ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, S Iss 4, 2022

The Application of Xylitol in ENT Practice

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ABSTRACT:

Background: Xylitol is a five-carbon sugar alcohol, providing some context. Plums, strawberries, and raspberries all contain xylitol naturally. In some countries, xylitol is commercially accessible in chewing gum, lozenges, syrups, nasal sprays, toothpastes, and mouthwashes. In the past decade, it has risen to popularity as a naturally occurring antibacterial agent.

Aim's & Objectives: the efficacy of xylitol usage in ENT practise, a review of the current literature was done.

Methods & Materials: A literature search was conducted using the following terms: xylitol, middle ear infection, nasal, sinusitis, dental caries, and preventative therapy. The identified articles are included in this review.

Results: Xylitol has no inherent antibacterial capabilities; rather, it appears to boost the body's innate defences. Xylitol inhibits the growth of microorganisms such as Streptococcus pneumoniae and Streptococcus mutans by decreasing their ability to adhere. Xylitol has been used to prevent middle ear infection, rhinosinusitis, and dental caries. The global expansion of drug-resistant pneumococci strains demonstrates the need for innovative strategies to avoid ENT-related infectious illnesses.

Conclusion: Xylitol may be a viable drug for this purpose in ENT therapy, although additional experimental and clinical research is necessary.

Keywords: Xylitol; Otitis Media; Rhinitis; Sinusitis; Dental Caries; Preventive Therapy.

INTRODUCTION:

Xylitol is a sugar alcohol with five carbon atoms that is extensively dispersed in plants; plums, strawberries, and raspberries contain large quantities. [1] It is used in foods as a bulking agent and as a low-calorie sweetener in pharmaceuticals, dental care products, chewing gums, and candies.[2] Diabetics may also ingest xylitol as an insulin-independent

ISSN PRINT 2319 1775 Online 2320 7876

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sweetener with approximately one-third less calories than sugar.[3] The human liver converts xylitol into glucose, glycogen, and lactic acid. It has less of an effect on blood glucose levels than glucose. It has also been used into parenteral feeding. In the presence of glucose, xylitol inhibits the development of Streptococcus pneumoniae. It inhibits the adhesion of both S pneumoniae and Haemophilus influenzae. [7] In addition, xylitol reduces the salt concentration of human airway surface fluids containing numerous antibacterial components, such as lysozyme, lactoferrin, human defensins, and cathelicidin LL-37. [8] Lowering the surface liquid salt concentration of the human airway can boost the effectiveness of the innate immune system, hence reducing or preventing airway infections. Xylitol lowers the adhesion of mutans streptococci to tooth biofilms and limits the growth of Streptococcus mutans, the most significant bacterium involved in the formation of dental caries. [10] By interfering with glucose cell-wall transit and intracellular glycolysis, xylitol inhibits the development of mutans streptococci. [11]

This literature study intended to assess the effectiveness of xylitol use in ENT practise.For this reason, the following terms were used to search the English literature: xylitol, middle ear infection, nasal, sinusitis, dental caries, and preventative therapy. The identified articles are included in this review.

In a 2010 comprehensive review of acute otitis media preventative treatment, Danhauer et al. stated that xylitol has prophylactic effects.shown in infants with acute middle ear infection [22] Children tolerate xylitol well and experience little negative effects. Chewing gum is the optimal vehicle for administration in youngsters. Chewing and swallowing aid in the removal of earwax and cleansing of the middle ear, while xylitol reduces bacterial growth in the eustachian tubes. [13] As indicated previously, a Finnish research team discovered that 10 g of xylitol daily, administered as 2 g orally five times a day, is well tolerated by children as young as nine months for the prevention of acute otitis media.However, xylitol lozenges appear to be poorly accepted; stomach discomfort and distaste for the product are more prevalent.[14]

Xylitol for rhinosinusitis

It is believed that bacteria play a significant role in sinusitis. In order for rhinosinusitis to develop, bacteria must first overcome the body's natural defences. Within the context of Rhinosinusitis, particularly in refractory patients, has received scant focus on innate immunity.Antimicrobial factors found in respiratory tract secretions include lysozymes, lactoferrin, - defensins, secretory phospholipase A2 and cathelicidins.[14-15] These antibacterial agents exist in the airway surface liquid's thin layer. Decreased airway surface liquid salt concentration boosts the action of endogenous antimicrobials in the laboratory.

Brown et al. gave xylitol, saline, and Pseudomonas aeruginosa to the rabbitmaxillary sinus in an experiment. 25 They observed that the concurrent twenty minutes following delivery of xylitol and P aeruginosa, there was a statistically significant increase in bacterial death

ISSN PRINT 2319 1775 Online 2320 7876

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compared to normal saline. They observed that xylitol reduced experimentally produced sinusitis when provided concurrently with bacteria, but its effect on sinusitis that was already present was unknown. Weissman et al. have studied the efficacy of xylitol nasal irrigation in patients with chronic rhinosinusitis .Twenty participants with chronic sinusitis were randomly assigned to undergo two sequential 10-day cycles of daily xylitol and saline irrigations. The authors noticed a substantial reduction in Sino-Nasal Outcome Test 20 scores linked with xylitol irrigation compared to saline irrigation, showing that xylitol irrigation alleviated sinonasal symptoms.

Miscellaneous studies on xylitol in ENT disorders

According to a study conducted in vitro by Kontiokari et al., xylitol significantly inhibits the growth of -haemolytic streptococci, including S pneumoniae. [6] Additionally, it the growth of -haemolytic streptococci was modestly reduced, but not that of H influenzae or Moraxella catarrhalis. In a later investigation, the same research team demonstrated that xylitol inhibits the adhesion of S pneumoniae and H influenzae to oropharyngeal epithelial cells and bacteria.[7-9]

Renko et al. showed the favourable effects of xylitol-supplemented diet on the oxidative death of bacteria in neutrophilic leucocytes and the survival of rats with experimentally induced sepsis with S pneumoniae in an experiment. [16] It has also been demonstrated that xylitol is cytoprotective during oxidative stress.[2]

Xylitol safety and side effects

When taken in high quantities, xylitol is slowly absorbed by the intestinal wall and may cause diarrhoea. The oral administration of xylitol is well tolerated by both adults and children. Adults may handle up to 200 g of xylitol per day without experiencing gastrointestinal issues, however children can only tolerate 45 g per day without experiencing gastrointestinal symptoms.[20,21] In addition to loose stools, excessive quantities of xylitol can cause abdominal pain and osmotic diarrhoea. [15] These negative effects do not appear to be age or weight dependant. It has been demonstrated that tolerance to xylitol develops swiftly, with the laxative effect diminishing within a few days of continued use. [22] Parenteral use of xylitol can induce mild hyperuricemia with no pathophysiological implications.[5]

Large intravenous dosages of xylitol have been observed to result in reno-cerebral oxalosis and renal failure, although being well tolerated in moderate levels.[23-24]

CONCLUSION:

Acute otitis media is one of the most prevalent and expensive diseases affecting children worldwide. The use of antibiotics for prevention produces the desired effect.However, it may result in the growth of antimicrobial-resistant microorganisms. Therefore, novel techniques are required to prevent acute middle ear infection. Comparable to the most effective

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prophylactic approaches, such as continuous antibacterial prophylaxis and surgical operations, is the efficacy of xylitol. By changing the airway surface liquid salt concentration, xylitol given to the nasal or sinus mucosa may improve innate bacterial defences. Xylitol can be used to prevent rhinosinusitis or slow its progression.

In addition, xylitol therapies are likely cost-effective in populations with high incidence of tooth decay. The global expansion of drug-resistant pneumococci strains demonstrates the need for innovative strategies to avoid ENT-related infectious illnesses. Xylitol may be a potential drug for this purpose in ENT therapy; however, additional experimental and clinical research is necessary.

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