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Natural Remedy for Periodontal Malady

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Abstract:
As resistance and sensitivity to antibiotics and other allopathic medications increase, the global demand for safe, effective and cost-efficient alternative for preventive and treatment methods is emerging. Researchers are seeking novel medicinal molecules from natural sources. Herbal medicines offer these advantages in mitigating the adverse effects. India, historically a centre for traditional medicine, has promoted the utilisation of natural remedies for oral and periodontal diseases. Our comprehension of the aetiology and diagnosis of periodontal illnesses is perpetually advancing, and periodontal therapy has been adapted and shaped by treatment methodologies. Medicinal plants exhibit significant antibacterial action against many microbes, including those responsible for dental cavities and periodontal disorders. Care must be exercised in their selection, as herbal products may differ in potency. The primary hurdle is the insufficient information regarding the impact of herbs on oral tissues, their mechanisms of action, and potential adverse effects. Familiarity with several prevalent herbs that are alternately utilised as significant components of dental treatment, demonstrating established therapeutic advantages is now esssential.

Keywords: Periodontal, Herbs, Medicinal Plants, Phytomedicine

INTRODUCTION

Herbs (medicinal plants) have served as traditional remedies for many human ailments for ages in numerous regions worldwide.[1] In rural regions of developing nations, they remain the principal source of medication. [2] Many Japanese and Chinese plants have been evaluated for their medicinal properties. Indian and African population have a long era of herbal use with better patient tolerance and acceptance. [3,4]

The natural products obtained from therapeutic plants have demonstrated to be a rich source of physiologically active chemicals.[5] Herbal remedies also known as alternative medicine possess one or more distinct therapeutic properties, such as antibacterial, anti-inflammatory, astringent, anaesthetic, immunological enhancers, and anticariogenic effects, making it suitable for usage as an anti-plaque agent, root canal irrigant, tooth whitener, and storage medium for avulsed teeth.[6] Herbal extracts are efficacious as they engage certain chemical receptors in the body and, in a pharmacodynamic context, function as medications themselves.

The worldwide demand for preventive, alternative treatment options and products that are safe, effective, and cost-efficient arises from the increasing incidence of diseases, heightened resistance of pathogenic bacteria to existing antibiotics and chemotherapeutics, and opportunistic infections in immunocompromised individuals.[7] In addition, there is a great demand in dentistry for new and better substances to inhibit or suppress bacteria and biofilm formation, to improve the quality of the dental treatment, and to facilitate some dental procedures.[8] Investigating the use of herbal medicine in dentistry provides natural alternatives for analgesia and inflammation control. It augments therapeutic alternatives

by amalgamating conventional therapies with contemporary dental methodologies. As the cultivation and processing of these herbs are environment friendly, their availability is not a problem. Hence these drugs act as renewable resource making medicines cheaper for the growing population. [9] With increasing use of herbs plant extracts as alternative form of treatment in medicine and dental field it is essential to have information of some common herbs that can be used alternatively/ in combinations of conventional dental treatments with cautious approach of their adverse effects. This review examines several herbal medicines that can enhance knowledge to improve patient treatment, particularly for individuals seeking holistic or less intrusive options.

Phytotherapy

The Latin prefix 'phyto' denotes plant and therapy comes from the Latin word 'therapia' originally means to treat medically. Phytotherapy is synonymous with herbal medicine. It is the examination of the application of extracts from natural sources as pharmaceuticals or health-enhancing substances.[10] Phytotherapeutic compounds are typically categorised into three groups: plant, animal and mineral-derived products. An herbal treatment is a dietary supplement, a product consumed with a standard balanced diet, but is neither food nor medication. [11] These substances frequently comprise numerous bioactive constituents that interact with various targets during administration and treatment.

In dentistry they are used as

1. Antimicrobial – Matricaria Chamomile, Salvadora Percica, Azadirachta Indica
2. Anti-inflammtory – Plumeria Acuminate, Kalamchoe brasilines
3. Sedative and Anxiolytics- Melissa officinalis, passiflora Incarnale, Piper Meythsticum
4. Miscellaneous – Endodontic irrigants, medicaments and endodontic retreatment.[8]

Herbal medicines are derived from plants at specified concentrations, manufactured in their original form, in conjunction with other herbal extracts, or utilised following the refinement of these extracts. [11] Herbal extracts are efficacious as they engage certain chemical receptors in the body and, from a pharmacodynamic perspective, function as medications.[2] Sometimes utilising whole unprocessed plant extracts combined with various components that function synergistically, result in an overall effect that surpasses the cumulative effects of its individual components and also results in diminished toxicity when utilised as whole herbs are utilised rather than isolated active compounds ("buffering").[10] A variety of herbs are utilised in combination, as mixing them enhances efficacy and mitigates unwanted effects.[10]

Herbs are utilised to mitigate inflammation and alleviate irritation. Herbs can be administered internally in the form of pills, syrups, and infusions, or externally as poultices, plasters, and liniments.[12]

Herbal Medicine in Periodontal Disease.

Herbal medications are increasingly recognised for their efficacy in the field of dentistry and its therapeutic arsenal. Previously, they were mostly utilised as a significant component in toothpaste, mouthwashes, and analgesics; however, they are now progressively employed in various dental treatments, including root canals, surgeries, periodontal therapies, and anti-plaque agents, among others.[2] A herb may possess one or more of the following distinctive medicinal properties: antibacterial, anti-inflammatory, astringent, anaesthetic, immune-enhancing, anticariogenic, storage medium for avulsed teeth, anti-plaque agents, root canal irrigants, and tooth whitener, among others. The various indications for herbal medicine in periodontal health and disease includes:

1. **Oral hygiene:** Chewing sticks are obtained from neem, mango (Mangifera indica), babul (Acacia

arabica) and guava (Psidium guajava) and Miswak (Salvadora persica). Chewing sticks are believed to enhance salivation, hence aiding in the elimination of oral microorganisms. Tannins and thiocyanate are released during chewing from Miswak, tannins from Mango; isoprenoids such as nimbin, nimbinin and nimbidin from neem have demonstrated antibacterial properties against early plaque colonisers, including streptococci, and periodontopathogen P. gingivalis.[13] Calendula, lavender oil, and echinacea are utilised to alleviate inflamed gingival tissues and address the effect of opportunistic yeast responsible for thrush.

2. **Dentifrices**
   Natural dentifrices comprise of calcium carbonate as the abrasive agent, fluorospar as the fluoride source, and a thickening agent potentially derived from sweeteners, such as guar gum. Propolis containing toothpaste demonstrated good plaque-cleaning, plaque-inhibiting and anti-inflammatory activities in over 4 weeks.[14] Bloodroot extract, derived from Sanguinaria canadensis, has previously been used into oral rinses and toothpaste preparations. Natural dentifrices include abrasive agents derived from calcium carbonate, fluoride sourced from fluorspar, and thickening agents perhaps originating from seaweed, such as guar gum. [11]
3. **Gingivitis:** Calendula, lavender oil, and echinacea are utilised to alleviate inflamed gingival tissues and address opportunistic yeast responsible for thrush. Propolis, a product of bees, is believed to possess antiviral properties and is beneficial in the treatment of oral lesions. Herbal-based mouthrinse containing *S. officinalis*, *M. piperita*, menthol, *M. chamomilla*, *C. myrrha*, *Carum carvi* (Umbelliferae), *Eugenia caryophyllus* (Myrtaceae) and *E. purpurea*. reported a significant reduction in gingival index by Pistorius *et al.* (2003). [15] Essential oil-bearing plants such as peppermint, spearmint, and cinnamon have antibacterial properties and are beneficial for enhancing blood circulation to the gingiva. Plants that produce essential oils possess antibacterial properties and are effective in enhancing blood circulation to the gums. These encompass peppermint, spearmint, and cinnamon.
4. **Halitosis:** Parsley is recognised as a breath freshener and is frequently served on plates for patrons to consume after meals in restaurants. Liquorice enhances breath freshness and is utilised to flavour herbal toothpastes and mouthwashes. Bloodroot extract, derived from Sanguinaria canadensis, has previously been used into oral rinses and toothpaste preparations.
5. **Periodontitis:** Periodontitis or the inflammation of the periodontal tissues is diseases present in the mankind since centuries. It has also increased the global burden of disease and therefore to control and prevent it without the development of microbial resistance can be achieved with the use of Herbal medicines. Placebo-controlled clinical research demonstrated that both clinical and microbiological assessments showed that subgingival irrigation with propolis extract in combination with conventional treatment was more successful than conventional treatment alone. Tea tree oils inhibited adhesion against P. gingivalis significantly. All essential oils which were researched prevented S. mutans adhesion. [14] Other herbs used for treatment of periodontitis are aloe vera (*Aloe barbadensis* miller) chamomile, *Azadirachta indica*, *Glycyrrhiza glabra* (Liquorice root) and *Cinnamomum zeylanicum.*[10] Garlic allicin extract may be useful for preventing and treating periodontal disease by suppressing the development of P. gingivalis, Actinobacillus, Fusobacterium nucleatum, Streptococcus mutans, Escherichia coli, Streptococcus sobrinus, and Actinomyces viscosus.[10]

Most common herbs used in dentistry

Aloe vera (Aloe barbadensis miller): Aloe vera belongs to family of Asphodelaceae (Liliaceae) and known as lily of desert. Aloe vera is utilised in the treatment of periodontal surgery sites to treat aphthous ulcers and to reduce the incidence of alveolar osteitis after third molar extraction surgeries. aphthous ulcers, gum abscesses, dry socket, lichen planus, benign pemphigus, and gingival issues related to AIDS, leukaemia, migratory glossitis, geographic tongue, (M Anushri, 2015)burning mouth syndrome, denture sore mouth, desquamative gingivitis, vesiculobullous diseases and xerostomia.[16] It can be utilised to control antiviral infections such as herpes simplex and herpes zoster, or as an antifungal drug against Candida albicans. It is available in several forms, such as a mouthwash, toothpaste, or gel Research indicates it may result in allergic reactions: generalised eczematous and papular dermatitis resulting from topical application[4,10]

Bloodroot (Sanguinaria canadensis): It possesses antibacterial, anti-inflammatory, and antifungal properties. It is primarily utilised for treatment of gingivitis and periodontal disease, due to its ability to inhibit the growth of oral bacteria such as *P.gingivalis* and permits remineralisation of enamel lesions. It is also useful in treatment of acute pharyngitis. Prolonged usage may result in nausea, vomiting, glaucoma, oedema, cardiovascular illness, miscarriage, diarrhoea, abdominal pain, visual disturbances, and paralysis. It should be avoided in youngsters and pregnant or lactating mothers.[6,16,17]

Clove (Syzygium aromaticum): Eugenol, vanillin and iso-eugenol is found in clove essential oil. Cloves possess antibacterial, analgesic and antiseptic characteristics inhibiting the proliferation of nearly all pathogenic bacteria while preserving helpful bacteria. It has been utilised in dental fillings, rubbing oil of cloves on sore gums to ease pain. Clove gel offers dentists an alternative to benzocaine for topical anaesthesia in their practice, particularly for paediatric patients. Chewing cloves also reduce bad breadth.[2,12,16,20]

Cranberry (Vaccinium macrocarpon**):** Cranberries have anticarcinogenic, antibacterial, antiviral, antifungal, and antioxidant properties. Presence of flavonoids, phenolic acids, anthocyanins, condensed tannins in cranberries which inhibit the enzymes involved in the development of the dental plaque polysaccharide matrix layer as well as prevent bacteria from adhering to surfaces thus inhibiting acid production of caries causing bacteria. Hence avoiding tooth decay and gum disease. Cranberry juice is inherently acidic and may lead to dental attrition with excessive consumption resulting in dental pain and heightened sensitivity.[2,16,20]

Chamomile (Matricaria recutita): The chemical ingredients in chamomile are volatile oils and bioflavonoids flavonoids, apigenin, luteolin, and quercetin. The active components have antibacterial, and antiviral effects as chamomile helps to resist and destroy the micro-organisms. Primary applications are in form of mouth wash and toothpaste which helps in reducing gingivitis, periodontal disease. It can be used in management of burning mouth syndrome cases and as an irrigation solution and to even treat ulcers. However, bronchial constriction can occur with systemic administration and allergic dermal responses may result from topical application.[16,18,20]

German Chamomile: This herb has anti-inflammatory, analgesic, antibacterial, antispasmodic, and sedative attributes. Chamomile has been demonstrated to be useful as a mouthwash and has been evaluated for alleviating mucositis in cancer patients as it aids in preventing, delaying, or mitigating the incidence of mucositis. At elevated doses vomiting, skin rashes, and antiplatelet activity leading to uncontrolled haemorrhaging is usually associated with the usage of this herb. [2, 20]

Grape seed extract: Grape seed extract comprises proanthocyanidins (PA), which are powerful

antioxidants recognised for their anti-inflammatory, antibacterial, and immunostimulatory properties. It has been reported to enhance collagenous tissues by augmenting collagen crosslinks. [2]

Ginger (Zingiber officinalis): Ginger includes phenolic compounds such as gingerol and shogaol, sesquiterpene hydrocarbons and oleoresins. This composition depends on the native region of the plant species. Ginger shows anti-inflammatory, antioxidant activity, anticancer activity and antimicrobial activity. It also shows antihyperglycemic effect and reduces fasting blood sugar. Ginger can be used for treating denture stomatitis, recurrent aphthous stomatitis, xerostomia and also dental caries. [21]

Neem (Azadirachta indica): Neem has efficacy in preventing and treating gum infections. The inhibitory effects of neem on bacterial growth, adhesion to hydroxyapatite on tooth surfaces, and the production of insoluble glucan, which may influence in vitro plaque formation, indicate that neem stick extract can diminish the capacity of certain streptococci to colonise tooth surfaces and may serve as an effective anti-caries agent. [2, 3, 13,20]

PAPAINE: Papaine is a proteolytic enzyme derived from the latex of the leaves and fruits of mature green papaya. It possesses anti-inflammatory, bacteriostatic, and bactericidal properties, demonstrating efficacy against both gram-positive and gram-negative pathogens. [2]

TEA TREE OIL: Tea Tree oil is volatile essential oil derived mainly from the Australian native plant *Melaleuca alternifolia*. In dentistry, tea tree oil is utilised to eliminate bacteria in the oral cavity prior to dental surgery, to remove the smear layer when employed as a root canal irrigant, and to alleviate oral discomfort resulting from dental treatments. Tea tree oil at two concentrations of 100% and 10% presented antimicrobial activity against several species, including *C. albicans.* Oral consumption of tea tree oil is inadvisable due to the potential for severe side effects, including disorientation, loss of muscle control, or coma. [2,8,20]

TURMERIC (Curcuma longa): Turmeric belongs to the Zingiberaceae family. The primary compound in turmeric is referred to as curcumin. The advantages of turmeric encompass analgesic, antibacterial, anti-inflammatory, anti-tumor, anti-allergic, antioxidant, antiseptic, antispasmodic, appetiser, astringent, carminative, cholagogue, digestive, and diuretic properties. Massaging with roasted ground turmeric relieves tooth ache, pain and swelling. Application in form of paste provides relief from gingivitis and periodontitis.[4,16,20]

The quality, purity, and potency of herbal supplements can be influenced by various factors, including the season in which the plant is cultivated: spring, summer, or autumn. And also on the geographical origin of the plant - desert or humid regions. Timing and conditions during harvest: whether arid or pluvial and the procedures for drying and preparing the raw material as well as development and production of the final dosage form.[11]

Adverse Effects and Interactions

Despite the perception of herbal products as safe and its use for various medicinal purposes, there is growing apprehension regarding the potential detrimental consequences of these natural substances. Tea tree oil derived from M. alternifolia and castor oil has been documented to induce allergic contact dermatitis. Allergic conjunctivitis has been linked to chamomile (M. chamomilla) tea. Castor oil induces adverse symptoms including nausea, vomiting, and colic. E. purpurea and V. officinalis induce gastrointestinal disturbances or malfunction, with the latter additionally causing headache and dizziness as side effects. Nausea and diarrhoea were reported alongside elevated intraocular pressure, headache, fatigue, sleep difficulties, and palpitations after using lemon balm.[8,11,22]

Analgesics, anaesthetics, antibiotics, and vasoconstrictors are the medications most prone to eliciting a reaction when administered concurrently with herbal supplements. If a herbal medication may disrupt dental therapy, the patient must be instructed to discontinue its use until the treatment is finalised. The predominant adverse effect arising from interactions between dental medications and herbal supplements is haemorrhage.[11] Garlic, ginkgo, and goldenseal, along with less common substances such as alfalfa, barberry, bromelain, cinnabar root, dong quai, horse chestnut, melilot, Oregon grape, and sweet woodruff, have been linked to an elevated risk of bleeding during dental procedures. The medicinal plant cassia cinnamon, utilised as an analgesic, diminishes the efficacy of tetracycline by as much as 80%, whereas soothing substances like kava kava or St. John's wort may enhance the effects of both general and local anaesthesia.

Due to the limited research on herbal supplements, numerous other potentially hazardous combinations may remain unidentified.[23] Individuals under 15 years of age and elderly patients appear to be more susceptible to potential adverse effects and should refrain from using herbs unless advised by their healthcare provider. Pregnant women should refrain from consuming herbal supplements due to the potential for herbs to traverse the placental barrier and induce preterm contractions. Lactating women should avoid herbal supplements to prevent the transmission of the herb's effects to the newborn.

Conclusion:

Plants possess phytochemicals which include alkaloids, tannins, essential oils, and flavonoids. The accessibility of these natural compounds, expedite healing duration, low cost, and reduce toxicity of these phytochemicals that have considerable medicinal potential. Natural remedies are perceived as more acceptable by the population, as they are believed to be safer and to have less adverse effects than synthetic alternatives. Simultaneously, it is imperative to guarantee public safety and maintain effective quality control of these preparations. Hence, herbal remedies and formulations can be included into contemporary oral health care procedures and therapies. Further research and investigations on the efficacy of herbal products should be conducted to ascertain their therapeutic benefits, both alone and in conjunction with conventional medicines.

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