Anticariogenic effect of xylitol versus fluoride – a quantitative systematic review of clinical trials

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CRD summary
This review sought to compare the effectiveness of xylitol and fluoride for preventing dental caries. The included trials did not address this comparison directly. The authors concluded that addition of xylitol to existing fluoride regimes may be beneficial but the evidence was at high risk of bias. This cautious conclusion appropriately reflects the evidence presented.

Authors' objectives
To assess the effectiveness of xylitol compared to that of topical application of fluoride for the prevention of dental caries.

Searching
The authors searched 12 databases including PubMed and The Cochrane Library to March 2011. Search terms were reported. It appeared that there were no language restrictions.

Study selection
The authors stated that eligible studies needed to compare in some form xylitol versus topical fluoride, be prospective and have test and control groups. The comparisons considered were: xylitol only versus fluoride only; both groups exposed to fluoride and the test group also received xylitol; and both groups received fluoride and xylitol but in different concentrations/dosages. Studies were excluded if they did not report caries-related primary outcomes or used chewing gum as the main form of clinical application in either group.

Details of participants in the included trials were not reported but it appeared that some were children at high risk of caries. Most studies compared fluoride with or without additional xylitol exposure; one study evaluated xylitol with and without fluoride. Participants in xylitol groups were exposed to fluoride through drinking water or other sources. Most studies measured outcomes using WHO criteria although methods of outcome evaluation varied across studies. Studies were conducted in French Polynesia, Costa Rica, Sweden and Hungary.

Two reviewers independently selected studies for inclusion; disagreements were resolved through discussion and consensus.

Assessment of study quality
Quality was assessed using criteria listed in the paper for randomisation and allocation concealment, baseline data for randomised trials, blinding/masking and loss to follow-up. Describing a trial as randomised without reporting further details was regarded as inadequate.

Two reviewers independently assessed quality; disagreements were resolved through discussion and consensus.

Data extraction
Data were extracted to derive mean differences between groups for caries development; raw data and data corrected for loss to follow-up were presented. Multiple data sets were extracted from each included trial.

Two reviewers independently extracted data; disagreements were resolved through discussion and consensus.

Methods of synthesis
Meta-analysis was not conducted because of clinical heterogeneity between trials. A narrative synthesis was presented with emphasis on sources and risks of bias. Publication bias was investigated using a funnel plot and Egger's test. Potential influence of confounders on the reported trial results was investigated using a directed acyclic graph.
Results of the review
Six articles reporting results from five trials were included. The total number of participants was unclear. None of the trials reported methods of randomisation and only one reported allocation concealment and blinding. Follow-up ranged from 12 to 36 months.

Five out of 21 extracted data sets showed no difference between treatment groups and the rest significantly favoured the xylitol group. The funnel plot and Egger’s test indicated possible publication bias.

Authors' conclusions
The addition of xylitol to existing fluoride regimes may be beneficial in the prevention of caries. However, the evidence found is at high risk of bias and may be limited by confounder effects, particularly that of external fluoride access.

CRD commentary
The review question was stated clearly. Inclusion criteria were also clear but were broader than the stated review question. All the included trials compared xylitol plus fluoride in some form with fluoride alone rather than xylitol alone versus fluoride alone. In other ways the review was well conducted with a thorough search, careful assessment of study quality and confounding, and use of measures to minimise errors and bias in the review process.

The authors’ conclusion about the possible benefits of adding xylitol to fluoride reflects the limitations of the evidence and seems appropriately cautious. Their call for high-quality research seems clearly justified.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that future trials in this field should take measures to reduce risk of the various biases detected in this review. No specific topics for research were recommended.

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