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Policy on Use of Xylitol in Pediatric Dentistry

Latest Revision
2024

Abbreviations
AAPD: American Academy of Pediatric Dentistry.
G/day: Grams per day
MS: Mutans streptococci.

Purpose
The American Academy of Pediatric Dentistry (AAPD) recognizes that there is considerable research on sugar substitutes, particularly xylitol, and their potential oral health benefits for infants, children, adolescents, and persons with special health care needs. The AAPD encourages practitioners to follow evolving literature on the effectiveness and limitations of sugar substitutes in preventing caries in children.

Methods
This policy was developed by the Council on Clinical Affairs, adopted in 2006[1], and last revised in 2020[2]. For this revision, literature searches of the PubMed®/MEDLINE and Google Scholar databases were conducted using the terms: xylitol AND dental, systematic review; field: all fields; limits: within the last five years, humans, English, birth through 18. One hundred seventy-four articles matched these criteria; 17 systematic reviews and/or meta-analyses were reviewed for this revision. When data did not appear sufficient or were inconclusive, policy was based upon expert and/or consensus opinion by experienced researchers and clinicians.

Background
Xylitol is a five-carbon sugar alcohol derived from forest and agricultural materials.[3,4] In 1963, the United States Food and Drug Administration (FDA) approved xylitol as a nutritional additive.[4-6] Dental benefits of xylitol first were suggested from Finnish studies using animal models in 1970.[7] The first xylitol studies in humans, the Turku Sugar Studies,[8,9] demonstrated the relationship between dental plaque and xylitol, as well as the safety of xylitol for human consumption. Xylitol as well as other sugar alcohols are not readily metabolized by oral bacteria and, thus, are considered noncariogenic sugar substitutes.[4,9] It is hypothesized that xylitol reduces Mutans streptococci (**MS**) counts and lactic acid production by bacteria in plaque and saliva with minimal effect on normal flora.[4,10,11] Some evidence shows a 30 to 80 percent decrease in caries incidence with consumption of xylitol (five to 10 grams three times per day).[12-14] However, frequencies less than three times a day [less than 3.44 grams per day [**g/day**]) yielded no protective effect.[4,15] Literature, systematic reviews, and meta-analyses show mixed results.[4,16-18]

Evidence regarding the frequency of use, duration of exposure, and age for introduction of xylitol in preventing early childhood caries is inconsistent.[17] The impact of xylitol on preventing caries by interrupting the transfer of cariogenic microorganisms from mother to child is also inconclusive.[8,9,19-27] These studies have been performed with xylitol intake ranging from four to 15 g/day divided into three to seven consumption periods[20-22], with use at higher daily doses yielding significantly better results.[4,15]

Xylitol is available in many neutraceutical products including gums, gummies, candies, mints, chewable tablets, lozenges, toothpastes, mouthwashes, cough mixtures, and oral wipes.[4] Some studies report the chewing process stimulates saliva production which enhances the caries inhibitory effect.[15,17] This can be a significant confounding variable when evaluating the efficacy of xylitol gum as a primary prevention agent.[15,19-25]

The safety profile of xylitol is well documented.[4,28] Studies show few adverse events with xylitol when administered at a recommended dose of six g/day.[4,28] Abdominal distress and osmotic diarrhea are common side effects with higher doses.[15,20-27,29,30] Xylitol also can cause life-threatening toxicoses in dogs.[31]

Xylitol products are branded as a preventive measure for dental caries.[4,15] However, the evidence supporting xylitol's role in the primary prevention of dental caries is mixed, suggesting insufficient evidence to show xylitol products reduce caries rates on their own.[15,20-27,29,32] Design flaws and/or bias (e.g., insufficient sample size, , inconsistent results, randomization, blinding, conflict of interest) limit the significance and applicability of some xylitol studies.[15,20-27,29,30] In addition, optimal results for primary prevention require consistent use of 100 percent xylitol, chewed or consumed three to five times per day after meals with a total dose of five to 10 g/day, which may be unrealistic in clinical practice.[4,15,23,24]

In light of current evidence, the true value of xylitol products lies as sugar substitutes, as they are noncariogenic natural alternatives.[33-35] In 2015, the World Health Organization recommended an ideal reduction of the intake of free sugars to below five percent of total energy intake to reduce the burden of overweight, obesity, and related diseases like dental caries.[36,37] In 2023, the FDI World Dental Federation (FDI) published a position paper on free sugars that called for policies and guidelines to reduce global sugar consumption, delivering the human resources for health, promoting industry accountability, and promoting healthy schools, hospitals, and workplaces.[38] It specifically suggested that dental associations should advocate for and support integrated strategies to reduce free sugars consumption addressing equitable access to appropriate oral healthcare, oral health literacy, health promotion, policy implementation, health surveillance, and monitoring.[38] Judicious use of natural sugar substitutes could be a feasible strategy for reducing sugar consumption as part of a comprehensive caries management plan.[38,39]

Policy statement

The AAPD:

- supports the use of xylitol and other sugar alcohols as noncariogenic sugar substitutes.
- acknowledges the current lack of consistent evidence supporting xylitol as a primary caries-preventive agent, specifically in demonstrating significant reductions in MS among children.
- recognizes that the large dose and high frequency of xylitol use in clinical trials may be unrealistic in clinical practice.
- supports further research to clarify the impact of xylitol delivery vehicles, the frequency of exposure, and the optimal dosage to reduce caries and improve the oral health of children.

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