

**Review Article**

**PHYTOTHERAPEUTIC HERBAL TREATMENT FOR PERIODONTAL POLYMICROBIAL INFECTION: A REVIEW AND UPDATE**

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**ABSTRACT:**

Phytotherapy, as additional therapeutic method, has been expanding rapidly, conquering the whole world. Besides its therapeutic effects, it has a role in improving general immunity. Natural products have been used for several years in folk medicine. Herbs and their extracts have been used as adjuvants in periodontal treatment because they reduce inflammation and act as antioxidants and antibiotics. The need to develop an alternative prevention and treatment option to antibacterial agents, is to avoid side-effects of the antibiotics and the increased resistance of the bacteria. Hence, natural herbs and ayurvedic drugs have become a subject of importance. Therefore, in this review herbs like *Acacia catechu* willd, *Aloe vera*, *Chamomile*, *Azadirchta indica*, *Glycyrrhiza gabra*, *Centella asiatica*, *Punica granatum* etc. are found to be useful in the prevention, treatment and maintenance of periodontal diseases. Aim of this review article is to give a basic overview of usage of herbal species in treatment of periodontal disease.

**KEYWORDS:** Antioxidants, Antibiotics, Ayurvedic Drugs, Herbs, Periodontal Disease, Phytotherapy.

**INTRODUCTION**

Periodontitis is one of the most ubiquitous diseases and is characterized by the destruction of connective tissue and dental bone support following an inflammatory host response secondary to infection by periodontal bacteria.[1,2] Severe periodontitis, which may result in tooth loss, is found in 5–20% of most adult populations worldwide.[3-5] Children and adolescents can have any of the several forms of periodontitis such as aggressive periodontitis, chronic periodontitis, and periodontitis as a manifestation of systemic diseases.[6-8] It is now generally agreed that almost all forms of periodontal disease occur as a result of mixed microbial infections within which specific groups of pathogenic bacteria coexist.[9-11]

Periodontitis is a health concern for centuries and are the most important causes of pain, discomfort, and tooth loss in adults. While a significant portion of the population is susceptible to periodontitis, there are those that are relatively resistant to the severe forms of periodontal disease. This leads to the hypothesis that, there are susceptibility factors or risk factors that modulate susceptibility or resistance of individuals to destructive periodontal disease. Over the last decade herbal medications turned out to be a popular form of therapy throughout the world when used in prophylaxis and treatment of various diseases. Many side-effects associated with modern medicines have been averted by using herbal medicines, and thus they are safer to use.[12]

Phytotherapy is used as an additional therapeutic method of treatment for gingivitis and periodontal disease. Herbs and their extracts have antimicrobial, antioxidative and antiinflammatory effects. Besides causal treatment for periodontal disease, which represents “gold standard” of periodontal therapy, the proper combination of herbal species and their extracts can improve the usual therapeutic procedure in patients with gingivitis and periodontal disease. Not only teeth is important, but gum care is also very important. Herbal extracts have been used in dentistry for reducing inflammation, as antimicrobial plaque agents, for preventing the release of histamine and as antiseptics, antioxidants, antimicrobials, antifungals, antibacterials, antivirals and analgesics. They also aid in healing and are effective in controlling microbial plaque in gingivitis and periodontitis and thereby improving immunity.[13]

### *Eugenia caryophyllata*



The essential oil extracted from the dried flower buds of clove, *Eugenia caryophyllata* is used as a topical application to relieve pain and to promote healing and also finds use in the fragrance and flavouring industries. The germicidal properties of the oil make it very effective for relieving toothache, sore gums and mouth ulcers.

Clove oil contains the compound eugenol, which has been used in dentistry for many years. Gargling with diluted clove oil helps in easing throat pain and irritation. The characteristic smell of clove oil also helps to eliminate bad breath.[14]

The main constituents of the essential oil are phenylpropanoids such as carvacrol, thymol, eugenol and cinnamaldehyde. The biological activity of *Eugenia caryophyllata* has been investigated on several microorganisms and parasites, including pathogenic bacteria, *Herpes simplex* and hepatitis C viruses. In addition to its antimicrobial, antioxidant, antifungal and antiviral activity, clove essential oil possesses anti inflammatory, cytotoxic, insect repellent and anaesthetic properties.[15]

### *Aloe vera*



Aloe vera is a cactus plant that belongs to the Liliaceae family. The parenchymal tissue makes up the inner portion of the aloe leaves and produces a clear, thin tasteless jelly-like material called Aloe vera gel. In recent years, various cosmetic and medical products are made from the mucilaginous tissue present in the center of the Aloe vera leaf in the form of Aloe vera gel. The sub lingual administration of aloe vera extract is reported to be efficient in treating periodontitis.[16-18] It contains vitamins, enzymes, minerals, sugars, fatty acids, amino and salicylic acids.[19] Aloe vera (in the form of a gel) improves wound healing and it can be used for burns, insect-bites and many other skin and mucosal lesions. Because of numerous healing properties of aloe vera, it has been used as dietary supplement and powerful antioxidant, as wound healing accelerator, after periodontal surgery, for traumatized gingival lesions by toothbrush, toothpick or solid food. Aloe vera (gel formula) is a non-toxic bactericide and it has antiviral, antifungal, antiinflammatory, analgesic properties and immune-stimulating properties.[20-22]

**Effects of Aloe vera:**

It has good wound healing activity. It has a protective effect against radiation damage to the skin. It inhibits the cyclooxygenase pathway and decreases prostaglandin E2 formation from arachidonic acid. Hence, it is a potent anti-inflammatory agent. It is a potent laxative. It has anti acne and antiseptic effect. Aloe vera is used in the treatment of Seborrheic dermatitis, psoriasis vulgaris, skin burns, type 2 diabetes, genital herpes, HIV infection, cancer prevention, ulcerative colitis, mucositis, radiation dermatitis, lichen planus, acne vulgaris, aphthous stomatitis, frostbite. Streptococcus pyogenes and Strptococcus faecalis are two microorganisms inhibited by aloe vera. Heggers et al suggested that Aloe vera in vivo inhibits bacteria that causes inflammation and thereby enhances wound healing[23-29].

***Azadirachta Indica***

*Azadirachta Indica* (Neem) is proved to be efficient in treating patients with chronic periodontitis. It acts by the removal or inhibition of subgingival plaque and maintenance is dependent on continued plaque control for which adjunctive local antimicrobial therapy has shown promising results.[30] The main ingredients are nimbin, nimbinin and nimbidin. The neem leaves contain 6-desacetylnimbinene, nimbandiol, nimbolide and quercetin, n-hexacosanol and nonacosane. Beta-sitosterol is present in all parts of the plant.

Neem oil along with the bark and leaf extracts have been therapeutically used to control leprosy, intestinal helminthiasis, respiratory disorders, constipation and as a health promoter. Rheumatism, chronic syphilitic sores and indolent ulcers have also been treated by neem. Bark, leaf, root, flower and fruit cure blood morbidity, biliary afflictions, itching, skin ulcers, burning sensation and pthysis. Neem leaf extracts have anti-arrythmic, anti-arthritis, anti-viral, anti-diabetic and antioxidant. It is hepato-protective. It has anti-ulcer, anti-malarial, anti-fungal and anti-carcinogenic activity. In vitro, it inhibits *Vibrio cholera*, *Klebsiella pneumonia*, *M.tuberculosis* and *M.pyogenes*.[31]

### Chamomile



Chamomile is recognized in the Western culture. Due to its calming and spasmolytic properties, it is a common ingredient in the herbal teas and also is an ingredient in health and beauty products for its soothing and anti-inflammatory effects on skin. Two species of Chamomile are *Matricaria chamomilla* (German chamomile) and *Chamaemelum nobile* (Roman chamomile). German chamomile is most commonly used. 50-65% of the total volatile oil content contain (-)-alpha-bisabolol and chamazulene. Other components of the oil include (-)-alpha-bisabolol oxide A and B, spiroethers, sesquiterpenes, cadinene, farnesene, furfural, spathulenol and proazulene. Chamomile oil (concentration of 25mg/mL) demonstrates antibacterial activity against Gram-positive bacteria such as *Bacillus subtilis*, *Staphylococcus aureus*, *Streptococcus mutans* and *Streptococcus salivarius*. It also has fungicidal activity against *Candida albicans*. Alpha-bisabolol provides the antibacterial, antifungal, anti-inflammatory, and anti-ulcer activity. Chamomile helps the body to resist or destroy micro-organisms. Azulene is bactericidal to staphylococcus and Streptococcus infections. Uses of Chamomile in the management of Periodontal diseases: Chamomile helps to reduce inflammation from periodontitis and also reduces the level of unhealthy bacteria in the mouth. In order to expose the gum to this herb, Chamomile tea is taken or mouthrinses and toothpastes containing Chamomile is taken to overcome periodontal infections.[32-44]

### *Glycyrrhiza glabra*



*Glycyrrhiza glabra* is also known as liquorice and sweet wood. It is native to the Mediterranean and certain areas of Asia. Licorice and Liquorice possess sweet taste and has extensive pharmacological effects. Liquorice is used in the treatment of upperrespiratory ailments like cough, hoarseness, sore throat and bronchitis.[45] In Japan,



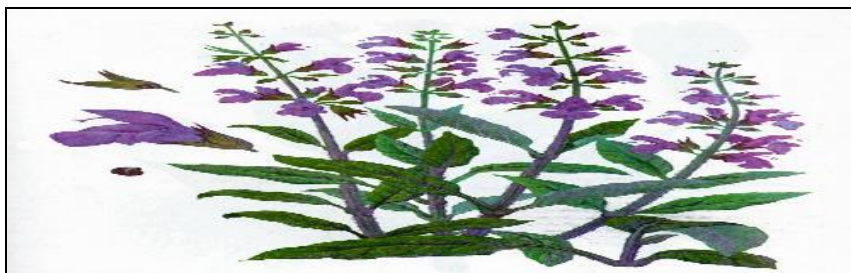
Liquorice extracts have been used for more than 60 years to treat chronic hepatitis. It is also thought to have a therapeutic benefit against human immunodeficiency virus, cytomegalo virus and herpes simplex virus. In the treatment of ulcers, Deglycyrrhizinated liquorice (DGL) is used. Topical liquorice preparations have been used to soothe and heal skin eruptions like psoriasis and herpetic lesions.[46] It is used in digestive disorders. It possess good anti-bacterial, anti-fungal, antioxidant, antitussive, hepatoprotective and anti-inflammatory activity.[47]

***Globulus labill***



Studies suggested that the use of a natural plant extract or essential oils like eucalyptus oil and clove oil either alone or in combination with an anti-microbial compound, a fluoride ion-providing compound, analgesic enzyme etc. The composition was formulated in the form of a liquid or a gel which moistened a single-use disposable sterile cotton roll to be received in a buccal vestibule. The system was therapeutically effective in treatment of periodontal diseases on topical administration.[48] Eucalyptus essence has antimicrobial activity against some microorganisms such as *Vibrio cholerae*, *Aspergillus flavus* and *S. aureus*. The results of studies indicated that eucalyptus extract could prevent tooth decay through inhibition of biofilm formation of plaques. It has also been reported that chewing gum containing eucalyptus extract improves gingival health, decreases bleeding during probing, and reduces periodontal diseases.[49]

***Salvia officinalis***



Sage belongs to Laminaceae family. Sage grows in the fields and along roadsides. It can be used as mouth rinse and it has been recommenended for treatment of sore throat, stomatitis, gingivitis and periodontal disease.[50] Sage essential oils have antibiotic,

antifungal and antiviral properties and it has been used to reduce inflammatory process in stomatitis and pharyngitis.[51].For therapy: 3g of sage chopped leaf could be added to 150 ml of boiling water for 10 minutes. Then, it can be used as a mouth rinse several times a day. Another prescription for mouth rinse is: two tablespoon of sage chopped leaf immersed in half a liter of water, covered and brought to a boil and then left covered for 15 minutes-this can be used for gargling several times a day for 5 to 10 minutes.[52,53]

### ***Turmeric***



Research studies proved that a bio-adhesive formulation comprising curcuminoids act as an active agent for treatment and prevention of periodontal disease. The composition included curcumin, tetrahydrocurcumin, bishydrocurcumin, crude drug and solvent extracts of *Curcuma longa*, one or more bioadhesive polymers such as hydroxypropyl cellulose, hydroxypropyl methylcellulose, sodium carboxymethylcellulose, hydroxyethylcellulose and carbomers and sodium chloride, sodium bicarbonate or mixtures and one or more excipients. This orally applicable composition can be used for the treatment of periodontal diseases.[54,55]

### ***Melaleuca alternifolia***



Tea tree or *Melaleuca alternifolia* belongs to Myrtaceae family. It can be applied directly on the inflamed gums, for instant relief.[56] Mouth rinse reduces inflammation and it has been used in endodontic and necrotic pulp treatment.[57] *Melaleuca alternifolia* has shown good effectiveness in control of microbial biofilm, with a significant reduction of gingival bleeding index.[58] .Santamaria et al.[59] evaluated the antimicrobial effects of

tea tree essential oil gel in controlling of oral microbial biofilm formation and they established its effectiveness against bacteria. Tea tree oil has demonstrated the ability to suppress the in vitro production of inflammatory cytokines, suggesting its potential as a therapeutic agent for inflammatory diseases, such as periodontal disease, via modulation of the host response.[60,61]

### CONCLUSION:

The use of herbal medicine continues to expand rapidly across the world. Many people take herbal medicines or herbal products now for their health care in different national healthcare settings. The global need for an alternative prevention, treatment options and products for oral disease are safe, effective and economical arises due to the rise in disease incidence, increased resistance by pathogenic bacteria to currently used antibiotics. The review also reported safer, potent and economic herbal remedies available in nature for periodontitis. The usage of herbal products in periodontal treatment has a great potential, but it is a challenge to determine the proper combination of herbal species and their extracts.

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