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Response to concerns about effects of fluoride in drinking water

Good evening Mayor Tolmie and Council,

My name is Dr Olanrewaju ('Lanre) Medu. I am a Public Health Physician, one of the two Medical health officers working with the Saskatchewan Health Authority, Moose Jaw office. My colleague out of the Moose Jaw office is Dr Hortense Tabien.

Thank you for the opportunity to provide a response to the concerns about fluoride in water.

As an introduction, fluorine is a naturally occurring, widely distributed element and a member of the halogen family, which includes chlorine, bromine, and iodine. Fluorides also are a natural component of the earth's crust and soil. Small amounts of fluorides are present in water, air, plants, and animals.

The use of fluorides in drinking water ranks as one of the great public health interventions of the past century. Its addition to public health water systems has served to significantly reduce rates of dental caries i.e. tooth decay. It is an effective, cost effective, and equitable intervention aimed at reducing the rates of dental caries and the associated deleterious effects on health and wellbeing.

The recommended levels for fluoride in municipal water systems is 0.7mg/l, i.e. 7 parts per million for the prevention of dental caries. This level accounts for the other potential sources of fluoride that the individual is exposed to.

The use of fluoride in municipal water systems referred to as community water fluoridation has been endorsed by a wide range of professional organizations including the College of Dental Surgeons of Saskatchewan, College of Physicians & Surgeons of Saskatchewan, the respective Saskatchewan associations of Dental Assistants; Hygienists, and Therapists, Canadian Dental Association and the Saskatchewan and Canadian Public Health associations among others. The Saskatchewan Ministry of Health also issued a position statement on community water fluoridation endorsing Health Canada's recommendation of a level of 0.7 mg/L as the optimal target concentration for fluoride in drinking water[1]. The body of evidence for the benefit of fluoride has been detailed most recently in a Cochrane Systematic Review.[2]

Despite this wide base of support and comprehensive evidence as to the benefits of water fluoridation, there are concerns about its safety, one of which was highlighted in a recent study that described a relationship between fluoride levels in tap water and the IQ's in a Canadian birth cohort.[3]

[1] Saskatchewan Ministry of Health position statement on community water fluoridation. Available at http://publications.gov.sk.ca/documents/13/100169-Saskatchewan-Ministry-of-Health-Position-Statement-REVISED-March-2017.pdf

[2] Benson PE, Parkin N, Dyer F, Millett DT, Germain P., Fluorides for preventing early tooth decay (demineralised lesions) during fixed brace treatment. Cochrane Database of Systematic Reviews 2019,

[3] Till. C. et al. Fluoride exposure from infant formula and child IQ in a Canadian birth cohort. Environment International 134 (2020) 105315

The authors describe exposure to increasing levels of fluoride in tap water being associated with diminished non-verbal intellectual abilities with the effect noted to be more pronounced among formula-fed children.

A few thoughts on the study. First is the type of study, this was a cohort study. Cohort studies while a good study design are not the best options to demonstrating causal evidence. In the hierarchy of evidence, they are listed lower that randomised experimental studies and the systematic reviews and meta-analysis. Cohort studies are also subject to significant potential confounding variables as well as bias due to recall issues especially in retrospective cohorts such as this. Confounding variables in this regard are factors other than fluoride exposure that may contribute to the reported result but were unaccounted for or unmeasured.

Hierarchy of evidence

This was an observational study and no single observational study provides a definitive test of a hypothesis, and while this early study suggests an association, this does not equate causation. It would thus be premature to modify or alter a valid, effective public health decision based on the conclusions of a few studies that have identified design issues that may result in biased conclusions.

Second, one of the central planks of their assertion about the fluoride levels in infants employed a non-validated approach which means this approach cannot be considered a valid measure of fluoride intake in infants.

Third, the assessment of infant fluoride exposure relied on the measures of fluoride at the water treatment plants, this would be expected to provide elevated levels because fluoride levels at the source (treatment) would be expected to be markedly higher that at the end user. It could be argued that a measurement of fluoride levels at the end-user would be the more appropriate option.

Fourth, the concept of causation relies on the specificity of the association. This concept suggest that an outcome should be linked directly to an exposure or cause for it to be considered responsible. In this case, the authors have not been able to demonstrate that the cause of the lower IQ measures was due to the fluoride levels in water. There is a myriad of causes that may be responsible for these differences that was not fully elucidated.

Further to this issue of causation, I want to discuss the gradient effect, which refers to when the higher the levels of an exposure the more marked the expected outcomes if the exposure is responsible. If the assertion of the authors holds correct, it would be expected that there would have been marked IQ decrements in previous years

given that the upper limits of fluoride in water was higher. This has not been demonstrated in other jurisdictions and thus may suggest that the findings warrant further research. It would be interesting to know if a gradient effect was demonstrable in this analysis.

We would like to thank you for the privilege of providing this response and would like to conclude that with these concerns highlighted and the demonstrated and evident benefits of water fluoridation, As Public Health Physicians we would recommend that the City of Moose jaw continue to fluoridate water at the current level of 0.7mg/l.

Sincerely,

Dr Olanrewaju Medu, MBBS
Medical Health Officer