



Awareness ,Knowledge Of Xylitol Sugar Free Chewing Gums Among Undergraduate Dental Students- A Questionnaire

S.M.Shabana Khathoon,
Saveetha Dental College Chennai.

Dr.Shabeena,
Saveetha Dental College,Chennai.

Abstract:

Aim:-The aim of this research is to assess the knowledge and bring awareness on xylitol sugar free chewing gums among undergraduates.

Background:Xylitol is indeed becoming quite popular especially in dentistry and for good reason it helps prevent cavities. It is a natural “sugar alcohol” similar to other so-called sugar alcohols such as mannitol and sorbitol used as sugarless sweeteners. Xylitol also has the added effect of stopping the saliva from becoming acidic so that decay not only doesn't start, but rather your mouth becomes an environment that favors non-acid producing bacteria. Researchers have found that systematic use of xylitol chewing gum significantly reduces the relative risk of caries (tooth decay) when compared to chewing gums containing sorbitol/xylitol and sucrose. Additionally, xylitol gum is more frequently associated with halting the progression of very tiny cavities versus other combinations of chewing gum. The use of other products containing xylitol such as mints, candy, and cookies has shown a decreased incidence of dental caries by arresting active decay.

Reason:This study was done to bring awareness and knowledge about benefits of xylitol which is an excellent way to protect overall oral health and even prevent cavities

Keywords: dental caries,xylitol, sugar substitutes, prevention

INTRODUCTION:

It is a natural “sugar alcohol” similar to other so-called sugar alcohols such as mannitol and sorbitol used as sugarless sweeteners. Xylitol is a sugarless sweetener usually derived from birch trees and it can be found in gum, lozenges and candies Xylitol is a naturally occurring diabetic-safe, low-calorie carbohydrate that is obtained from the bark of birch trees, coconut shells and cottonseed hulls. It looks and tastes like sugar and is comparable in sweetness. The main culprit associated with tooth decay, xylitol is not broken down by the most prominent decay causing bacteria, Mutans Streptococci, to produce acid. Remineralizing teeth actually makes for stronger teeth, and the news gets even better. xylitol inhibits the growth of bacteria that causes cavities but also it works as well fluoride in helping to strengthen teeth.(1). xylitol not only rids the mouth of sticky harmful bacteria, it actually promotes the growth of tooth-protective, non-acidic bacteria. Plaque bacteria use sucrose and carbohydrates from our diet to grow and multiply. (2)They create sticky threads that allow them to attach to the tooth surface and each other to form thick layers and acids that damage teeth.Xylitol actually inhibits the growth of the bacteria that cause cavities. It does this because these bacteria (Streptococcus mutans) cannot utilize xylitol to grow. When plaque bacteria absorb Xylitol, they cannot multiply, produce acids, or stick to teeth. (3)Over time with xylitol use (gums, mints and rinses), the quality of the bacteria in the mouth changes and fewer and fewer decay-causing bacteria survive on tooth surfaces. Less plaque forms and the level of acids attacking the tooth surface is lowered. Xylitol also raises mouth pH and encourages mineral-rich saliva to flow in to the mouth. This can protect and remineralize teeth by repairing the deep layers of enamel.(3,4)

MATERIALS AND METHODS:-

A questionnaire based study on awareness and knowledge of xylitol sugar free chewing gums and prevention of caries was conducted among undergraduates in saveetha dental college . This questionnaire were distributed among 100 students. The students were requested to answer the questionnaire . The questionnaire contains about knowledge, frequency, reason for using xylitol chewing gums. Data were collected and analysed.If the questionnaire was not filled completely ,it was not excluded as whole,but only the answer questions were taken into considerations in statistical analysis

DISCUSSION:-

Chewing gums are made of natural or synthetic materials. The main constituent is the gum resin or the gum base. It also contains some amount of preservatives, flavoring and sweetening agents like sucrose (sugared chewing gums). The only exception can be of a sugar substitute, i.e., xylitol as a sweetening agent instead of sucrose. Clinical evidence shows that the use of sugar-free chewing gum does not lead to caries, presumably because the sugar substitutes used do not lead to the production in plaque of metabolic acids at a rate sufficient to cause a fall in pH and to attack the teeth(5).Many clinical evidence found that the awareness of xylitol sugar free chewing gums is very less compared to topical fluorides and sealants.The evidence suggests that chewing sugar-free chewing gum, used immediately after meals, reduces caries. The observed caries reduction can be ascribed to saliva stimulation throughout the chewing process, the lack of sucrose and the inability of bacteria to metabolize polyols into acids. No evidence for a direct therapeutic effect caused by Sorbitol or Xylitol was found. Further well-designed randomized trials are needed to confirm these findings.

The only varieties of gum with the ADA Seal are sugarless. Chewing sugarless gum should not replace brushing and flossing. The ADA recommends brushing twice a day with fluoride toothpaste and cleaning plaque from between your teeth once a day with dental floss or other interdental cleaners. The ADA Seal is your assurance that the sugar-free chewing gum has met the ADA criteria for safety and effectiveness..(5,6)

In another study, researchers had mothers chew xylitol gum 3 months after delivery until their children were 2 years old. The researchers found that children in the xylitol group had "a 70% reduction in cavities (dmf)(7)". Xylitol has been used extensively to sweeten chewing gum and its properties have attracted considerable attention either as a bulk sweetener on its own or mixed with sorbitol in various proportions. It does not appear to be metabolized to form acid by any oral microorganism and indeed in vitro it is an antimetabolite, since on entering the cell it is phosphorylated to form an inhibitory compound. (8.Xylitol in chewing gum is reported to reduce the proportions of mutans streptococci in plaque or saliva(9) and the amount of plaque present(9,10). Recent researches confirm a plaque-reducing effect and suggests that the compound, having some chemical properties similar to sucrose, attracts and then "starves" harmful micro-organisms, allowing the mouth to remineralize damaged teeth with less interruption.(11)The results of this study tend to confirm the previous report that consumption of sugar-free chewing gums (xylitol), over a period of time, leads to an increase in the alkaline pH of saliva and plaque from an acidic pH and thereby prevent decay to the teeth.(12,13)

Park et al. reported the results of comparisons of the plaque pH effects of sugared and sugar-free chewing gum after an acidogenic challenge. Their preliminary report also suggested that when chewed for 20 min, both chewing gums reduced the fall in pH, but the sugar-free chewing gum was more effective than its counterpart(14). The time for the collection of saliva was kept in the morning (8:30 a.m.) because there is a circadian variation in the flow rates of saliva from all the glands. The peaks of ion concentration are usually either in the early morning (6 a.m.-8 a.m.) or in the early evening (4 p.m.-8 p.m.).So keeping that in mind, the time was kept in the morning to avoid any difficulty while collecting the saliva samples.(15,16,17)

According to a study done by Dawes, the concentration of ions in the saliva keeps changing as the time progresses. Hence, in this study, saliva and dental plaque samples were taken at five different time intervals to record the variations in their pH values.(16)Another study has shown that both the chewing gums (sugar and sugar-free) can also enhance the remineralizing forces in the mouth leading to the repair of early white spot lesions.(18,19)Previous studies have been done to assess the pH changes after consuming snacks or meals or juices only. (18)But in the present study, there is a marked increase in the pH of saliva, only after chewing

sugar-free chewing gum. Parallel studies have been done to assess the reduction of *S. mutans* as a result of use of xylitol. There have been a universal agreement that the use of xylitol helps to prevent dental caries not only by increasing the pH of saliva and dental plaque, but also by reducing the number of salivary microorganisms present in the oral cavity.(20)

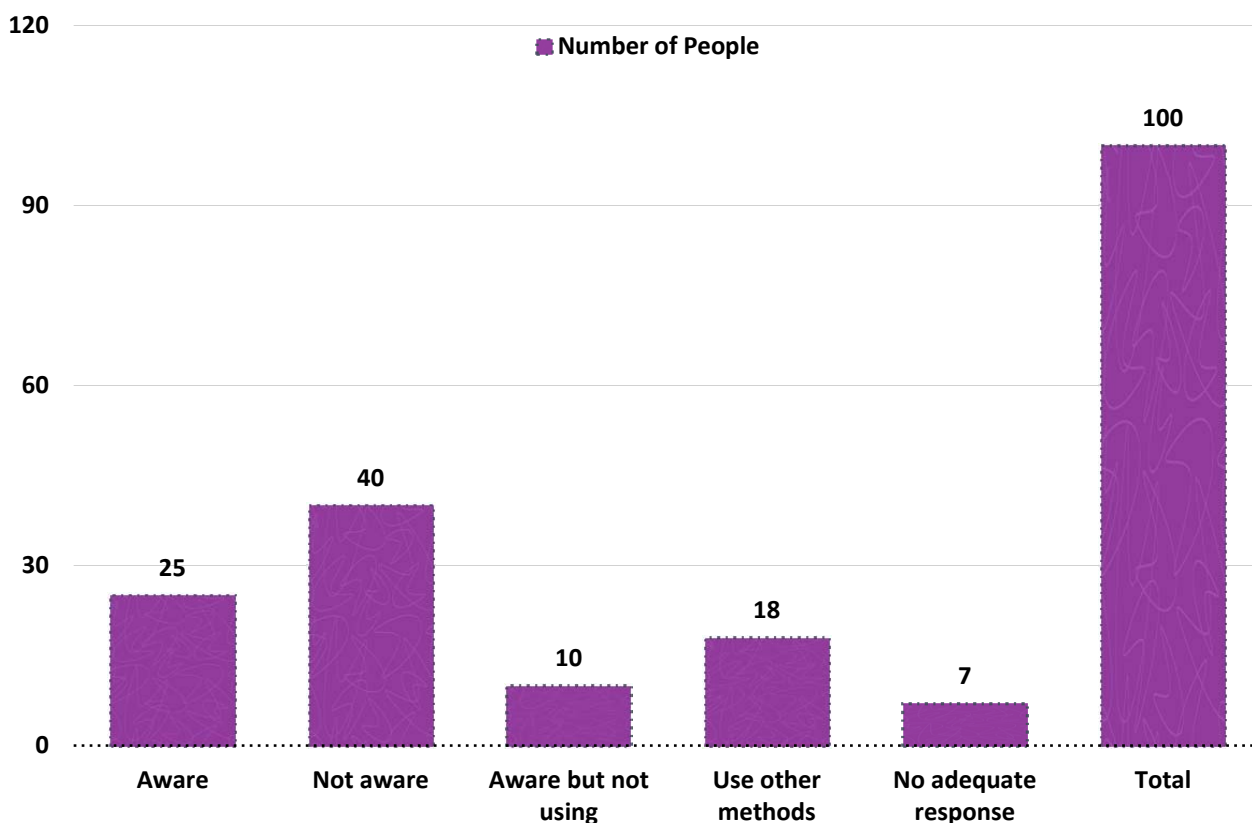
Holgerson et al. did a study to investigate the short and long term effects of daily use of xylitol chewing gum on mutans streptococci and xylitol uptake in saliva. They found that consumption of xylitol could alter salivary microbial composition only during the intervention period, i.e., for a shorter period of time, but when consumed for longer time duration, i.e., for 6 months or more, there was no alteration in the salivary microbial composition.(21,22)

Several studies have shown that chewing gums containing xylitol can reduce caries incidence by a variable amount, when compared with a sucrose containing chewing gum or no chewing gum(20,21). Double-blind, placebo-controlled studies enrolling a total of almost 4000 children, have found that xylitol gum, candy or toothpaste can help prevent cavities(23). Clinical studies have shown that chewing sugarless gum for 20 minutes following meals can help prevent tooth decay, according to the ADA. The chewing of sugarless gum increases the flow of saliva, which washes away food and other debris, neutralizes acids produced by bacteria in the mouth and provides disease-fighting substances throughout the mouth. Increased saliva flow also carries with it more calcium and phosphate to help strengthen tooth enamel.(24)

Xylitol provides benefits in two ways as a sugar substitute and as an antimicrobial used at higher doses. It is non-acidogenic and non-cariogenic. When used properly, xylitol can help stop the formation of tooth decay (cariostatic). A recent study demonstrated that as a water additive for animals, xylitol was effective in reducing plaque and calculus accumulation in cats.(25)

RESULTS:

The study records based on the questionnaires showed that out of the 100 people contacted regarding the study and all the 100 people agreed to participate in the study. The study was basically conducted on under graduate students from a dental school. These 100 students included both male and female students. All these students belonged to different age groups studying different years of dental education. The main purpose of this study is to determine the awareness of xylitol chewing gums and their uses in preventing dental caries. The results showed that about 25% of students were aware of the availability of xylitol chewing gums and were interested in using them for caries prevention and were also positive in advising the same to their patients, about 40% of students were unaware of the availability of xylitol chewing gums and were more interested in knowing more about their uses in caries prevention, about 0% of students were aware of the xylitol chewing gums but were not using or advising because of



various factors, about 18% of students were more inclined towards using other modes of caries prevention and the remaining 7% students did not respond properly to draw any conclusion. So based on the concerned questionnaire study, the results showed that the awareness of the use of xylitol chewing gums are still in their early times as majority of students were not aware about their availability and there are chances in the near future to see much improvement in use of xylitol chewing gums in caries prevention.

CONCLUSION:

To determine the degree of awareness in using xylitol chewing gums to prevent dental caries present among students from different age groups from a dental school. The questionnaire focused mainly on the awareness in use of xylitol chewing gums as a mode of caries prevention. Initially 100 students were contacted regarding the study and all 100 students actively agreed to be a part of it. The results showed that about 25% of the students were well aware of the availability of xylitol chewing gums in the market and were currently using them as a mode of caries prevention and are even positive about recommending these chewing gums to their patients. Whereas about 40% of students were not aware of the xylitol chewing gums and their uses in caries prevention as they were relatively new to dentistry but were more positive about knowing the advantages of using xylitol chewing gums in the future to prevent caries formation. About 10% of students were aware about the xylitol chewing gums but were not using them as they were

comparatively costly, had less or no taste to be used for children and were not knowing about the benefits of these chewing gums to prevent caries formation. About 18% of students preferred to use other methods for caries prevention rather than the xylitol chewing gums as the other modes have been available for a very long time, are much cheaper and are more commonly used. Whereas the remaining 7% of students didn't respond properly to the questionnaire to draw any conclusion regarding the awareness of use of xylitol chewing gums in caries prevention. So based on the results obtained from the above mentioned graph, it can be concluded that the awareness among students in using xylitol chewing gums for caries prevention is still in the early days and not very popular in caries prevention. But there is scope for these chewing gums to play a major role in caries prevention in the future compared to other modes of caries prevention.

REFERENCE:

1. June 25, 2014 by Hogan" Reason to use Xylitol chewing gums"
2. Edgar WM. Sugar substitutes, chewing gum and dental caries - A review. *Br Dent J* 1998;184:29-32
3. Wennerholm K, Arends J, Birkhed D, Ruben J, Emilson CG, Dijkman AG. Effect of xylitol and sorbitol in chewing-gums on Mutans streptococci, plaque pH and mineral loss of enamel. *Caries Res* 1994;28:48-54
4. Kandelman D, Gagnon G. A 24-month clinical study of the incidence and progression of dental caries in relation to consumption of chewing gum containing xylitol in school preventive programs. *J Dent Res* 1990;69:1771-5
5. Tanzer JM. Xylitol chewing gum and dental caries. *Int Dent J* 1995;45:65-76

6. Macpherson LM, Dawes C. An in vitro stimulation of the effects of chewing sugar-free and sugar-containing chewing gums on pH changes in dental plaque. *J Dent Res* 1993;72:1391-7.
7. Park K, Schemehorn BR, Bolton JW, Stookey GK. Effect of sucrose and sorbitol gums on plaque pH responses. *J Dent Res* 1991;70:404.
8. Tenovuo JO. *Human Saliva: Clinical Chemistry and Microbiology*. Vol. 1. Boca Raton, Florida: CRC Press, Inc.; 1989.
9. Dawes C. The effects of flow rate and duration of stimulation on the concentrations of protein and the main electrolytes in human parotid saliva. *Arch Oral Biol* 1969;14:277-94
10. Manning RH, Edgar WM. pH changes in plaque after eating snacks and meals, and their modification by chewing sugared- or sugar-free gum. *Br Dent J* 1993;174:2414.
11. Banan LK, Hegde AM. Plaque and salivary pH changes after consumption of fresh fruit juices. *J Clin Pediatr Dent* 2005;30:9-13.
12. Jannesson L, Renvert S, Kjellsdotter P, Gaffar A, Nabi N, Birkhed D. Effect of a triclosan-containing toothpaste supplemented with 10% xylitol on Mutans streptococci in saliva and dental plaque. A 6-month clinical study. *Caries Res* 2002;36:36-9.
13. Kakuta H, Iwami Y, Mayanagi H, Takahashi N. Xylitol inhibition of acid production and growth of Mutans streptococci in the presence of various dietary sugars under strictly anaerobic conditions. *Caries Res* 2003;37:404-9.
14. Sintes JL, Escalante C, Stewart B, McCool JJ, Garcia L, Volpe AR, et al. Enhanced anticaries efficacy of a 0.243% sodium fluoride/10% xylitol/silica dentifrice: 3-year clinical results. *Am J Dent* 1995;8:231-5.
15. Assev S, Vegarud G, Rolla G. Growth inhibition of *Streptococcus mutans* strain OM7 176 by Xylitol. *Acta Pathol Microbiol Immunol Scand [B]* 1980;88:61-63.
16. Creanor SL et al. The effect of chewing gum use on In-situ enamel lesion remineralisation *J Dent Res* 1992;71:1895-1900
17. Bader JD, Shugars DA, Bonito AJ. A systematic review of the performance of methods for identifying carious lesion. *J Public Health Dent*. 2002;62:201-213.
18. Barber LR, Wilkins EM. Evidence-based prevention, management, and monitoring of dental caries. *J Dent Hyg*. 2002;76:270-275.
19. Beiswanger BB, Boneta AE, Mau MS, Katz BP, Proskin HM, Stookey GK. The effect of chewing sugar-free gum after meals on clinical caries incidence. *J Am Dent Assoc*. 1998;129:1623-1626.
20. Creanor SL, Strang R, Gilmour WH, Foye RH, Brown J, Geddes DAM, et al. The effect of chewing gum use on in situ enamel lesion remineralization. *J Dent Res*. 1992;71:1895-1900.
21. Done eating? Start chewing! *Environ Nutr*. 1993;16:1-1
22. Creanor SL, et al. The effect of chewing gum use on in-situ enamel lesion remineralization. *J Dent Res* 1992;71:1895-1900.
23. Leach SA, Lee GTR, Degar WM. Remineralization of artificial caries-like lesions in human enamel in-situ by chewing sorbitol gum. *J Dent Res* 1989;68:1064-8.
24. Manning RH, Edgar WM, Agalamanyi EA. Effects of chewing gums sweetened with sorbitol or a sorbitol/xylitol mixture on the remineralization of human enamel lesions in-situ. *Caries Res* 1992;26:104-9.
25. Bader JD, Vollmer WM, Shugars DA, et al. Results from the Xylitol for Adult Caries Trial (X-ACT). *JADA* 2013; 144(1):21-30