

# Consistent evidence to support the use of xylitol- and sorbitol-containing chewing gum to prevent dental caries

**Abstracted from**

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**Question: Are polyol-containing chewing gums effective in reducing dental decay?**

**Data Sources** Studies were identified using searches with Medline, the Cochrane Library and Google Scholar.

**Study selection** Studies were screened independently and were included if they evaluated the effect of one or more chewing gums containing at least one polyol (xylitol, sorbitol, mannitol or maltitol) on caries development, provided they supplied original data generated by means of a comparative design (experimental or observational) and were published in English. Studies were excluded if only an abstract was available or they described only the pharmacodynamic or pharmacokinetic properties of polyols or did not include a no-treatment arm in the study. Randomised trial quality was assessed using the Jadad scale, and the US Preventive Services Task Force criteria to grade the internal validity of individual nonrandomised studies.

**Data extraction and synthesis** Data were extracted independently with only the final outcomes of a study being recorded. It was decided that surface rather than tooth level data would be recorded. Incremental caries was converted to prevented fraction (PF; the proportional reduction in dental caries in experimental groups relative to control groups) for meta-analysis. The studies were grouped according to type of polyol and a separate meta-analysis performed. Data were pooled using both a random and a fixed-effects model and heterogeneity assessed using  $I^2$ .

**Results** Of 231 articles identified 25 studies were initially selected with 19 being included in the review [six randomised controlled trials (RCT) of which four were cluster RCT, nine controlled clinical trials (CCT) and four cohort studies]. Two RCT had a Jadad score of three or higher. The mean preventive fraction for the four main gum types are

shown in the table1, results of all except the sorbitol -mannitol blend were statistically significant. Sensitivity analyses confirmed the robustness of the findings.

**Conclusions** Although research gaps exist, particularly on optimal dosing and relative polyol efficacy, there is consistent evidence to support the use of xylitol- and sorbitol-containing chewing gum as part of normal oral hygiene to prevent dental caries.

**Commentary**

This is an excellent systematic review performed in a transparent way according to high standards. The PF figures as well as the clinical recommendation are likely to be frequently cited in future publications. The findings, based on 19 articles from 14 study populations with almost 12 000 participants, were consistent but challenge the conclusions of previous reports.<sup>1–3</sup> In contrast with an earlier systematic review,<sup>1</sup> the authors used wider inclusion criteria and accepted both randomised controlled trials (RCT) and observational studies. It should be stressed, however, that only a quarter of the papers were assessed as being of high quality. For example, none of the six RCT was randomised at subject level, and the only paper appraised to be of good quality exhibited marked socio-economic differences between the experimental groups.<sup>4</sup> Furthermore, those authors’ own conclusion was that the caries-preventive effect was a result of the mechanical action of chewing rather than on the different sugar substitutes.<sup>4</sup> The wide acceptance of non-RCT is also problematic in terms of external validity because some of the trials were performed in developing countries which have high caries prevalence and a very sugar-rich diet. Another study displayed an attrition rate of more than 50%,<sup>5</sup> which is highly compromising. It should also be emphasised that all comparisons were computed against “no chewing” groups instead of placebo control. Therefore, it is possible that the PF presented in this review represents a best-case scenario and somewhat overestimates the true caries preventive effect. It was also of interest to find that this review was initiated by the industry and that only four out of the 19 papers were published after year 2000.

An intriguing issue in this field to date has been whether the caries-preventive effect of sugar-free chewing gums can be ascribed to the various polyols themselves or to the general effect of saliva stimulation. The present paper cannot provide an answer to that. Furthermore, health-economic evaluations of preventive programs with chewing-gums are still lacking, so the question remains over whether this is a cost-effective public health measure, especially in the light of obstacles to achieve professional acceptance and patient

Gum Type	Prevented Fraction (PF) Mean	95% Confidence Interval (CI)	Heterogeneity $I^2$
xylitol-containing gum	58.66%	35.42–81.90%	99%
xylitol-sorbitol blend	52.82%	39.64–66.00%	93%
sorbitol	20.01%	12.74–27.27%	56%
sorbitol-mannitol blend	10.71%*	20.50–41.93%	100%

\* not statistically significant

compliance.<sup>6</sup> The present review identifies some important gaps in our knowledge, such as the optimal dose and relative efficacy of the different polyols commonly used in chewing gums, which illustrates the need for further well-designed studies. In any case, the conclusions of this systematic review should be limited to the primary and young permanent dentition: all the included studies were performed in school-aged children.

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### Practice points

- There is good evidence to support the use of sugar-free chewing gums as a caries-preventive measure in schoolchildren, especially in those with increased caries risk.
- Chewing gums should be an adjunct to multiple preventive measures such as fluoride exposure, fissure sealants and patient empowerment.

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