

# Effect of Xylitol versus Sugar on Caries Risk

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## Research Question

In adult patients, what is the effect of xylitol versus sugar on caries risk?

## Abstract

The effect of xylitol versus sugar on caries risk is a rising trend in caries prevention. The dominant explanation for this trend is explained by xylitol's ability to significantly decrease caries rates in recent studies. To answer the question, in adult patients, what is the effect of xylitol versus sugar on caries risk, we compared previous studies in a literature review. The limitations of these findings include the many intrinsic *and* extrinsic factors that influence plaque accumulation that were not considered. Further research is needed to determine if xylitol alone has caries-prevention qualities.

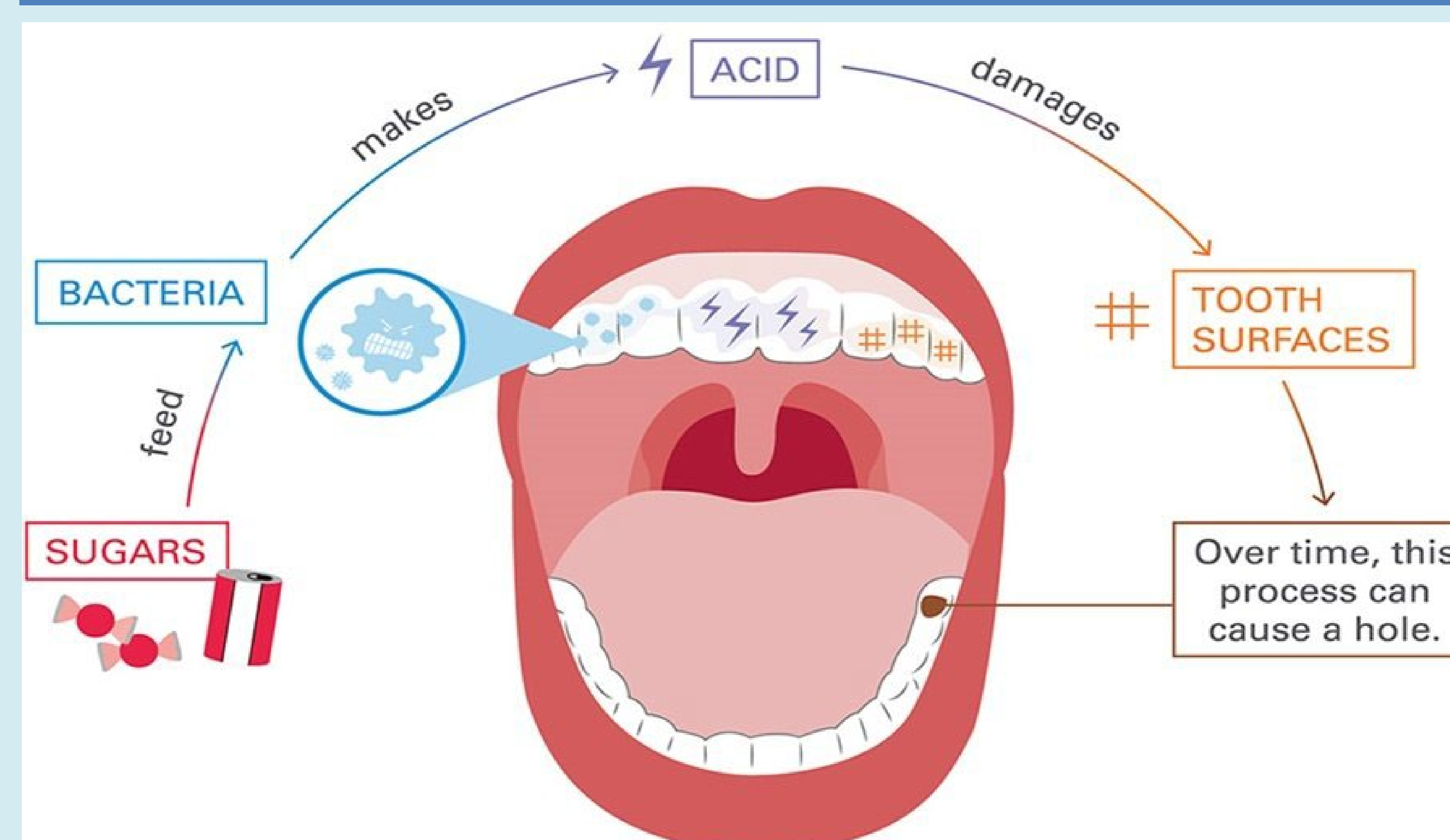
## Introduction

- Dental caries is the most common disease of the oral cavity induced by acid.<sup>5</sup>
- Dental biofilm and plaque consist of *Streptococcus mutans* and *Lactobacilli* microbes, which are potent producers of enamel-compromising acid.<sup>2</sup>
- Xylitol is a natural sugar alcohol found in plants capable of suppressing *Streptococcus mutans* and *Lactobacilli* microbes present in the oral cavity.<sup>3</sup>
- When sugar is broken down by salivary amylase enzymes, it produced acid as a by-product.<sup>5</sup>

## Review of Literature

- Dental caries is very much a diet-associated disease that could be easily prevented if the benefits of sugar substitutes such as xylitol were shared more among healthcare professionals.<sup>4,6</sup>
- Xylitol products work to reduce the lactic acid and the bacterium *Streptococcus mutans* associated with dental caries.<sup>1,4,6,7</sup>
- Xylitol efficacy in both adult and child populations<sup>1,4,6,7</sup>
- Xylitol as a full dietary supplement for sugar over two years at a dose of 67 grams per day had the highest rate of caries reduction at approximately 87% compared to a sugar diet.<sup>6</sup>
- Xylitol chewing gum at a dose of 6.7 grams per day over a year had the second highest rate of caries reduction at approximately 82% compared to sugar gum.<sup>6</sup>

## Process of Caries Initiated by Sugar



## Discussion

- Research has shown that products that contain xylitol as a sugar substitute chewed or consumed three to five times a day have significantly helped to prevent tooth decay.
- Need for more population-specific research studies on this topic.
- Research on xylitol as a complete dietary substitute for sugar to prevent tooth decay exists, but does not discuss any potential downsides.

## Conclusion

- Each of the articles reviewed thus far concludes that frequent use of xylitol products significantly reduces the risk of dental decay.
- Xylitol has a significant effect in reducing plaque in the oral cavity, in addition to decreasing caries risk.
- Patients benefit the most from nutritional counseling centered around xylitol and from being offered xylitol products from their dental homes.
- There is a need for more population-specific research studies on this topic.

## References

1. ALHumaid, J., & Bamashmous, M. (2022). Meta-analysis on the effectiveness of xylitol in caries prevention. *Journal of International Society of Preventive and Community Dentistry*, 12(2), 133. [https://doi.org/10.4103/jisped.jisped\\_164\\_21](https://doi.org/10.4103/jisped.jisped_164_21)
2. Forssten, S. D., Björklund, M., & Ouwehand, A. C. (2010). *Streptococcus mutans*, caries and simulation models. *nutrients*, 2(3), 290–298. <https://doi.org/10.3390/nu2030290>
3. Gasmı Benahmed, A., Gasmı, A., Arshad, M., Shanaida, M., Lysiuk, R., Peana, M., Pshyk-Titko, I., Adamiv, S., Shanaida, Y., & Björklund, G. (2020). Health benefits of Xylitol. *Applied Microbiology and Biotechnology*, 104(17), 7225–7237. <https://doi.org/10.1007/s00253-020-10708-7>
4. Janket, S.-J., Benwait, J., Isaac, P., Ackerson, L. K., & Meurman, J. H. (2019). Oral and systemic effects of xylitol consumption. *Caries Research*, 53(5), 491–501. <https://doi.org/10.1159/000499194>
5. Medical. (2021, January 6). *What are dental caries: Caused, symptoms & dental caries treatment*. medical. Retrieved October 17, 2022, from <https://www.radiantstardental.com/blog/what-are-dental-caries-causes-symptoms-treatment/>
6. Mäkinen, K. K. (2011). Sugar Alcohol Sweeteners as Alternatives to Sugar with Special Consideration of Xylitol. *Medical Principles and Practice*, 20(4), 303–320. <https://doi.org/10.1159/000324534>
7. Söderling, E., & Pienihäkkinen, K. (2021). Effects of xylitol chewing gum and candies on the accumulation of dental plaque: a systematic review. *Clinical Oral Investigations*, 26(1), 119–129. <https://doi.org/10.1007/s00784-021-04225-8>