

JOINT EFFECTS OF ENVIRONMENTAL EXPOSURE TO GEOMAGNETIC ACTIVITY AND DRINKING WATER TRIHALOMETHANES ON CONGENITAL HEART ANOMALIES RISK IN A KAUNAS COHORT STUDY

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Background and Aims: There is growing evidence for an adverse effect of maternal exposure to environmental factors on pregnancy outcomes. Recent epidemiological studies suggested that trihalomethanes (THM) exposures during pregnancy might impair the fetal growth and that exposure to high geomagnetic activity may increase the risk of congenital anomalies. We investigated whether geomagnetic activity might modify the association between THM exposure and risk of congenital heart anomalies (CHA).

Methods: We conducted a case-control study on CHA (ICD-10 codes Q20 – Q28) in Kaunas (Lithuania), using individual information on social and demographic characteristics, residence history, health behaviour, and pregnancy history. We used tap water THM concentrations, geocoded maternal address at birth, and individual information on drinking water ingestion, showering and bathing, and uptake factors of THMs in blood, to estimate an internal dose of THM. As a measure of the geomagnetic activity level we used the average of daily Ap indexes during first trimester of pregnancy. We classified monthly geomagnetic activity exposure into two groups: above median and below median and examined the associations between THM dose, geomagnetic activity and the risk of CHA by multiple logistic regression. All data were adjusted for maternal age, education, stress, body mass index, multiple birth, preterm birth, and miscarriage in previous pregnancy.

Results: The estimated individual total uptake of THMs ranged between 0.0025 and 2.40 $\mu\text{g}/\text{d}$ (median 0.1733 $\mu\text{g}/\text{d}$). Geomagnetic activity median was 7.33. The adjusted odds ratio for THM dose above median vs. below median and geomagnetic activity below median was 1.39, 95% CI 0.69-2.81 for CHA, while exposure to geomagnetic activity above median and THM dose above median was associated with OR 2.25, 95% CI 1.19-4.25.

Conclusions: These data suggest that THM internal dose may affect CHA and that increased geomagnetic activity strengthen the THM exposure effects on CHA.