) among fertile women

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INTRODUCTION

Nitrates are one of the pollutants of drinking water, produced in part by the excessive fertilization of fields and the inadequate management of the manure generated by livestock farmers.

Evidences showing consistent pattern of associations between nitrates and adverse reproductive outcomes have been inconsistent and rare.

The sensitivity of fecundability measures and the mixed reports of associations between early losses and Nitrates in other animal species and some scarce findings in epidemiological studies to date, led us to focus on this outcome .

OBJECTIVE

The objective of this study was to analyze the association between nitrate levels in drinking water and Time to Pregnancy (TTP) among fertile women (in months).

METHODS

A cross sectional survey with retrospective collection design based on a questionnaire was conducted among female personnel who lived in small towns in the Comarca Lagunera, This area includes ten rural communities belonging to the city municipality of Lerdo, Durango, Mexico. These communities are served by a secondary aquifer which represents the water reserve in the Comarca Lagunera because the main aquifer is contaminated with arsenic salts.

Exposure variable was the level of nitrate contamination in a sample of 62 wells used by the community, classified in three different levels : high, medium, low.

Outcome measurement

Valid data on TTP can be derived retrospectively, with a recall time of 14 years or more. A modified version of the key question from the questionnaire of Baird et al (1991) was used to elicit TTP: "How many months were you having sexual intercourse before you got pregnant for the first time?"

TTP-Fecundability odds ratios (fOR) were estimated using a discrete time analogue of Cox's proportional hazard model.

RESULTS

Participating women (n=181) were generally young (mean age 26 years old and SD 4.6)

Most, first became pregnant at younger ages than common in the developed world (mean age 19 years old and SD 3.3).

Time to pregnancy in months according to exposure levels low, medium and high was 2.7, 3.2 and 4.2 months respectively.

Time to pregnancy in months according nitrate levels in drinking water. Comarca Lagunera. Mexico

Nitrate Level (drinking water)	n	TTP (months) *
High	96	2.7
Medium	67	3.2
Low	18	4.2
T O T A L	181	3.7

*Trend test p<0.01

In the final multivariate model the main predictor is the nitrate level in drinking water, adjusted by maternal age at first pregnancy and, marginally, maternal coffee consumption and paternal smoking habit.

Fecundability OR (fOR) for level 2 and 3 were 0.78 (CI95% 0.38-1.55) and 0.53 (CI95% 0.26-1.05)

DISCUSSION

•This work allows us to think that there is a population at risk by drinking water contaminated by nitrates.

•The reduced fecundability in relation with different water levels of nitrates is slight marginal, but with a clear tendency toward association and it worth further study for precising specific damage.

•Future studies examining semen quality and characteristics of menstrual cycle are needed.

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