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Flawed study overstates link between fluoride and ill health

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Despite only finding an association between fluoridated water and underactive thyroid gland, the paper says we should try to reduce all sources of fluoride in the environment. Credit: Joost Nelissen/Flickr, CC BY-NC

Researchers have widely criticised a new study that questions the safety of water fluoridation, arguing the findings were overstated and the study poorly designed.

The paper, published in the Journal of Epidemiological & Community Health, links fluoridated water to increased rates of hypothyroidism, which occurs when the thyroid gland is under active, causing weight gain, hair loss, fatigue and depression, among other symptoms.

The study authors question the safety of water fluoridation as a public health measure.

"It's simplistic and it's extremely overreaching in its conclusions," said Mike Morgan, chair of population oral health at the University of Melbourne.

"To do a study like this and say there's an association without taking into account other factors, and then say, we should reduce the levels of fluoride, well it beggars belief that they should be able to say that in a reputable publication," he added.

The study looked at 2012 levels of fluoride in drinking water in the United Kingdom and the national prevalence of underactive thyroid diagnosed by family doctors across the country. They then compared an area that had fluoridated water supply with another that did not and found an association between rates of hypothyroidism and fluoridated water.

"The main problem with this particular study is that it's not only observational, it's ecological," said John Attia, professor of medicine and clinical epidemiology at the University of Newcastle. "That means you're making correlations between variables at a geographic level, not an individual level, so the link between cause and effect is very distal.

"The reason this kind of observational epidemiology is the lowest grade of evidence is because there are, as in any relationship between two variables, many potential confounders," he said. "You can never know whether the variable you have chosen is causing the effect or if it is one of an infinity of potential other variables that are associated with it that is actually driving the effect."

Professor Morgan said the paper failed to take these confounding factors into account, despite the existence of statistical tools for doing this, and there were many things that hypothyroidism may be related to that the study was not picking up on.

In an email interview, study author Stephen Peckham, professor of health policy at the Centre for Health Services Studies at the University of Kent said since the study was conducted at the GP level, the data was fine-grained enough to not require statistical analyses that could take some of these confounders into account.

"While this is the first study to look at fluoride and hypothyroidism in a large population, and cannot prove that fluoride causes hypothyroidism," he said, "it is a comprehensive and methodologically solid study and should be an important red flag."

The study authors noted that fluoride was used in the 1950s to help reduce the activity of an overactive thyroid (hyperthyroidism), but such evidence is out of date, said Creswell Eastman, who is a clinical professor of medicine at the University of Sydney and an endocrinologist specialising in thyroid disorders.

Professor Attia said the discussion about fluoride's purported use to treat an overactive thyroid gland was particularly misleading.

"What they didn't mention is that all this effect on the thyroid takes very

large doses, and occurs because both fluorine and iodine are in the same chemical family – small bits of iodine stimulate the thyroid but large doses inhibit it," he said. "Those studies in the 1950s, I'm sure used huge doses of fluoride, not the milligram doses that we're talking about here."

The only time you see hypothyroidism is when you've got extremely high concentrations of fluoride, Professor Eastman added. "We're talking about 10 to 100 times the amount added to the water."

He explained that fluoride had very little physiological function in the body but in really large amounts, could block the uptake of iodine by the thyroid gland, which needs it to make thyroxine.

"It's only in situations of iodine deficiency that you've got a problem with fluoride excess," Professor Eastman said, taking issue with the paper's discussion of iodine levels in the UK population.

The study authors note:

In the UK, while iodine intake levels have been considered adequate since the middle of the 20th century, concern has been expressed about iodine deficiency in pregnant women and teenage girls.

"That sentence is an incorrect spin in my view," said Professor Eastman. "What they've done is played down the iodine deficiency component in their interpretation, when it could be the reason for hypothyroidism."

He added that mothers who are iodine deficient have children who are slower, and have low IQ, and this has recently been shown in research in the United Kingdom.

"I would have thought it's far more important to get on and save the brains of the generation that's currently in utero than start pulling the

fluoride out of the water," Professor Eastman said.

Professor Peckham said the study looked carefully looked at the issue of iodine, most of which comes from nutritional sources in the United Kingdom.

"In the post-war period iodine intake has been seen as adequate. However, recent studies of teenagers and young pregnant women have suggested that levels are decreasing," he said. "Given we focused on a 40+ years population it is likely that iodine levels were sufficient."

Professor Attia said it was irresponsible for the paper's peer reviewers to not have asked the authors to tone down their conclusions.

"To make such sweeping statements about this research having implications for fluoridation generally when it's the lowest level of evidence within the lowest band of study types, that should have been picked up at the peer reviewer level," he said.

"Water fluoridation has been with us for over 50 years and no existing evidence suggests the levels used in Australia has any health impact apart from reducing dental caries," said Professor Morgan.

"The only risk when you have it in this low dosage is very mild fluorosis, which is a white flecking on the tooth surface that everyone seems to be keen on these days anyway."

The head of the National Health and Medical Research Council has issued a statement reaffirming that "fluoridation of drinking water remains the most effective and socially equitable means of achieving community-wide exposure to the caries prevention effects of fluoride". The Council says evidence for such position statements are regularly reviewed and the current review is expected to endorse water

fluoridation's safety again.

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