Fluoride prevents caries among adults of all ages

Is fluoride effective in preventing coronal caries in all adults and in older adults (40+ years) and in preventing root caries in the older group?

How effective are the different fluoride delivery modes in preventing caries?

Griffin SO, Regnier E, Griffin PM, Huntley V.

Effectiveness of fluoride in preventing caries in adults. J Dent Res 2007; 86:410–415

Data sources Medline, Embase and the Cochrane Central Register of Controlled Trials were searched. References of each retrieved article were also searched for relevant articles. The US Food and Drug Administration, American Dental Association and manufacturers of topical fluoride products were contacted to identify unpublished trials.

Study selection For inclusion, the study had to be published in the English language, was of duration 1 year or longer, and examined the association between fluoride and caries in intact human teeth in study populations that included adults. To examine the effectiveness of self- or clinically applied fluoride, only longitudinal studies with random assignment of participants or of split-mouth design were included. For studies examining the effectiveness of water fluoridation, cross-sectional studies were included if their participants lived most of their lives in a fluoridated or a nonfluoridated community.

Data extraction and synthesis Screening of eligible studies and data extraction were conducted independently and in duplicate. A random-effects model was used to estimate the effect-size of fluoride (absolute difference in annual caries increment or relative risk ratio) for all adults aged 20+ years and for adults aged over 40 years. Root caries increment was also estimated for adults aged over 40 years.

Results Twenty studies involving 13 551 participants were included in the final body of evidence. Eleven studies examined the effectiveness of self- or clinically applied fluoride. Of these studies, 10 were randomised controlled trials, and one was a controlled trial (split-mouth) that did not specify whether the treatment had been randomly assigned. Nine studies examined the effectiveness of water fluoridation; all were cross-sectioned studies except one which was a prospective cohort trial. Of the studies published after or during 1980, any fluoride (self- and clinically applied or water fluoridation) annually averted 0.29 [95% confidence intervals (CI), 0.16–0.42] carious coronal and 0.22 (95% CI, 0.08–0.37) carious root surfaces. The prevented fraction for water fluoridation was 27.2% (95% CI, 19.4–34.3%).

Conclusions These findings suggest that fluoride is effective in preventing caries in adults of all ages.

Commentary

The effectiveness of different fluoride delivery systems has been evaluated primarily in children and adolescents and the results have, in most instances, been extrapolated to adults. Recent research¹ suggests that adults are keeping their teeth longer and are at similar or higher risk for dental caries than are children.

The objective of this systematic review was to examine the effectiveness of self- and clinically applied fluoride and water fluoridation among adults. The inclusion and exclusion criteria were explicit. The search strategy, however, appeared to be too simple. It was not clear whether a controlled vocabulary had been used in searching electronic databases. Restriction to English-language studies may also have had an effect on the findings.

It is interesting to compare the findings of this review to the systematic review conducted by McDonagh *et al.* (York review).² In the current review, cross-sectional studies were included to examine the effectiveness of water fluoridation, but cross-sectional studies were excluded from the York review² as it was not possible to tell whether the observed differences in caries experience had always existed between these populations or whether they were the result of differing levels of water fluoride content between the study areas. Out of the 26 included studies in the York review,² that by Pot *et al.*³ was the only one whose participants were adults. Because the study by Pot and colleagues was published in Dutch, it was excluded from this recent systematic review. In other words, the studies included in these two systematic reviews were completely different!

The findings of the York review² showed that there was a median change of 14.6% in the proportion of caries-free children, roughly equivalent to a prevented fraction of 40%.⁴ In this recent systematic review, the prevented fraction for water fluoridation was only 27%. Such a difference is not unexpected because of the pre-eruptive effects of fluoridated water.

The authors compared their results with those of Cochrane reviews on fluoride mouthrinse and fluoride toothpaste in children and adolescents: the findings were surprisingly similar. The authors, however, did not compare their findings with the systematic reviews by Twetman *et al.*^{5,6} in which both adults and children were considered. Twetman and colleagues⁵ found limited evidence that fluoride mouthrinse prevented root caries in older adults. Regarding fluoride toothpaste, all the studies of adult participants identified by Twetman *et al.*⁶ were dealing with materials or additional active ingredients other than fluoride. Therefore, none of these studies fulfilled the inclusion criteria and they were excluded.

The retention of a functional and natural dentition for life is now a realistic goal for most individuals. In view of the findings in the above systematic reviews, further well-designed studies are needed to elucidate the effectiveness of fluoride among adults.

Address for correspondence: SO Griffin, Centers for Disease Control and Prevention/ Division of Oral Health, 4770 Buford Highway, MSF10, Chamblee GA 30341, USA. E-mail: sig1@cdc.gov

Practice point

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C Albert Yeung

Department of Public Health, National Health Service Lanarkshire,
Hamilton, Lanarkshire, Scotland, UK

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Evidence-Based Dentistry (2007) **8**, 5–6. doi:10.1038/sj.ebd.6400506

Key to evidence graphic used in the Evidence-based Dentistry Journal

The graphic is based on the Centre for Evidence-based Medicine levels of Evidence tables www.cebm.net/levels_of_evidence.asp (see *Evidence-based Dentistry* 2003;**4**: p 17–18)

Evidence Graphic	Evidence Level	Therapy/Prevention/ Aetiology/Harm
	1A	SR (with homogeneity*) of RCTs
	1B	Individual RCT (with narrow Confidence Interval)
	2A	SR (with homogeneity*) of cohort studies
	2B	Individual cohort study (including low quality RCT; e.g. <80% follow-up)
	2C	Ecological studies
	3A	SR (with homogeneity*) of case-control studies

* By homogeneity we mean a systematic review that is free of worrisome variations (heterogeneity) in the directions and degrees of results between individual studies. Not all systematic reviews with statistically significant heterogeneity need be worrisome, and not all worrisome heterogeneity need be statistically significant.