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[Intervention Review]

# Xylitol for preventing acute otitis media in children up to 12 years of age

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## ABSTRACT

### Background

Acute otitis media (AOM) is the most common bacterial infection among young children in the United States with limitations and concerns over its treatment with antibiotics and surgery. Therefore, effective preventative measures are attractive. A potential preventative measure is xylitol, a natural sugar substitute that reduces the risk for dental decay. Xylitol can reduce the adherence of *Streptococcus pneumoniae* (*S. pneumoniae*) and *Haemophilus influenzae* (*H. influenzae*) to nasopharyngeal cells in vitro.

### Objectives

To assess the efficacy and safety of xylitol to prevent AOM in children up to 12 years old.

### Search strategy

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library* 2011, Issue 3) which contains the Cochrane Acute Respiratory Infections Group's Specialised Register, MEDLINE (1950 to August Week 1, 2011), EMBASE (1974 to August 2011), CINAHL (1982 to August 2011), Health and Psychosocial Instruments (1985 to August 2011), Healthstar (OVID) (1966 to August 2011) and International Pharmaceutical Abstracts (2000 to August 2011).

### Selection criteria

Randomised controlled trials (RCTs) or quasi-RCTs of children aged 12 years or younger where xylitol supplementation was compared to placebo or no treatment to prevent AOM.

### Data collection and analysis

Two review authors independently selected trials from search results, assessed and rated study quality and extracted relevant data for inclusion in the review. We contacted trial authors to request missing data. We noted data on any adverse events of xylitol. We extracted data on relevant outcomes and estimated the effect size by calculating risk ratio (RR), risk difference (RD) and associated 95% confidence intervals (CI).

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## Main results

We identified four studies of adequate methodological quality that met our eligibility criteria. In three RCTs with a total of 1826 healthy Finnish children attending day care, there was a reduced risk of occurrence of AOM in the xylitol group (in any form) compared to the control group (RR 0.75; 95% CI 0.65 to 0.88). The fourth RCT included 1277 Finnish day care children with a respiratory infection and found no effect of xylitol on reducing the occurrence of AOM (RR 1.13; 95% CI 0.83 to 1.53). Xylitol chewing gum was superior to xylitol syrup in preventing AOM among healthy children (RR 0.59; 95% CI 0.39 to 0.89) but not during respiratory infection (RR 0.68; 95% CI 0.43 to 1.07). There was no difference between xylitol lozenges and xylitol syrups in preventing AOM among healthy children (RR 0.77; 95% CI 0.53 to 1.11) or among children during respiratory infection (RR 0.74; 95% CI 0.47 to 1.14). Similarly, no difference was noted between xylitol chewing gum and xylitol lozenges in preventing AOM among healthy children (RR 0.73; 95% CI 0.47 to 1.13) or among children during respiratory infection (RR 0.92; 95% CI 0.59 to 1.46). Among the reasons for drop-outs, there were no significant differences in abdominal discomfort and rash between the xylitol and the control groups.

## Authors' conclusions

There is fair evidence that the prophylactic administration of xylitol among healthy children attending day care centres reduces the occurrence of AOM by 25%. This meta-analysis is limited since the data arise from a small number of studies, mainly from the same research group.

## PLAIN LANGUAGE SUMMARY

### Xylitol sugar supplement for preventing middle ear infection in children up to 12 years of age

There is fair evidence to show that a daily dose 8.4 g of xylitol (two pieces of chewing gum, five times a day after meals for at least five minutes) can prevent acute middle ear infection (acute otitis media (AOM)) in children without acute upper respiratory infections attending day care centres.

AOM is the most common bacterial infection among young children in the United States. The key step in the disease is colonisation of the upper airway with bacteria which move from the nasopharynx (the part of the pharynx lying directly behind the nasal passages and above the soft palate) to the middle ear by way of a slender passage called the Eustachian tube. By the age of one, approximately 62% of children have experienced at least one episode of AOM; and by the age of three, almost 83% of children have experienced at least one episode. Although serious complications are rare, this common childhood ailment imposes a huge impact on the healthcare system. In the United States, it accounted for almost 16 million office visits in 2000 and costs almost USD 3.8 billion annually in direct and indirect healthcare costs. Antibiotic treatment of AOM is costly and raises concerns regarding the development of antibiotic-resistant strains of bacteria. Surgery is invasive and costly and because of these factors, effective measures for preventing AOM are sought. An alternative treatment is xylitol or birch sugar. Xylitol has been used for decades as a natural non-sugar sweetener principally in chewing gums, confectionery, toothpaste and medicines, and can reduce the risk of tooth decay. This review found four clinical trials in 3103 Finnish day care children, mainly from the same research group. It was found that xylitol (administered in chewing gum, lozenges or syrup) reduced the occurrence of AOM among healthy children with no acute upper respiratory infection by 25%. No significant adverse effects were identified.