Xylitol Gum – A Solution to Cavities Caused by Dry Mouth

Abstract

Not only is having a dry mouth uncomfortable, but it also contributes to tooth decay and to cavities because people with dry mouth do not produce enough saliva, which has bacterial properties. Chewing xylitol gum is a convenient and unobtrusive way of addressing both of these issues. Xylitol gum simulates saliva production, which helps relieve symptoms in more minor cases of dry mouth. In addition, the sugar xylitol also has inherent anti-bacterial properties, which help quench the growth of bacteria responsible for tooth decay and acid wear.

Problem Statement

Having a dry mouth can be uncomfortable, but it also puts you at a heightened risk of tooth decay. Dry mouth is caused by lowered production of saliva. Saliva has several cavity-preventing properties: it kills plaque-producing bacteria, neutralizes teeth-damaging acids produced by bacteria, and strengthens teeth by replenishing vital minerals such as calcium (Dowd). Having a healthy flow of saliva is particularly important after eating starchy or sugary foods because these foods provide fuel for the immediate growth of acid-producing bacteria – the acidic waste products of these bacteria corrode teeth, contributing to tooth decay (Hardie). Therefore, the flow of saliva during and after eating helps hinder the growth of these bacteria while neutralizing their acidic products.

Roughly 21-27% of the general adult population has dry mouth (Nederfors), benefitting less from the cavity-preventing properties of saliva since they do not produce sufficient
quantities. Therefore, this segment of the population needs to pay particular attention to their dental hygiene especially after eating sugary or starchy foods.

**Description of Solution**

An intuitive but flawed solution for people with dry mouth would be to brush their teeth after eating or drinking. However, overly-frequent tooth brushing may actually be harmful to your teeth. Acids from food weaken tooth enamel, so brushing too soon after a meal may actually wear down teeth by removing enamel (Carr). Besides having the potential to damage teeth, brushing your teeth after every meal or snack can be highly inconvenient: making the time to find a sink and brush after every coffee break and small snack is simply not feasible for many people. An ideal dental solution would need to be as unobtrusive and portable as possible to fit into the fast-paced nature of modern lifestyles.

One product marketed towards people with dry mouth is artificial saliva, a lubricating liquid that can be sprayed into the mouth to relieve symptoms of dry mouth. However, in addition to being difficult to find commercially (“Learn More about Artificial Saliva”), these products can be embarrassing to use. Dry mouth has varying degrees of severity, so people with more minor symptoms of dry mouth may find artificial saliva to be too strong of a solution, as these products tend to be designed for people with more extreme cases of dry mouth. A more commercially-available product that is designed for casual use would therefore benefit more people.

Many artificial salivas contain the natural sugar xylitol which has been demonstrated to reduce the incidence of cavities and tooth decay by as much as two-thirds (Council of Clinical Affairs). Xylitol inhibits cavities in two ways: first, xylitol directly interferes with the growth of cavity-causing bacteria by interfering with bacterial metabolism (Alves et al.). Second, xylitol
increases the flow of saliva in the mouth while making dental plaque less acidic (Aguirre et al.), helping activate and augment the cavity-preventing properties of saliva. Ingesting xylitol regularly may relieve symptoms of dry mouth and assist in the prevention of cavities. Given that xylitol is sweet and low in calories (Walter), it could easily replace sugar in some products to make them more dental-friendly.

How Product or Service Solves Problem

Xylitol chewing gum is one such product that has entered the market within the past few years. In addition to being extremely effective at reducing the incidence of cavities – a 1995 study demonstrated that chewing xylitol gum several times a day resulted in a 76% reduction in the rate of cavities (Mäkinen et al.) – the use of xylitol gum is an unobtrusive way to add to one’s daily oral health regime. For people who chew gum on a regular basis, swapping out regular gum for xylitol gum takes advantage of pre-existing gum-chewing habits, unlike other dental routines (such as flossing) which may require more substantial behavioural modifications. Unlike other dental routines, chewing xylitol gum can be pleasant due to the sweet and flavourful nature of the sugar.

Xylitol gum provides a quick way to counteract the effects of acid-producing bacteria after eating, when the bacteria are most active. Unlike other methods that may require locating a sink or toiletries, xylitol gum can be chewed immediately after eating regardless of location. Another factor to consider is the number of times you eat or drink during the day. In addition to major meals, growth of cavity-causing bacteria occurs after eating even light snacks and drinks – such as sugary coffees in the morning, soda from the vending machine, or pretzels as you work at the office. Rushing to the washroom to clean your teeth after each snack may not be feasible.
Therefore, xylitol gum provides a quick way to maintain your teeth in accordance with busy schedules.

Finally, chewing gum is generally socially appropriate, meaning that there is no embarrassment in chewing xylitol gum in public. Other dental routines, such as flossing, may not be appropriate to conduct on public transit, or even in a public washroom. Conversely, very few people will consider it offensive to chew gum in a public place. People with dry mouth will find the ability to chew xylitol gum whenever necessary a relief, given the saliva-simulating properties of xylitol. The lack of significant social stigma around chewing gum in most places mean that they can relieve discomfort associated with dry mouth whenever symptoms flare up.

One thing to be aware of, however, is that xylitol has a slightly laxative effect – while not toxic, excessive consumption of over 65 grams a day might cause diarrhea in a small percentage of the population (Wang et al.). However, given that most retail gums tend to contain only around 1 gram of xylitol even for 100% xylitol gums (“Cinnamon Xylitol...”), even regular chewers of xylitol gum will find it difficult to consume over the limit. When used in moderation, xylitol gum has no adverse effects. Otherwise, xylitol is considered a healthier alternative to sugar, having about two-thirds of the calories of sugar; xylitol is absorbed into the bloodstream much slower than sugar as well (Walters), making it suitable for people with diabetes.

Should you decide that xylitol gum is a good fit for your daily dental routine, one suggestion would be to buy a 100% xylitol gum as opposed to a xylitol-sorbitol mixture. While all gums with xylitol in them reduce the prevalence of cavities, pure xylitol gums are much more effective than xylitol-sorbitol mixtures at doing so (Mäkinen et al.). Some manufacturers will advertise their gums as “having xylitol” when their gums only have a small ratio of xylitol to other sugars. Scrutinizing labels and reading ingredient lists will help you get the most dental benefit from your chewing gum.
**Conclusion**

Despite being an easy solution requiring few behavioural modifications, chewing xylitol gum has been shown to significantly reduce the prevalence of cavities associated with having dry mouth. Chews of xylitol gum benefit from having a convenient and lightweight product that can be used at virtually any time and place. People who wish to adopt the habit of chewing xylitol gum are advised to chew gum immediately following meals, to buy 100% xylitol gum as opposed to a mixture with xylitol in it, and to watch their daily intake of xylitol such that it does not exceed 65 grams a day.

**References**


Usability Report

On November 4th, 2014, this white paper was read by three peer-reviewers from the Writing 2205F course at the University of Western Ontario. This report discusses feedback from these reviewers, and the modifications made to the white paper as a result of integrating this feedback.

One issue that all reviewers noticed was that the tone of the white paper was at times too informal. In the original paper, I used some colloquial language with the intent of fostering a friendly tone for my audience, but on review I agreed that the informality was at odds with the ethos of the paper, making my writing seem less objective in the areas where I was less formal. Accordingly, I edited key sections to make my writing more formal. These modifications also created a more consistent tone throughout the piece, given that I heavily cite scientific papers and make use of scientific fact.

One reviewer noted that I made heavy use of unnecessary conjunctions in my writing (such as therefore, however, etc. in beginning my sentences). Upon re-reading my report, I agreed that the excessive use of conjunctions was distracting for readers. I removed conjunctions that did not contribute significantly to the structure of my writing.

Finally, another reviewer suggested that my description of solution section should focus more on the physical features of the product, rather than alternatives to the product. However, I chose to reject this feedback, because given the very simple nature of my product, a discussion of physical features of chewing gum beyond the medicinal properties of xylitol would not be very informative to my reader. I chose to use this section to focus on features that consumers would require in “a” solution, so I could demonstrate how xylitol gum fulfilled these requirements in the subsequent section. The examples of tooth-brushing and using artificial saliva demonstrated why certain features were necessary, so I chose to retain these examples.