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Review

Community Water Fluoridation Exposure: A Review of Neurological and Cognitive Effects [Internet]

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Excerpt

In Canada, community water fluoridation (CWF) is the process of monitoring and controlling fluoride levels (by adding or removing fluoride) in the public water supply to reach the optimal level of 0.7 part per million (ppm) and not to exceed the maximum concentration of 1.5 ppm, as recommended in the 2010 *Health Canada Guidelines for Drinking Water Quality*. CWF has been identified as a cost-effective method of delivering fluoride to the population and reducing dental caries in children and adults.[1] The Centers for Disease Control and Prevention recognized CWF as one of 10 great public health achievements of the 20th century because of its contribution to the prevention of tooth decay and improvement in oral health over the past 70 years. CWF is endorsed by over 90 national and international governments and health organizations around the world.[1]

Despite the endorsement of governments and health organizations, and a large body of empirical evidence on the preventive effect of CWF on dental caries, a number of municipalities across Canada have not implemented or have discontinued water fluoridation. In 2017, 38.7% of the Canadian population were exposed to community water systems having recommended optimal fluoride levels to protect their teeth. Different factors contributed to CWF cessation including concerns about the potential harmful side effects of water fluoride to human health, including fluorosis, skeletal fractures, cancer, reproduction and development, thyroid function, and children's intelligence quotient (IQ).

Multiple studies have been published showing that exposure to higher levels of fluoride in drinking water may be associated with lower intelligence among children.[7] However, the generalizability of the findings from those studies to the Canadian context is unlikely given they were conducted in rural areas and areas of low socioeconomic status in countries, such as China, India, Iran, or Mexico, which also include other sources of fluoride such as fluoridated salts or naturally occurring water fluoride levels that are many folds higher than the current Canadian levels.[7] Multiple methodological limitations were identified in these studies including the lack of control for important confounding variables such as exposure to known neurotoxicants (e.g., lead, arsenic, or iodine), socioeconomic status, nutritional status, and parental education that could be related to fluoride exposure and also potentially affect children's IQ. The CADTH CWF Review of Dental Caries and Other Health Outcomes reviewed studies from countries with comparable water fluoride levels and socioeconomic parameters, and found no evidence for an association between water fluoridation at recommended Canadian levels and IQ or cognitive function. A study published by a group of researchers in Canada and the US after the CADTH HTA concluded that exposure to higher levels of fluoride during pregnancy is associated with lower IQ scores in children aged 3 to 4 years in Canada. The findings of that study prompted a further review on this topic.

The aim of this report is to review recent evidence on the effects of fluoride exposure through CWF at levels that are relevant to the Canadian context on the neurological or cognitive development in children and adolescents less than 18 years of age.

In this report, gender-neutral language has been used where possible in order to be inclusive of all gender identities. When reporting results from the published manuscript, gender-neutral language was not used in order to be consistent with the terms used in the source material.

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