預防蛀牙：木糖醇是否優於氟化物呢?

Does Xylitol Outshine Fluoride in the Fight against Tooth Decay?

By Spring Hatfield, RDH - March 23, 2019

多年來，氟化物一直是牙科對抗蛀牙的黃金標準。1945 年，美國開始實施了飲水加氟。在飲水加氟後的 12 年間，蛀牙減少了 60%。1950 年，第一批含氟牙膏上市銷售[1,2]。氟化物的發現無疑對減少蛀牙有很大的好處。但即使使用含氟牙膏和飲水加氟，在 20 到 64 歲之間的成年人中仍有 92%經歷過蛀牙[3]。雖然目前普遍支持使用氟化物來減少蛀牙，但很明顯地我們需要在這場持續對抗蛀牙的鬥爭中為我們的武器庫添加一些工具。

木糖醇或許是我們進一步減少蛀牙所需的工具。木糖醇是天然存在的五碳糖多元醇。它存在於水果、蔬菜和莓果中。它也可以使用富含木聚醣的植物製造。

在過去的 40 年裡，木糖醇對於蛀牙的成效被廣泛研究。發現木糖醇能破壞變形鏈球菌(Streptococcus mutans)能量導致細胞死亡以降低牙菌斑和唾液中的數量。也被證實可以降低變形鏈球菌(Streptococcus mutans)在牙齒表面的黏附以及產酸量。木糖醇可增加唾液流量和提高 pH 值，使其成為口腔乾燥症患者的一個很好的選擇[4]。

變形鏈球菌(Streptococcus mutans)是導致兒童早期齲病的主要細菌之一。 兒童經常通過垂直或水平傳播方式從母親獲得細菌[7,8]。在一項對照試驗中，研究人員比較木糖醇和氟化物在母親與孩童間傳播變形鏈球菌(Streptococcus mutans)數量中的作用。他們發現，與木糖醇組相比，氟化物組的變形鏈球菌(Streptococcus mutans)數量顯著增加。該研究的結論是，母親木糖醇的攝入可以減少唾液中變形鏈球菌(Streptococcus mutans)的數量並減少孩童齲齒發生風險[9]。

一項臨床試驗中，針對 179 名高齲齒風險成人使用低劑量木糖醇口香糖進行 12 個月的追蹤。受試者每天早晨、中午和下午三次咀嚼口香糖 5 分鐘。木糖醇的每日總攝入量為 2.5 克。該研究得出結論，低劑量木糖醇口香糖的使用可顯著降低齲齒的增加[5]。木醣醇存在於許多口香糖和硬糖中。推薦某些患者使用木糖醇糖和口香糖來減少蛀牙，特別是兒童或口腔乾燥症患者。

木糖醇的使用也被運用在牙科臨床中。一項評估 20%木糖醇漆(相似於氟漆，但是成分是木糖醇)對牙齒初期琺瑯質侵蝕(脫鈣)的再礦化作用效果，發現琺瑯質再礦化顯著增加，再礦化與氟漆一樣有效。這項研究為臨床試驗打開了大門，進一步證實了木糖醇漆的效果[6]。木糖醇漆或許能成為氟漆的替代品，特別是在我們目前看到有些反氟化物聲音的時代。

一項又一項的研究支持木糖醇對於減少蛀牙方面的功效。發現更有趣的是，木糖醇似乎是許多病原體菌株的剋星，不僅僅是與蛀牙有關的菌株；木糖醇也能降低牙周病桿菌幽門螺桿菌(Helicobacter pylori)的數量並抑制牙齦卟啉單胞菌(Porphyromonas gingivalis)的作用[4,10]。根據這些研究，木糖醇可能會是預防和治療牙周炎以及預防齲齒的候選物之一。

在臨床研究發現木糖醇可降低念珠菌病和口角炎的風險[11]。它具有益生菌作用，可降低葡萄糖，三酸甘油脂和膽固醇[12]。有些證據表明木糖醇可減少兒童急性中耳炎的發生[13]。當木糖醇與紅參一起作膳食補充劑時，發現能有效改善甲型流感病毒（H1N1）的流感誘發症狀[14]。木糖醇似乎不論在藥物或是營養方面都具有廣闊的前景。

雖然木糖醇是安全的，並且已被證明可有效治療人類的許多不同的醫學和牙科疾病，但對於我們的毛茸茸的朋友，特別是狗，這是不安全的。狗攝入木糖醇可能導致嚴重的低血糖，以及急性腎衰竭和其他出血性疾病。如果狗攝取含木糖醇的產品，必須立即進行治療[15]。

木糖醇應用於牙科的未來性是能夠期待的。為患者提供更多選擇進而提高遵從性，並有望降低蛀牙率。每個患者都需要個別化的牙科疾病預防計劃。雖然氟化物已被證明有效且安全，但一些患者可能更受益於含木糖醇成分之漱口劑或牙膏。我們可以提醒並尊重那些喜歡使用非氟化產品的患者，推薦其他已被證明有效的選擇，如木糖醇。

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For years fluoride has been dentistry's gold standard in the fight against tooth decay. In 1945, water fluoridation was implemented. A 60% reduction in tooth decay was reported over a 12-year span after water fluoridation. In 1950, the first fluoride toothpastes were marketed.[1,2] The discovery of fluoride has no doubt been a huge benefit in reducing tooth decay. Even with the use of fluoride toothpaste and fluoridated water, a staggering 92% of adults between the ages of 20 and 64 have experienced tooth decay.[3] Though I am an avid supporter of the use of fluoride to reduce tooth decay, it is becoming quite clear that we need to add some tools to our arsenal in this ongoing fight against tooth decay.

Xylitol may be just the tool we need to reduce tooth decay further. Xylitol is a naturally occurring five-carbon sugar polyol. It is found in fruits, vegetables, and berries. It can also be manufactured using xylan-rich plant materials.

Xylitol has been widely studied over the past 40 years for its effect on tooth decay. Xylitol has been found to reduce the levels of Streptococcus mutans in plaque and saliva by disrupting their energy production process leading to cell death. It has also been shown to reduce adhesion of S. mutans to the tooth surface and reduces their acid production. Xylitol increases saliva flow and pH levels, making it a great option for patients suffering from xerostomia.[4]

S. mutans is one of the primary bacteria that contribute to early childhood caries. Children often acquire this bacterium from their mothers via vertical or horizontal transmission.[7,8] In a controlled trial, researchers compared the effect of xylitol and fluoride in the transmission of S. mutans from mother to child. They discovered the fluoride group had a significant increase in the level of S. mutans when compared to the xylitol group. The study concluded that maternal xylitol consumption provides preventative outcomes on salivary levels of S. mutans and caries risk in children.[9]

A clinical trial on caries prevention using low dose xylitol gum in high caries risk adults followed 179 subjects over 12 months. The participants chewed the gum for 5 minutes 3 times a day, morning, midday and afternoon. The total daily intake of xylitol was 2.5 grams a day. The study concluded there was a significantly lower caries increment associated with low dose xylitol gum use.[5] Xylitol can be found in many chewing gums and hard candies. Recommending the use of xylitol candy and gum in reducing tooth decay may be appealing to some patients, especially children and patients with xerostomia. I believe patient compliance would not be an issue with this homecare method.

Xylitol may be making its way into clinical settings as well. A study in situ evaluating the effect of 20% xylitol varnish on remineralization of artificial incipient lesions found a significant increase in enamel remineralization. The remineralization was found to be as effective as commonly used sodium fluoride varnishes. This study opens the door to clinical trials, to further confirm these findings.[6] Xylitol varnish may be a promising alternative to fluoride varnish, especially during this anti-fluoride era we are seeing currently.

Study after study supports the efficacy of xylitol in the reduction of tooth decay. What I find more interesting is that xylitol appears to be kryptonite to many strains of pathogens, not just those associated with tooth decay. Xylitol has been shown to reduce levels of the periodontopathic bacteria Helicobacter pylori and inhibit the effects of Porphyromonas gingivalis.[4,10] Considering these studies xylitol may be a promising candidate for the treatment and prevention of periodontitis as well as dental caries.

In vivo studies have found xylitol reduces the risk of candidiasis and angular cheilitis.[11] It has prebiotic effects which can reduce glucose, triglycerides, and cholesterol level.[12] There is some evidence that xylitol may reduce the occurrence of acute otitis media in children.[13] When xylitol is used in conjunction with Red Ginseng as a dietary supplement, it has been found to effectively ameliorate influenza-induced symptoms from the influenza A virus (H1N1).[14] It seems that xylitol has a promising future in pharmaceuticals and nutrition.

Though xylitol is safe and has been shown effective in treatments for many different medical and dental diseases in humans, it is not safe for our furry friends, particularly dogs. Xylitol ingestion in dogs may lead to severe hypoglycemia followed by acute kidney failure and other bleeding disorders. Immediate treatment by a veterinarian is necessary in the event a dog ingests xylitol-containing products.[15]

I am excited about the possibilities for the future of xylitol in dentistry. More options for patients lead to better compliance and hopefully lower percentages of tooth decay. Every patient needs an individualized plan for the prevention of dental diseases. Though fluoride has been shown effective and safe, some patients may better benefit from xylitol rinses or toothpaste. We can be mindful and respect patients that prefer to use non-fluoridated products by recommending other options that have been shown to be effective, such as xylitol.

Resources

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