

Fluorinated water consumption in pregnancy and neuropsychological development of children at 14 months and 4 years of age

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Background / Aim: The fluorination of drinking water is a public health measure used to prevent dental caries in children. Epidemiological studies carried out in areas with very high fluoride levels in drinking have shown that children living in these areas have lower scores on neuropsychological functions compared to those living in control areas.

Methods: Fluorine levels in urine were determined in pregnant women from 438 mothers (INMA Project: <http://www.proyectoinma.org/>) in the 1st and 3rd trimesters of pregnancy. Infant neuropsychological development was assessed around 14 months of age by the Bayley Scales and at 4-5 years of age using a standardized version of the McCarthy Scales. Multivariate linear regression models were built for the six conventional domains (Verbal, Perceptive-Manipulative, Numeric, Memory, Motor and General Cognitive).

Results: 37% of mothers resided in fluoridated drinking areas (1 mg/L in water). The mean fluoride level in urine of the residents in fluorinated areas (0.83 mg/L) was significantly higher than in the non-fluorinated areas (0.45 mg/l). No association was found between fluoride levels in maternal urine and standardized scores for mental and psychomotor development at 14 months. At the age of 4-5 years, an increase of 1 mg/l in the level of fluoride in urine during pregnancy (mean level of 1st and 3rd trimesters) was related to a higher score on the perceptual-manipulative scale of 4.44 (0.13, 0.75) points. Taking into account the window of prenatal exposure, at week 32 the level of fluorine was associated with an increase of 4.11 (0.28, 7.94) points in verbal function, 3.57 (-0.03, 7.18) in perceptive-manipulative and 3.97 (0.29, 7.65) in general cognitive.

Conclusions: Prenatal exposure at the levels found in fluorinated drinking water may exert a beneficial effect on the development at 4 years of age. At low doses, fluoride could present a dose-response pattern with a beneficial effect.