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A Comprehensive Review on Herbal Mouthwash: Efficacy Against Oral Diseases and Its Potential as a Safe Alternative

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ABSTRACT

Problems with synthetic antimicrobial resistance have created new opportunities in the hunt for natural products. The following plants and other natural products are thoroughly reviewed in this article for their use in oral health: pomegranate (Punica granatum L.), chamomile (Matricaria recutita L.), green tea (Kuntze), chewing sticks made from Diospyros mespiliformis Hochst. ex A.D.C., Diospyros lycioides Desf., and Salvadora persica L. (miswak); honey and propolis from the manuka tree (Leptospermum scoparium J.R. Forst. & G. Forst.); rhein from Rheum rhabarbarum L. (rhubarb); dried fruits from Vitis vinifera L. (raisins); essential oils; probiotics; and mushrooms. Additionally, plants from Africa, Asia, Brazil, Mexico, Europe, and the Middle East are highlighted in the review. The chemical principles and antibacterial capabilities of several plants have been clarified.
While antimicrobial testing is primarily carried out in the following countries (in decreasing order of magnitude): India, South Africa, Brazil, Japan, France, Egypt, Iran, Mexico, Kenya, Switzerland, Nigeria, Australia, Uganda, and the United Kingdom, the use of natural products for oral health is prevalent in settings with limited resources. The assessment highlights a critical need for additional research on clinical efficacy and toxicity, but it also identified a growing trend: the majority of basic research on plants for oral health is conducted in Brazil, Europe, and Australia. In general, value addition of natural ingredients for toothpaste fortification is done in Brazil, China, India, and New Zealand. African nations prioritize primary production of raw plants and other natural items having antibacterial properties, as well as bioprospecting.

Keywords- synthetic, antimicrobial, resistance.

INTRODUCTION

The primary cause of tooth loss if treatment is not received is periodontal disease, a multifactorial inflammatory condition characterized by the breakdown of the tissues that support teeth, such as the cementum, alveolar bone, and periodontal ligament. The main cause of periodontal disorders and dental cavities is dental biofilm. The polymer-based biofilm that adheres to the tooth surface is immune to both antibiotics and host defense. For oral health, effective biofilm removal is essential. This can be maintained by the patient maintaining proper oral hygiene and can be accomplished via scaling and root planning (SRP) with or without the use of antibiotics and other medications.

A 70% to 100% of people worldwide suffer from gingivitis, which is directly linked to tooth plaque and has an impact on their oral health. Gingivitis can be reversed by controlling plaque, but if dental hygiene is neglected, it can worsen and eventually damage the teeth's entire periodontal attachment system, leading to more serious issues like periodontitis, tooth loss, and a lower quality of life. Therefore, preventing and treating gingivitis and its associated disorders depends heavily on efficient plaque control.

Herbal remedies, which are made from botanical sources, have long been used in dentistry to treat pain, inflammation, irritation, and germs. According to recent reports, a significant number of herbal mouthwashes have shown promising outcomes in the management of gingivitis and plaque. Herbal mouthwashes are made using phototherapeutic plant extracts and essential oils, which contain a variety of active ingredients such sterols, tannins, and catechins. The natural component mixture found in medicines produced from plants or herbs often has mild healing effects.

Depending on the mouthwash's effectiveness, risk, and dental health, the right one can be chosen. Mother Nature has given us a wealth of therapeutic herbs with antibacterial and antimicrobial qualities, as noted in the literature. These herbal plants are still used to treat a variety of periodontal and other oral illnesses, despite the fact that our knowledge of their therapeutic qualities is quite limited. For the beneficiaries, understanding the scientific expression of the herbal medicine's true effects is crucial. Papers were gathered for this bibliographical revision in order to confirm the traditional applications of herbs and come to the conclusion that experimental research should be the foundation for using plants to treat oral health issues, confirming their suitability for dental care.

Patients with periodontitis may benefit from using herbal-based oral solutions because the condition is a chronic inflammatory disease. To the best of our knowledge, no systematic review has examined the use of natural products in patients with periodontitis, despite the fact that many of them have been studied in the literature. Furthermore, there are more studies examining the safety and effectiveness of herbal dental products than conventional and CHX-based oral care products, but the findings are mixed and unclear. Therefore, a thorough evaluation of the herbal products' efficacy is necessary due to their growing popularity and possible advantages. We postulated that in patients with periodontitis, herbal oral care products would be just as beneficial as traditional dentistry treatments. The purpose of this systematic review was to evaluate the clinical efficacy of herbal dental products (mouthwash, dentifrice, and gel) in patients with periodontitis in comparison to conventional treatments or a placebo.

Conventional medicine is growing more accepting of the use of antimicrobials made from plants and other natural materials, as over 25% of prescription and over-the-counter medications come from plants. Interest in the potential of plant extracts to manage plaque and other oral disorders has increased due to the growing popularity of herbal remedies (Lobo et al., 2014). One practical method for finding natural substances with antimicrobial qualities against dental infections is to screen for antimicrobial agents that have been isolated from plants (Tichy and Novak, 1998). In fact, plants that have historically been utilized as oral medicines are increasingly yielding chemicals with antibacterial properties against oral infections.

FIG – PERIODONTITIS DISEASE **FIG – GUM INFLAMMATION**

BACKGROUND HISTORY

Oral illnesses are increasingly recognized as a major global concern.

Periodontal disease is one of the major oral health conditions among the many others. Oral health has an impact on life quality. As a result of a complicated interaction between pathogenic bacteria and the host's immune system, periodontal diseases are recognized as chronic inflammatory illnesses that are typified by alveolar bone resorption, loss of connective tissue, and the development of periodontal pockets.

One of the main causative agents of periodontal disease is dental plaque.1 To stop or slow the course of periodontal diseases, a variety of plaque control techniques are employed.

To maintain good dental hygiene, one of them consists of mechanical plaque control techniques.2.

The market offers a wide range of chemical plaque control products, including as mouthwash, dentifrices, chewing gum, and gel. However, they have certain unfavorable side effects, such as tooth discoloration, diarrhea, and vomiting.

. Mouthwashes may serve as a measure in controlling dental plaque and periodontal disease for mentally or physically handicapped patients who are incapable of brushing their teeth themselves or other individuals who are lacking dexterity, skill, or motivation for mechanical plaque removal.3 Thus, instead of using them solely, mouthwashes should always be used in association with mechanical plaque control measures.

HERBAL DRUGS PROFILE

- AZADIRACHTA INDICA [NEEM]

Native to the Indian subcontinent, neem (Azadirachta indica) is an evergreen tree that grows quickly. Oral health is one among the many traditional therapeutic uses for its leaves, bark, flowers, and seeds. Neem's antibacterial, antifungal, and anti-

CHEMICAL CONSTITUENTS

Among the many bioactive substances found in neem are:

Azadirachtin: renowned for its antibacterial and insecticidal qualities.

Nimbin: A strong substance that has anti-inflammatory and antifungal activity

Salannin: Shows antifungal and antimicrobial properties.

Quercitin: One flavonoid with antioxidant qualities.

Tannins: Help to fight bacteria and have astringent qualities.

Oils: Having antibacterial properties, such as limonene and eugenol.

THERAPEUTIC EFFECT

1. Activity of Antimicrobials
Neem works very well against a variety of bacteria and fungi that cause dental problems such periodontitis, gingivitis, and plaque production. Streptococcus mutans, a primary cause of tooth decay, Porphyromonas gingivalis, which is linked to gum disease, and other oral pathogens are inhibited in their growth by neem extracts.

2. Effects on Inflammation
Neem is good for illnesses like gingivitis and periodontitis because of its anti-inflammatory qualities, which assist to lessen gum irritation.

3. Properties of Antioxidants
Neem's antioxidants aid in scavenging free radicals, shielding oral tissues from inflammation and oxidative stress.

NEEM MOUTHWASH BENEFITS

include preventing dental plaque and tartar, which can cause gum disease, by preventing plaque from forming and then solidifying into tartar.

Reduction of Periodontal Disease and Gingivitis: Using neem mouthwash on a regular basis may lessen gingivitis-related inflammation and bleeding of the gums.

Breath Freshening: Its antibacterial qualities aid in the fight against the microorganisms that cause foul breath.

Encourages General Oral Hygiene: Neem mouthwash can enhance general oral health by acting as a natural, chemical-free substitute for store-bought mouthwashes.

FIG – NEEM LEAVES

➢ SYZYGIUM AROMATICUM[CLOVE]

1. Introduction
The dried flower buds of the clove tree are used to make the spice clove (Syzygium aromaticum). Because of its many therapeutic benefits, including its ability to effectively support oral health, it has been utilized extensively in traditional medicine. Because of its strong antibacterial, analgesic, and anti-inflammatory properties, clove has gained popularity as an ingredient in herbal mouthwashes in recent years.

2. Chemical Components
The primary active ingredients in clove that support its medicinal properties are as follows:

Eugenol: The most significant component, what gives clove its analgesic, antibacterial, antifungal, and antiseptic qualities.
Acetyleugenol: A byproduct of eugenol, they adds to its aromatic and therapeutic properties.

Beta-caryophyllene: Another anti-inflammatory substance that may help reduce gum inflammation.

Tannins: Astringent qualities are provides.

Flavonoids: contains the antioxidant effect

Therapeutic property of clove

1.Antimicrobial activity

Clove are effective against a oral pathogens, includes bacteria, viruses and fungi. It is mainly effective against STREPTOCOCCUS MUTANS. which are responsible for tooth decay , its also contribute the periodontal diseases.

Clove also inhibit the growth of microorganisms and reduce the oral infection.

2.Analgesic effect

The component of clove are Eugenol is also knows for its analgesic property. They provide pain relief of tooth includes inflamed gums, toothaches and cavities.

3.Anti-inflammatory Effect

The action of clove are reduces the gum inflammation and also protect microorganism.

FIG - CLOVE

➢ OCIMUM SANCTUM [TULSI]

INTRODUCTION

Its referred to as Holy Basil, this herb is highly prized for its many therapeutic uses in ancient Ayurvedic medicine. Its rich pharmacological profile, which promotes oral hygiene and treats common dental disorders, is the reason it is included in herbal mouthwashes.

Tulsi is a well-known natural remedy for oral hygiene because of its antibacterial, anti-inflammatory, antioxidant, and astringent qualities. Eugenol, its active ingredient, is essential in the fight against oral infections, inflammation reduction, and plaque prevention. Furthermore, by fortifying tissues and reducing inflammation, tulsi's tannins and flavonoids support gum health.

CHEMICAL CONSTITUENTS

EUGENOL: It is a major component of tulsi with having of A strong antiseptic and antimicrobial property.

LINALOOL: other important constituents having a antifungal and antibacterial effect that is help to maintain the oral hygiene and prevent from infectios

ROSMARINIC ACID: the polyphenolic compound has antioxidant , antimicrobial, and anti-inflammatory properties. They help to protect mouth tissues from oxidative damages.

FLAVONOIDS: reduces gum inflaamation.

TERPENS: It also has a antibacterial effect in oral health

THERAPEUTICS EFFECT OF TULSI

ANTIMICROBIAL ACTION

Oral pathogens like Streptococcus mutans, Porphyromonas gingivalis, and Candida albicans are inhibited in their proliferation by active ingredients such ursolic acid, carvacrol, and eugenol.

efficient against fungus and bacteria that cause plaque.

ANTI-INFLAMMATORY EFFECT

It act as reducs inflammation in mucosal tissues and gums.

aids in the treatment of periodontitis and gingivitis.

ANTIOXIDANTS PROPERTY

shields oral tissues from free radical damage and oxidative stress.

WOUNDS HEALING

Because of its regenerative qualities, it accelerates the healing of oral lesions and ulcers.

ANALGESIA EFFECT

For oral discomfort, eugenol provides a minor form of pain relief.

IMMUNOMODULATORY EFFECT

increases oral immunity, which aids in infection prevention.

FIG - TULSI

CONCLUSION

A possible substitute for traditional oral care products are herbal mouthwashes made with natural, plant-based components. To improve oral hygiene and general oral health, these formulations take advantage of the antibacterial, antifungal, anti-inflammatory, and antimicrobial qualities of several herbs. Since herbal mouthwashes frequently don't contain artificial chemicals, people with allergies or sensitivities can use them.

Herbal mouthwashes have been shown to be effective in lowering plaque accumulation, avoiding gum disease, and easing oral discomfort. Their application also gives consumers a safer, more environmentally friendly choice, supporting the growing trend for natural and holistic health treatments. To completely determine the efficacy and safety of particular herbal compositions, more research and clinical trials are required.

REFERENCES

1. Khobragade, Vrushali R., Prashanthkumar Vishwakarma, Arun S. Dodamani, Minal M. Kshirsagar, Sulakshana N. Raut, and Rahul N. Deokar. "Herbal Mouthwash for the Management of Oral Diseases: A Review on the Current Literature." Journal of Oral Health and Community Dentistry 15, no. 2 (2021): 71.
2. Khobragade, V. R., Vishwakarma, P., Dodamani, A. S., Kshirsagar, M. M., Raut, S. N., & Deokar, R. N. (2021). Herbal Mouthwash for the Management of Oral Diseases: A Review on the Current Literature. Journal of Oral Health and Community Dentistry, 15(2), 71.
3. Khobragade, Vrushali R., et al. "Herbal Mouthwash for the Management of Oral Diseases: A Review on the Current Literature." Journal of Oral Health and Community Dentistry 15.2 (2021): 71

4. Chatzopoulos, Georgios S., et al. "Clinical effectiveness of herbal oral care products in periodontitis patients: a systematic review." International Journal of Environmental Research and Public Health 19.16 (2022): 10061.
5. Chatzopoulos, G. S., Karakostas, P., Kavakloglou, S., Assimopoulou, A., Barmpalexis, P., & Tsalikis, L. (2022). Clinical effectiveness of herbal oral care products in periodontitis patients: a systematic review. International Journal of Environmental Research and Public Health, 19(16), 10061.
6. Chatzopoulos, Georgios S., Panagiotis Karakostas, Stefania Kavakloglou, Andreana Assimopoulou, Panagiotis Barmpalexis, and Lazaros Tsalikis. "Clinical effectiveness of herbal oral care products in periodontitis patients: a systematic review." International Journal of Environmental Research and Public Health 19, no. 16 (2022): 10061.
7. Chatzopoulos, G.S., Karakostas, P., Kavakloglou, S., Assimopoulou, A., Barmpalexis, P. and Tsalikis, L., 2022. Clinical effectiveness of herbal oral care products in periodontitis patients: a systematic review. International Journal of Environmental Research and Public Health, 19(16), p.10061.
8. Page RC, Kornman KS. The pathogenesis of human periodontitis: an introduction. Periodontol 2000 1997;14(1):9–11. DOI: 10.1111/j.1600-0757.1997.tb00189.x.
9. DePaola LG, Overholser CD, Meiller TF, et al. Chemotherapeutic inhibition of supragingival dental plaque and gingivitis development. J Clin Periodontol 1989;16(5):311–315. DOI: 10.1111/j.1600-051x.1989.tb01661.x.
10. Dona BL, Gründemann LJ, Steinfort J, et al. The inhibitory effect of combining chlorhexidine and hydrogen peroxide on 3rd day plaque accumulation. J Clin Periodontol 1998;25(11 Pt 1):879–883. DOI: 10.1111/j.1600-051x.1998.tb02385.x.
11. Albert-Kiszely A, Pjetursson BE, Salvi GE, et al. Comparison of the effects of cetylpyridinium chloride with an essential oil mouth rinse on dental plaque and gingivitis—a six month randomized controlled clinical trial. J Clin Periodontol 2007;34(8):658–667. DOI: 10.1111/j.1600-051X.2007.01103.x.
12. Najafi MH, Taheri M, Mokhtari MR, et al. Comparative study of 0.2% and 0.12% digluconate chlorhexidine mouth rinses on the level of dental staining and gingival indices. Dent Res J (Isfahan) 2012;9(3):305. drj.mui.ac.ir/index.php/drj/article/view/1089
13. Kaur H, Jain S, Kaur A. Comparative evaluation of the antiplaque effectiveness of green tea catechin mouthwash with chlorhexidine gluconate. J Indian Soc Periodontol 2014;18(2):178–182. DOI: 10.4103/0972-124X.131320
14. Kumar, Pramod, Shahid H. Ansari, and Javed Ali. "Herbal remedies for the treatment of periodontal disease-a patent review." Recent Patents on Drug Delivery & Formulation 3.3 (2009): 221-228.
15. Ahuja, Ashima, and Sonia Singh. "Impact of the current scenario and future perspectives for the management of oral diseases: Remarkable contribution of herbs in dentistry." Anti-Infective Agents 20.5 (2022): 27-45.
16. Kumar, Pramod, Shahid H. Ansari, and Javed Ali. "Herbal remedies for the treatment of periodontal disease-a patent review." Recent Patents on Drug Delivery & Formulation 3.3 (2009): 221-228.
17. Motallaei, Mohammad Nima, Mohsen Yazdanian, Hamid Tebyanian, Elahe Tahmasebi, Mostafa Alam, Kamyar Abbasi, Alexander Seifalian, Reza Ranjbar, and Alireza Yazdanian. "The current strategies in controlling oral diseases by herbal and chemical materials." Evidence-Based Complementary and Alternative Medicine 2021, no. 1 (2021): 3423001

18. Kukreja, Bhavna Jha, and Vidya Dodwad. "Herbal mouthwashes-A gift of nature." *Int J Pharma Bio Sci* 3.2 (2012): 46-52.

19. Chinsembu, Kazhila C. "Plants and other natural products used in the management of oral infections and improvement of oral health." *Acta tropica* 154 (2016): 6-18.

20. Hugoson A, Norderyd O. Has the prevalence of periodontitis changed during the last 30 years? J Clin Periodontol. 2008;35:338–45. doi: 10.1111/j.1600-051X.2008.01279.x.

21. Löe H, Theilade E, Jensen SB. Experimental gingivitis in man. J Periodontol. 1965;36:177–87. doi: 10.1902/jop.1965.36.3.177.

22. Axelsson P, Lindhe J. Effect of controlled oral hygiene procedures on caries and periodontal disease in adults. Results after 6 years. J Clin Periodontol. 1981;8:239–48. doi: 10.1111/j.1600-051x.1981.tb02035.x.

23. Selwitz RH, Ismail AI, Pitts NB. Dental caries. Lancet. 2007;369:51–9. doi: 10.1016/S0140-6736(07)60031-2.

24. Paraskevas S. Randomized controlled clinical trials on agents used for chemical plaque control. Int J Dent Hyg. 2005;3:162–78. doi: 10.1111/j.1601-5037.2005.00145.x.

25. Zhan L, Featherstone JD, Gansky SA, Hoover CI, Fujino T, Berkowitz RJ, et al. Antibacterial treatment needed for severe early childhood caries. J Public Health Dent. 2006;66:174–9. doi: 10.1111/j.1752-7325.2006.tb02576.x. [

26. Van Strydonck DA, Slot DE, Van der Velden U, Van der Weijden F. Effect of a chlorhexidine mouthrinse on plaque, gingival inflammation and staining in gingivitis patients: A systematic review. J Clin Periodontol. 2012;39:1042–55. doi: 10.1111/j.1600-051X.2012.01883.x.

27. Botelho MA, Bezerra-Filho JG, Correa LL, Heukelbach J. Effect of a novel essential oil mouthrinse without alcohol on gingivitis: A double-blinded randomized controlled trial. J Appl Oral Sci. 2007;15:175–80. doi: 10.1590/S1678-77572007000300005.

28. Ribeiro LG, Hashizume LN, Maltz M. The effect of different formulations of chlorhexidine in reducing level of mutan streptococci in the oral cavity. J Dent. 2007;35:359–70. doi: 10.1016/j.jdent.2007.01.007. [

29. Twetman S. Antimicrobials in future caries control. Caries Res. 2004;38:223–9. doi: 10.1159/000077758.

30. Gupta D, Bhaskar DJ, Gupta RK, Karim B, Gupta V, Punia H, et al. Effect of Terminalia chebula Extract and Chlorhexidine on Salivary pH and Periodontal Health: 2 Weeks Randomized Control Trial. Phytother Res. 2013 doi: 10.1002/ptr.5075. [In press]

31. Autio-Gold J. The role of chlorhexidine in caries prevention. Oper Dent. 2008;33:710–6. doi: 10.2341/08-3]

32. Ahonkhai I, Ba A, Edogun O, Mu U. Antimicrobial activities of the volatile oils of Ocimum bacilicum L. and Ocimum gratissimum L. (Lamiaceae) against some aerobic dental isolates. Pak J Pharm Sci. 2009;22:405–9.

33. 14.Turesky S, Gilmore ND, Glickman I. Reduced plaque formation by the chloromethyl analogue of Victamine C. J Periodontol. 1970;41:41–3. doi: 10.1902/jop.1970.41.41.41.

34. 15.Loe H, Silness J. Periodontal disease in pregnancy. I. Prevalence and severity. Acta Odontol Scand. 1963;21:533–51. doi: 10.3109/00016356309011240.

35. 16.Pattanayak P, Behera P, Das D, Panda SK. Ocimum sanctum Linn. A reservoir plant for therapeutic applications: An overview. Pharmacogn Rev. 2010;4:95–105. doi: 10.4103/0973-7847.65323

36. Geeta, Vasudevan DM, Kedlaya R, Deepa S, Ballal M. Activity of Ocimum sanctum (the traditional Indian medicinal plant) against enteric pathogens. Indian J Med Sci. 2001;55:434–8.]

37. Singh PH. 1st ed. India: CRC Press; 2002. Rasayana: Ayurvedic Herbs for Longevity and Rejuvenation; pp. 272–80. [Google Scholar]

38. Shokeen P, Bala M, Sing M, Tandon V. In vitro activity of eugenol, an active component from Ocimum sanctum, against multiresistant and susceptible strains of Neisseria gonorrhea. Int J Antimicrob Agents. 2008;32:172–9. doi: 10.1016/j.ijantimicag.2008.03.018.

39. Kelm MA, Nair MG, Strasburg GM, DeWitt DL. Antioxidant and cyclooxygenase inhibitory phenolic compounds from Ocimum sanctum Linn. Phytomedicine. 2000;7:7–13. doi: 10.1016/S0944-7113(00)80015-X.

40. Jaggi RK, Madan R, Singh B. Anticonvulsant potential of holy basil, Ocimum sanctum Linn., and its cultures. Indian J Exp Biol. 2003;41:1329–33.

41. Singh S. Comparative evaluation of antiinflammatory potential of fixed oil of different species of Ocimum and its possible mechanism of action. Indian J Exp Biol. 1998;36:1028–31.

42. Singh S, Majumdar DK. Evaluation of anti-inflammatory activity of fatty acid of Ocimum Sanctum fixed oil. Indian J Exp Biol. 1997;35:380–5.

43. Agarwal P, Nagesh L, Murlikrishnan Evaluation of the antimicrobial activity of various concentrations of Tulsi (Ocimum sanctum) extract against Streptococcus mutans: An in vitro study. Indian J Dent Res. 2010;21:357–9. doi: 10.4103/0970-9290.70800.

44. Prakash P, Gupta N. Therapeutic uses of Ocimum sanctum linn (Ocimum sanctum) with a note on eugenol and its pharmacological actions: A short review. Indian J Physiol Pharmacol. 2005;49:125–31.