



Herbs and Dental Caries- A Review

Authors

Nahan.K¹, Dr Jayalakshmi Somasoundaram²

¹3rd Year BDS, Saveetha Dental College and Hospitals

²Senior Lecturer, Department of Conservative and Endodontics, Saveetha Dental College

ABSTRACT

AIM: - To review the role of herbs in dental caries prevention

OBJECTIVE: - The purpose of this review is to describe the role of herbs in prevention of dental caries.

BACKGROUND: - Dental caries which is a cause of many oral diseases is a major health problem in most countries affecting children and adults. Dental caries occur due to bacterial infection. Medicinal plants confer considerable antibacterial activity against various microorganisms including bacteria responsible for dental caries. The natural products derived from medicinal plants such as neem, tulsi, miswak etc have been proven to be abundant source of biologically active compound. Due to the curative properties of medicinal plants we can reduce the occurrence of caries

REASON: - The review is done to know herbs helps in preventing dental caries

INTRODUCTION

Dental caries is an infectious microbiologic disease of the teeth that results in localized dissolution and destruction of the calcified tissue [1]. Dental decay is mainly due to demineralization which is caused by acids produced by bacteria particularly mutans streptococci and possibly lactobacilli that ferment dietary carbohydrates. This occurs when dental plaque adheres to tooth surfaces and become colonized by bacteria. Thus caries result from the interplay of three main factors over time; dietary carbohydrates, cariogenic bacteria within dental plaque and susceptible hard tooth surfaces [2].

Herbal medicine is an increasingly common form of alternative therapy. Herbs are widely exploited in the traditional medicine and their curative

potentials are well documented [3]. Herbal remedies may exhibit one or more remedies like anti bacterial, anti inflammatory, anti cariogenic etc [4].

With the knowledge of curative properties of the medicinal plants against oral microorganisms we can aim to prevent the occurrence of dental caries

TULSI (OCIMUM SANCTUM)

Tulsi is the traditional herb and it has rich antimicrobial substances that can be used to treat a variety of illnesses. A literature review by Mahantesh p et al (2011) elaborated the role of tulsi in the medicinal field, in addition stated that it has an effective antibacterial potential to conflict with the oral pathogens. Their components like ursolic acid and carvacrol are

known to be responsible for the anti microbial activity of tulsi ^[5]. A review by Chirag Modi et al (2012) has determined that these plant extracts were more active against gram positive than against gram negative bacteria ^[6]. A study done by Pooja Agarwal et al (2010) has demonstrated an antimicrobial activity of tulsi extract against streptococcus mutans which is maximum at 4% concentration level ^[7].

LICORICE ROOT (*Glycyrrhiza glabra*)

Licorice root contains glycyrrhizol A, a compound that has strong antimicrobial activity against cariogenic bacteria. Two pilot human studies indicate that a brief application of lollipop containing licorice roots led to a marked reduction of cariogenic bacteria in oral cavity ^[8]. Compounds isolated from licorice contain atleast two compounds that appear to be potent inhibitors of streptococcus mutans. Further studies have to be done to show that licorice compounds can be used as a cavity fighting components in mouthwash or toothpaste ^[9].

CLOVE (*Syzygium aromaticum*)

Cloves are used traditionally in Indian ayurvedic medicine and Chinese medicine and since it possess a lot of medicinal properties it has been tried out in dentistry as well. Clove oil is commonly used for the relief of toothache. Clove oil contains eugenol and methanolic extracts which is effective against gram positive and gram negative bacteria ^[10]. The molecule named eugenol in clove oil has analgesic and antiseptic properties and particularly inhibits growth of nearly all disease causing bacteria while leaving the beneficial bacteria unharmed

In a study done by Jinan et al (2008) he found that clove extract was found to inhibit the growth of mutans streptococci which was experimented through agar well diffusion technique. It showed that clove extract was effective in reducing acid production by bacteria ^[11]. Pachori et al demonstrated that soaked and boiled extracts of cloves showed a positive anti microbial activity

against *S.mutans* and *C.albicans* ^[12]. In a study done by kamal rai et al (2010) showed clove and clove oil have a potent antimicrobial activity against dental caries causing microorganisms ^[13]. In a work by Dorman and Deans (2000), the antibacterial activity of black pepper, geranium, nutmeg, oregano, thyme and clove was tested against 25 strains of gram positive and gram negative bacteria among which clove oil had one of the widest spectrum of activity ^[14].

CINNAMON (*cinnamomum zeylanicum*)

Cinnamon has excellent antimicrobial activity on the growth of mutans streptococci and lactobacilli, but their effects are more on lactobacilli than mutant streptococci ^[15]. Goni et al (2009) described the antimicrobial activity of a combination of cinnamon and clove oils against gram positive organisms as well as gram negative bacteria ^[16]. Jinan et al (2008) he found significant reduction in the counts of bacteria *S.mutan* at concentrations of 20%, 25%, 30% aqueous cinnamon extract ^[17]. Shiney ramya et al (2012) showed that *Escherichia coli* and *proteus* species were sensitive to ethanolic extracts of cinnamon ^[18]. Prita D.Nimje et al (2013) showed that *E.coli* was found to be most sensitive towards the antimicrobial activity of essential oils of *cinnamomum* species when compared with *P.aeruginosa* and *S.aureus* ^[19]. A systematic review by priyanga ranasinghe et al (2013) described that cinnamon has a potential antimicrobial activity against a wide variety of bacteria ^[20].

NEEM (*Azadirachta indica*)

Neem has been extensively used in ayurveda, unani and homeopathic medicine ^[21]. Neem is considered as a resourceful medicinal plant having a wide spectrum of biological activity. Each of its components has several actions such as its fluoride content is known to exhibit maximum antimicrobial activity against streptococcus mutans. Tannins exert an astringent effect and form a coat over the enamel, thus protecting

against tooth decay. The use of neem twigs as tooth brush has been endorsed by the dentists to prevent caries ^[22]

Packia Lekshmi et al (2012) evaluated the antimicrobial properties of neem extract against three bacterial strains causing dental caries and suggested that it could be used in the treatment of dental caries ^[21].

The inhibitory effects of neem upon bacterial growth, adhesion on hydroxyapatite on tooth surface, and production of insoluble glucan suggests that neem stick extracts can reduce the ability of some streptococci to colonize tooth surfaces, and useful as anti caries products ^[23]. Neem is commonly available in market as toothpaste and mouth rinse ^[21].

Mango and neem extracts showed antimicrobial activity against *S.mutans*, *S.salivarius*, *S.sanguis*, *S.mitis*. A combination of chewing sticks is found to be beneficial in preventing the dental caries ^[24]. Raja ratni et al (2013) showed that the aqueous extracts of neem leaf exhibited highest antimicrobial activity compared with the bark and seed ⁽²⁵⁾.

Widowati et al (2007) determined that the ethanolic neem stick extract had higher antibacterial properties than the leaf extracts ^[26].

MISWAK (*Salvadora persica*)

The chewing stick (miswak) is used for oral hygiene in many parts of the world. In addition to the mechanical removal of plaque, a antibacterial effect has also been postulated ^[27]. Fatemah et al (2010) showed that rate of caries decreases after using miswak and this can be due to antimicrobial effects. Almas et al (2004) in a study investigated the antimicrobial effects of miswak comparing with toothbrush and their results showed that in miswak users there was a significant decrease in streptococcus but not in lacto bacillus ^[28].

BABOOL (*Acacia nilotica*)

Babool has been used for dental problems and used as a great astringent and is equally useful as dentrifice, anti-hemorrhagic agent, and anti-

diarrheal. The extracts of babul can reduce the ability of some streptococci to colonize tooth surfaces. Ethanolic extract of Acacia bark showed 22.3mm inhibition zone against *S.mutans* ⁽²⁹⁾. Mohan lal saini et al (2008) performed a comparative study on the microbial activity of acacia species and found that *A.nilotica* exhibited the highest activity against staphylococcus aureus and salmonella typhi ^[30]. Bansa A et al (2008) assessed that the minimal bactericidal concentration of stem bark extract of the plant against different bacteria's ranged from 35-60 mg/ml ^[31]

CRANBERRY (*Vaccinium oxycoccus*)

Cranberry has been recognized for its beneficial effects on human health. Cranberry constituents prevent adhesion of oral pathogens to tooth surface ^[32].

Yamanaka and colleagues assessed the effect of cranberry juice on the ability of several oral species of streptococcus to adhere to hydroxyapatite pellets that had been pretreated with saliva. When the bacteria were exposed to cranberry juice, their adhesion to the pellets decreased significantly ^[33]

CONCLUSION

To conclude, herbal extracts can be effective in preventing dental caries. The use of traditional medicines and medicinal plants in most developing countries as therapeutic agents for the maintenance of good health has been widely observed. Herbs have the potential to be developed into agents that can be used as preventive or curative agents for dental caries and also as antimicrobial plaque agents, antiseptics, antioxidants, antimicrobials, antifungal and analgesics.

REFERENCES

1. Cariology : the lesion ,etiology,prevention and control sturdevants art and science of operative dentistry 5th edition

2. Enzo A. Palombo 'traditional medicinal plant extracts and natural products with activity against oral bacteria; potential application in the prevention and treatment of oral disease. Evidence based complementary and alternative medicine, Vol;2011
3. Dubey nk, kumar r , tripathi p. global promotion of herbal medicines ;india's opportunity. Curr sci.2004;86; 37-41
4. Taheri et al; herbs in dentistry,int dent j, 2011; 61(60); 287-296
5. Kukreja BJ et al – a gift of nature. Int j of pharma and biosciences 2012;3;46-52
6. Chirag modi, shailesh modi, Hitesh patel, ghanshyam dhudhra, avinash kumar kumar, madhawi awale. Herbal antibacterial a review. J of intercultural ethnopharm,2012;1(1): 52-61
7. Pooja agarwal et al –evaluation of the antimicrobial activity of various concentrations of tulsi extract against streptococcus mutans; an in vitro study; Indian j dent res, 21(3), 2010
8. Hamidreza poureslami – the effects off plant extracts on dental plaque and caries
9. Messier c et al ; licorice and its potential beneficial effects in common oro dental diseases. Oral dis;2012;18(1);32-39
10. Dhanya k, preena s, the antimicrobial activity of azardirachta indica, glycyrrhiza glabra, syzygiu aromaticum on streptococcus mutans and enterococcus faecalis- an in invitro study.J of endodontology
11. Dr. jinan mohammed rashad; effect of water clove extract on streptococci and mutans streptococci ,in comparison to chlorhexidine gluconate 9 a comparative in vitro and in vivo study; MDJ; vol;5, no.4, 2008
12. Pachori RR, antimicrobial studies of herbs and shrubs against dental pathogens, journal of empirical biology,vol 1(1);10-16
13. Kamal rai aneja, radhika joshi, "antimicrobial activity of syzygium aromaticum and its bud oil against dental caries causing microorganisms. Augg-2010
14. Dorman HJ, deans SG, " antimicrobial agents from plants: antibacterial activity of plant volatile oils. J appl microbial 2000;88(2); 308-316
15. Ghada al duboni, muhamed t usman, redhwan al nagger, " antimicrobial activity of aqueous extracts of cinnamon and ginger on two oral pathogens causing dental caries.,”research j of pharmaceutical, bio and chem. Sci, vol:4(3)2013,pg no:957-965
16. P.goni, p.lopez, c.sanchez, r.gomez lus, r.becerril and c.nerin, "antimicrobial activity in the vapour phase of a combination of cinnamon and clove essential oils”, food chemistry, vol.116, no.4, pp-982-989, 2009
17. Jinan MR, effect of water cinnamon extract on mutans streptococci, in comparison to chlorhexidine gluconate and zac (in vitro and in vivo study), "MDJ,vol:5,no.3,2008
18. Shiney ramya, p.ganesh, photochemical analysis and comparative effect of cinnamomum zeylanicum, piper nigrum and pimpinella anisum with selected antibiotics ad its antibacterial activity against enterobacteriaceae family, inr j of pharmaceutical and bio archives, 2012;3(4);914-917
19. Pritam d.nimje, hemant garg, anu gupta, niharika srivastava, monica katiyar and c.ramalingam”comparison of antimicrobial activity of cinamomum zeylanisicum and cinnamomum cassia on food spoilage bacteria and water borne bacteria, der pharmacia letter, 2013, 5(1):53-59
20. Priyanga ranasinghe, shehani pigera, ga sirimal premakumara, priyadarshini ga; apathy, godwin r, Prasad katulanda, ”medicinal properties of true cinnamon :a systematic review BMC complementary and alternative medicine2013, 13:275

21. Prasanth G, chandu G, muralikrishna K, the effect of mango and neem extract on four organisms causing dental caries; streptococcus mutans, streptococcus salivaris an in vitro study Indian dent J 2007;18(4); 148-51
22. Rajiv saini, sughanda Sharma, santosh saini, Ayurveda and herbs in dental health. Medknow publications, 32(2), 285-286, 2011
23. Wolinsky LE, mania S, nachnani , ling S; the inhibiting effect of aqueous azadirachta indica extract upon bacterial properties influencing in vitro plaque formation. J dent res., 1996;75(20);816-812
24. T.lakshmi, vidya Krishnan, n. madhusudhanan; azadirachta indica; a herbal panacea in dentistry- an update; pharmacognosy reviews, 2015 jan-jun;9 (17); 41-44
25. Raja ratna reddy, Krishna kumara, lokanathamamatha s, damodar reddy, antimicrobial activity of azadirachta indica leaf, bark and seed extracts. Int j res phtochem pharmacol, 3(1),1-4
26. Widowati siswomihardjo, siti sunarintyas badawi, masahiro nishimura and taizo Hamada, " the difference of antimicrobial effect of neem leaves and stick extracts.
27. Abier H.sofrata et al ; strong antibacterial effect of miswak against oral microorganisms associated with periodontitis and caries; j of periododontology; , vol:79, no.8, 1474-1479,2008
28. Fatemeh ezodinni- ardakani" efficacy of miswak (salvadora persica) in preventing dental caries, vol:2, no:5, 499-503, 2010
29. Xavier, vijayalakshmi, nadu, india.s. screening of antibiotic resistant inhibitors from Indian traditional medicinal plants gainst streptococcus mutans. J of plant sciences, 2007, 2(3),370-373
30. Saini ml. comparative pharmacognostical and antimicrobial studies of acasia species, j of med plants research 2008,:2(12): 378-386
31. Banso a. phytochemical and antibacterial investigation of bark extracts of acacia nilotica, j of med plants esearch, vol:32, pp:82-85,2009
32. Johnson white B, buquo L, Zeinali M, ligler FS. Prevention of nonspecific bacterial cell adhesion in immunoassays by use of cranberry juice. Anal chem. 2006;78;853-7
33. Yamanaka a, kimizuka r, kato d, okuda k. inhibitory effects of cranberry juice on attachment of oral streptococci and biofilm formation, oral microbial immunol. 2004; 19(3);150-4