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Fluoride exposure and thyroid function among adults living in Canada: Effect modification by iodine status

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Abstract

Background: Fluoride exposure has the potential to disrupt thyroid functioning, though adequate iodine intake may mitigate this effect. This is the first population-based study to examine the impact of chronic low-level fluoride exposure on thyroid function, while considering iodine status. The objective of this study was to determine whether urinary iodine status modifies the effect of fluoride exposure on thyroid stimulating hormone (TSH) levels.

Methods: This cross-sectional study utilized weighted population-based data from Cycle 3 (2012-2013) of the Canadian Health Measures Survey (CHMS). Information was collected via a home interview and a visit to a mobile examination centre. The weighted sample represented 6,914,124 adults in Canada aged 18-79 who were not taking any thyroid-related medication. Urinary fluoride concentrations were measured in spot samples using an ion selective electrode and adjusted for specific gravity (UF_{SG}). Serum TSH levels provided a measure of thyroid function. Multivariable regression analyses examined the relationship between UF_{SG} and TSH, controlling for covariates.

Results: Approximately 17.8% of participants fell in the moderately-to-severely iodine deficient range. The mean (SD) age of the sample was 46.5 (15.6) years and the median UF_{SG} concentration was 0.74 mg/L. Among iodine deficient adults, a 1 mg/L increase in UF_{SG} was associated with a 0.35 mIU/L increase in TSH [95% CI: 0.06, 0.64; p = 0.01, one-tailed].

Conclusions: Adults living in Canada who have moderate-to-severe iodine deficiencies and higher levels of urinary fluoride may be at an increased risk for underactive thyroid gland activity.

Keywords: Fluoride; Iodine status; Thyroid; Thyroid stimulating hormone.

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