

Policy on the Use of Xylitol in Caries Prevention

Originating Council

Council on Clinical Affairs

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Purpose

The American Academy of Pediatric Dentistry (AAPD) recognizes the benefits of caries preventive strategies involving sugar substitutes, particularly xylitol, on the oral health of infants, children, adolescents, and persons with special health care needs. This policy is intended to assist oral health care professionals make informed decisions about the use of xylitol-based products in caries prevention.

Methods

A MEDLINE literature search was conducted using the terms “xylitol AND dental caries”, “caries prevention”, “plaque reduction”, “maternal *Streptococcus mutans* (MS) transmission”, and “*Streptococcus mutans* long term suppression with xylitol”.

Background

Xylitol is a five-carbon sugar alcohol derived primarily from forest and agricultural materials. It has been used since the early 1960's in infusion therapy for post-operative, burn, and shock patients; in the diet of diabetic patients; and, most recently, as a sweetener in products aimed at improved oral health.¹ Dental benefits of xylitol first were recognized in Finland in 1970, using animal models.² The first chewing gum developed with the aim of reducing caries and improving oral health was released in Finland in 1975 and in the United States shortly after. The first xylitol studies in humans, known as the Turku Sugar Studies,^{3,4} demonstrated the relationship between dental plaque and xylitol, as well as the safety of xylitol for human consumption. These early studies showed the decayed, missing, and filled (dmf) incidence in teeth in a sucrose chewing-gum group was 2.92 compared to 1.04 in the xylitol gum group. The most comprehensive study with xylitol gum, conducted in 1995, compared the effect on caries incidence for xylitol, sorbitol, and sucrose consumption.⁵ The group that received 100% xylitol gum 5 times/day had significantly lower levels of sucrose and free sialic acid in whole saliva than at baseline, and significantly lower plaque index scores.⁵ The xylitol group also exhibited the lowest levels of salivary lactobacilli at endpoint, and this group did not experience the age-related increase in MS as did the other groups.⁵

Xylitol studies show varying results in the reduction of the incidence of caries or MS levels.⁵⁻¹¹ Studies suggest xylitol intake that consistently produces positive results ranged from 4-10 grams per day divided into 3 to 7 consumption periods.⁵⁻¹¹ Higher amounts did not result in greater reduction in incidence of caries and may lead to diminishing anticariogenic results.⁵⁻¹¹ Similarly, consumption frequency of less than 3 times per day at optimal xylitol amount showed no effect.¹²⁻¹⁴ Abdominal distress and osmotic diarrhea have been reported following the ingestion of xylitol.¹⁵⁻¹⁶ Diarrhea has been reported in patients who have consumed 3-60 grams of xylitol per day.¹⁷⁻²¹

Xylitol reduces plaque formation and bacterial adherence (ie, is antimicrobial), inhibits enamel demineralization (ie, reduces acid production), and has a direct inhibitory effect on MS. Prolonged use of xylitol appears to select for a “xylitol-resistant” mutant of the MS cells.²² These mutants appear to shed more easily into saliva than the parent strains,²³ resulting in a reduction of MS in plaque²⁴ and possibly hampering their transmission/colonization from mother to child. Long-lasting effects have been demonstrated up to 5 years after 2 years of using xylitol chewing gum.²⁵ Use of xylitol gum by mothers (2-3 times per day) starting 3 months after delivery and until the child was 2 years old, reduced the MS levels in children up to 6 years of age and was significantly better than applying fluoride varnish or chlorhexidine varnish at 6, 12, and 18 months after delivery. At 5 years of age, the xylitol group had 70% reduction in caries (dmf) as compared with the varnish and chlorhexidine groups. Fluoride varnish alone had little effect on total salivary levels of MS.²⁵ Some studies suggest the chewing process may enhance the caries inhibitory effect of xylitol chewing gum.²⁶⁻²⁹

Xylitol currently is available in many forms (eg, gums, mints, chewable tablets, lozenges, toothpastes, mouthwashes, cough mixtures, nutraceutical products).³⁰ Xylitol chewing gum has been shown to be effective as a preventive agent; however, the usefulness of other xylitol products that have not been studied is uncertain and cannot be recommended at this time because the delivery system and dose/frequency of use both impact the effectiveness of products.

Policy statement

The AAPD:

1. supports preventive strategies aimed specifically at long term caries pathogen suppression and caries (dmf) reduction using commercially available non-cariogenic sugar substitutes such as xylitol.
2. recommends further research on xylitol to improve the evidence-based knowledge, the impact of delivery vehicles, and the identification of optimal prevention strategies to reduce caries (dmf) and improve the oral health of children.
3. encourages xylitol-containing products to be labeled clearly to enable dentists and consumers to evaluate fully their therapeutic value.²⁹

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