



Water fluoridation to prevent tooth decay

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Primary Review Group:

Oral Health Group

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Background

Tooth decay is a worldwide problem affecting most adults and children. Untreated decay may cause pain and lead to teeth having to be removed. In many parts of the world, tooth decay is decreasing. Children from poorer backgrounds still tend to have greater levels of decay. Fluoride is a mineral that prevents tooth decay. It occurs naturally in water at varying levels. Fluoride can also be added to the water with the aim of preventing tooth decay. Fluoride is present in most toothpastes and available in mouthrinses, varnishes and gels. If young children swallow too much fluoride while their permanent teeth are forming, there is a [risk](#) of marks developing on those teeth. This is called 'dental fluorosis'. Most fluorosis is very mild, with faint white lines or streaks visible only to dentists under good lighting in the clinic. More noticeable fluorosis, which is less common, may cause people concern about how their teeth look.

Review question

We carried out this [review](#) to evaluate the effects of fluoride in water (added fluoride or naturally occurring) on the prevention of tooth decay and markings on teeth (dental fluorosis).

Study characteristics

We reviewed 20 studies on the effects of fluoridated water on tooth decay and 135 studies on dental fluorosis. The evidence is up to date at 19 February 2015.

Nineteen studies assessed the effects of starting a water fluoridation scheme. They compared tooth decay in two communities around the time fluoridation started in one of them. After several years, a second survey was done to see what difference it made. Around 70% of these studies were conducted before 1975. Other, more recent studies comparing fluoridated and non-fluoridated communities have been conducted. We excluded them from our [review](#) because they did not carry out initial surveys of tooth decay levels around the time fluoridation started so were unable to evaluate changes in those levels since then. We reviewed one [study](#) that compared tooth decay in two fluoridated areas before fluoridation was stopped in one area. Again, after several years, a second survey was done to see what difference it made.

Around 73% of dental fluorosis studies were conducted in places with naturally occurring – not added – fluoride in their water. Some had levels of up to 5 parts per million (ppm).

Key results

Our [review](#) found that water fluoridation is effective at reducing levels of tooth decay among children. The introduction of water fluoridation resulted in children

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old studies and may not be applicable today.

Within the 'before and after' studies we were looking for, we did not find any on the benefits of fluoridated water for adults.

We found insufficient information about the effects of stopping water fluoridation.

We found insufficient information to determine whether fluoridation reduces differences in tooth decay levels between children from poorer and more affluent backgrounds.

Overall, the results of the studies reviewed suggest that, where the fluoride level in water is 0.7 ppm, there is a chance of around 12% of people having dental fluorosis that may cause concern about how their teeth look.

Quality of the evidence

We assessed each [study](#) for the quality of the methods used and how thoroughly the results were reported. We had concerns about the methods used, or the reporting of the results, in the vast majority (97%) of the studies. For example, many did not take full account of all the factors that could affect children's [risk](#) of tooth decay or dental fluorosis. There was also substantial variation between the results of the studies, many of which took place before the introduction of fluoride toothpaste. This makes it difficult to be confident of the size of the effects of water fluoridation on tooth decay or the numbers of people likely to have dental fluorosis at different levels of fluoride in the water.

Authors' conclusions:

There is very little contemporary evidence, meeting the [review's](#) inclusion criteria, that has evaluated the [effectiveness](#) of water fluoridation for the prevention of caries.

The available [data](#) come predominantly from studies conducted prior to 1975, and indicate that water fluoridation is effective at reducing caries levels in both deciduous and permanent dentition in children. Our confidence in the size of the effect estimates is limited by the observational nature of the [study](#) designs, the high [risk](#) of [bias](#) within the studies and, importantly, the applicability of the evidence to current lifestyles. The decision to implement a water fluoridation programme relies upon an understanding of the [population's](#) [oral](#) health behaviour (e.g. use of fluoride toothpaste), the availability and uptake of other caries prevention strategies, their diet and consumption of tap water and the movement/migration of the [population](#). There is insufficient evidence to determine whether water fluoridation results in a change in disparities in caries levels across SES. We did not identify any evidence, meeting the [review's](#) inclusion criteria, to determine the [effectiveness](#) of water fluoridation for preventing caries in adults.

There is insufficient information to determine the effect on caries levels of stopping water fluoridation programmes.

There is a significant association between dental fluorosis (of aesthetic concern or all levels of dental fluorosis) and fluoride level. The evidence is limited due to high [risk](#) of [bias](#) within the studies and substantial [between-study](#) variation.

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