Policy on the Use of Xylitol in Caries Prevention

Originating Council
Council on Clinical Affairs

Adopted
2006

Review Council
Council on Clinical Affairs

Revised
2010

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
This policy is an update of the previous policy, adopted in 2006. The update is based upon a review of current dental and medical literature related to the use of xylitol in caries prevention. A MEDLINE literature search was conducted using PubMed with the following parameters: Terms: "xylitol" AND "caries prevention"; Field: all fields; Limits: within the last 10 years; humans, English; birth through 18. Two hundred forty articles matched these criteria; 25 papers were reviewed at this revision. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

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 Mutans streptococci (**MS**) as did the other groups.[5]

Xylitol studies show varying results in the reduction of the incidence of caries or MS levels.[5-13] Studies suggest xylitol intake that consistently produces positive results ranged from 4-10 grams per day divided into 3 to 7 consumption periods.[5-12] Higher amounts did not result in greater reduction in incidence of caries and may lead to diminishing anticariogenic results.[5-13] Similarly, consumption frequency of less than 3 times per day at optimal xylitol amount showed no effect.[14-16] Abdominal distress and osmotic diarrhea have been reported following the ingestion of xylitol.[17-18] Diarrhea has been reported in patients who have consumed 3-60 grams of xylitol per day.[19-23]

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.[24] These mutants appear to shed more easily into saliva than the parent strains,[23] resulting in a reduction of MS in plaque[26] 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.[27-28] 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.[27] Some studies suggest the chewing process may enhance the caries inhibitory effect of xylitol chewing gum.[28-31]

Xylitol currently is available in many forms (eg, gums, mints, chewable tablets, lozenges, toothpastes, mouthwashes, cough mixtures, nutraceutical products).[32-33] Xylitol chewing gum has been shown to be effective as a preventive agent. The effectiveness of other xylitol products is being studied at this time.

Policy statement

The AAPD:

1. supports the use of xylitol as part of a preventive strategy aimed specifically at long term caries pathogen suppression and caries (dmf) reduction in higher risk populations.
2. recommends that, as further research and evidence-based knowledge is available, protocols be established to further clarify the impact of delivery vehicles, the frequency of exposure, and the optimal dosage to reduce caries and improve the oral health of children.
3. encourages xylitol-containing products be labeled clearly with regard to their xylitol content to enable dentists and consumers to ensure therapeutic levels of exposure.[31]

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