WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Role Of Medicinal Herbs In The Treatment Of Periodontal Diseases

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ABSTRACT :

Oral diseases pose a significant global challenge. Oral health is vital for overall well-being and affects quality of life beyond the functioning of the craniofacial complex. The side effects of certain antibacterial agents used in dentistry and financial limitations in developing countries have led dentists to seek natural remedies for dental treatments. Plant-derived phytochemicals are considered effective alternatives for treating various oral diseases. Medicinal plants have played a crucial role in developing affordable, effective, and reliable treatments for oral health issues. The harmful side effects of synthetic dental chemicals and rising antibiotic resistance have increased the demand for alternative medicines with fewer side effects. Herbal remedies provide various benefits, including anti-inflammatory, antimicrobial, analgesic, antifungal, and antioxidant properties, supporting oral hygiene and treating and preventing oral diseases. The traditional use of plants for oral health has driven the creation of numerous plant-based oral care products in the market. Literature reviews strongly support the integration of plant-based products into daily oral hygiene practices. Expanding the exploration of medicinal plants to include aquatic environments could uncover new natural resources for the dental care industry. Traditional knowledge of plant-based treatments offers modern society a way to reduce adverse effects, such as antibiotic resistance and tooth staining, associated with chemical products, while also recognizing and utilizing indigenous plants. Chemical drugs often cause side effects and promote drug-resistant microorganisms. The increasing occurrence of infections has created a global demand for safe, effective, and affordable alternatives for preventing and treating oral infections. By integrating plant-based products into oral care practices, we can leverage natural resources to develop cost-effective and efficient solutions for oral health maintenance and disease prevention This article provides a comprehensive review of the effectiveness of various medicinal plants in oral care, highlighting their role in modern oral healthcare and potential for future applications.

Keywords: Periodontal diseases, oral herbal medications, herbal remedies, oral care

Introduction :

Medicinal plants have played a crucial role in the evolution of human societies, forming the foundation of medical practices across virtually all cultures. These plants are valued for their rich resources of traditional medicines, and many contemporary drugs have been derived from compounds found within them. Historically, medicinal plants have been used not only for treating various health conditions but also for enhancing food flavor, preserving food, and preventing disease outbreaks. The healing properties of medicinal plants are primarily due to the secondary metabolites they produce. These chemical compounds, such as alkaloids, flavonoids, tannins, and terpenoids, are responsible for the biological effects of the plants and have been widely employed globally to manage microbial growth and treat infections.[1]

Without plants, life could not exist. The fundamental building block of medicine is plants. Several significant pharmaceuticals that are still in use today are made from conventionally used medical plants. The search for novel medications has drawn attention to ethnobotany and ethnopharmacology, opening up new avenues for research and knowledge that have led to the discovery of various chemical sources and classes. These days, research on structure-activity interactions and how they affect the creation of innovative medications has made them one of the most important and valued achievements of pharmacochemistry.[2]

Herbal medicines are organic substances produced from plants that are used in traditional local or regional healing techniques to address a variety of diseases. These goods are made up of intricate blends of organic compounds that can come from any raw or processed plant material. Herbal medicine has a long history in many different civilizations. There are numerous traditional medical systems, and they are all influenced by the social context, natural surroundings, and geographical location. They all take a comprehensive approach to health in spite of these variations. Well-known medical systems like Ayurveda and Traditional Chinese Medicine place more emphasis on preserving health than on curing illnesses. Instead of concentrating just on treating particular conditions, these systems support the use of medicinal herbs to enhance general well-being by addressing the harmony of the mind, body, and environment. Herbal therapy, sometimes referred to as botanical medicine or herbalism, has its roots in ancient societies and uses plants to treat illnesses and improve overall health. Plant extracts that are consumed or administered topically are the basis of this medical system. Herbal medicine has been used historically to treat a wide range of ailments, such as warts, chronic pain, digestive disorders, malaria, and heart problems. Knowledge of these treatments is frequently derived from the joint expertise of physicians and pharmacists, who have expanded upon customary knowledge. [3]

The practice of treating ailments either directly or indirectly with plants and substances obtained from them is known as "phytodentistry". Phytotherapy is the study of using plant extracts for medicinal purposes, and it is very important for treating oral and dental health problems. The amazing phenomena of symbiosis is best illustrated by nature, where natural substances derived from plants, animals, and minerals have long formed the basis for the treatment of human illnesses. It is estimated that 80 percent of people in underdeveloped nations still receive their primary medical care from traditional medicine, which mostly uses plants and animals. Herbal medicine is currently in high demand and is expanding every day. Approximately 800 plants are used in indigenous medical systems, and 500 species are mentioned in ancient literature as having therapeutic qualities. Particularly India has an extensive variety of medicinal plants that are employed in conventional medical procedures. Natural phytochemicals are a viable treatment and prevention option for dental caries and other oral infections, and they are promising as strong antibiotic substitutes.[4]

Medicinal herbs used in periodontal diseases

1.1. Syzygium aromaticum (Clove)

The clove tree is an evergreen species that grows to a height of 8-12 meters. It features large, square-shaped leaves and clusters of bright red flowers. Initially, the flower buds are pale, then turn green, and finally become bright red when they are ready for harvest. Cloves are picked when they reach a length of 1.5–2 cm. They consist of a long calyx ending in four spreading sepals and four unopened petals that form a small central ball.

High-quality clove buds are known to contain 15–20% essential oil. This oil is primarily composed of eugenol (70–85%), eugenyl acetate (15%), and β-caryophyllene (5–12%), which together constitute 99% of the oil. Additionally, the oil contains minor components such as methylamylketone, methyl salicylate, α- and β-humulene, benzaldehyde, β-ylangene, and chavicol. These minor constituents, like methylamylketone and methyl salicylate, contribute to the distinctive and pleasant aroma of cloves.[5]

Clove contains essential oil, eugenol, eugenol acetate, and β-caryophyllene. It possesses analgesic, antibacterial, antiviral, anti-inflammatory, and antioxidant properties. Clove is used to alleviate toothache, treat periodontitis, act as an anaesthetic, and address bleeding gums. Caution is advised when using clove in children, pregnant, and lactating women due to potential allergic contact dermatitis from topical use. It is available in various forms, including tincture (1:5, 25% ethanol), lozenges, and mouthwash.[6]

1.2. Mentha piperata (Pudina)

Menthol numbs the mucous membranes, which is why chewing mints gives one the impression of freshness . Its analgesic and euphoric effects are quite potent. In addition, it has antiviral, antinauseant, antipruritic, anti-inflammatory, and decongestant properties[7]. Due to all of these characteristics, peppermint essential oil is used to treat a variety of oral diseases, including neuralgia, caries, herpes, periodontal disease, and halitosis. Local medical care is provided for these ailments. Menthol is a common adjuvant or supplemental therapeutic ingredient in many medications for all of these ailments. There are elixirs and pastes made of menthol. Because of its high ketone level, children under 6 years old and women who are pregnant or nursing should not use peppermint essential oil.[8,9]

1.3. Cinnamomum verum- (cinnamon)-

The cinnamon tree is a tropical evergreen with a maximum height of 7 meters. However, because the stems are constantly trimmed back to a shorter length, the plant is more frequently cultivated as a shrub under cultivation, which limits the plant height to less than 3 m. yield fresh shoots for the extraction of bark and quills. It boasts vigorous branches and thick, scabrous bark. As a spice, cinnamon bark is frequently used. Whether raw or cooked, the bark has a pleasant aroma and a warm, sweet, aromatic flavour.[10] cinnamon oil was used to treat dental pain and as a disinfectant for carious cavities after their instrumentation. [11]

1.4. Curcuma longa (Curcumin or Turmeric)

Derived from the Curcuma longa plant, is a perennial herb belonging to the Zingiberaceae family. This plant's rhizome contains various active phytochemicals, with curcumin being the primary biologically active compound. Curcumin, responsible for turmeric's distinctive yellow-orange color, is a water-insoluble pigment that constitutes 2% to 5% of the plant. Historically, since the seventh century AD, curcumin has been utilized in traditional Chinese and Indian medicine for its health benefits and as a food preservative.[12] The primary benefits of curcumin on oral mucositis include decreased pain, erythema intensity, ulceration area, and severity. Furthermore, curcumin and turmeric were successful in postponing the development of mucositis lesions, indicating its averting impact.[13]

Numerous studies have demonstrated the potential of curcumin in treating periodontitis. Researchers have explored its use in various forms, including solutions, chips, gels, and capsules, for this purpose. When combined with other periodontal treatments like scaling and root planning (SRP) and photodynamic therapy (PDT), curcumin's effectiveness in managing periodontitis is enhanced. Besides natural curcumin, chemically modified versions such as 4-phenylaminocarbonyl bis-demethoxy curcumin (CMC 2.24) and 4-methoxycarbonyl curcumin (CMC 2.5) have also been utilized in animal models to study their effects on periodontitis.[14]

1.5. Glycyrrhiza glabra (Liquorice)

Liquorice, sometimes referred to as sweetwood, mulhatti, or yashtimadhu, is one such herbal therapy that has demonstrated enormous promise in the management of orofacial conditions. Secondary metabolites found in liquorice are widely utilized in ancient and modern healthcare, food products, and cosmetics. Its well-known qualities include antiviral, glucocorticoid, antioxidant, anti-inflammatory, anti-ulcerative, and anti-carcinogenic effects, among many more. Oral illnesses can be prevented and treated with the use of liquorice extracts and licorice bioactive substances such glabridin, licoricidin, licorisoflavan A, licochalcone A, and glycyrrhizin. In addition to being used as a root canal medication, licorice and its ingredients are used to treat oral disorders such as dental caries, periodontitis, gingivitis, candidiasis, recurrent pharyngitis, and oral cancer.[15]

1.6. Alchemilla vulgaris(Lady mantle)

Lady's Mantle has a long history of use in oral hygiene practices and has recently been demonstrated to enhance wound healing when combined with glycerine. A gel containing Alchemilla vulgaris has been found effective in treating minor mouth ulcers, alleviating discomfort, and achieving complete healing in a significant number of patients. Specifically, 60.4% of patients experienced complete healing within two days, and 75% within three days, compared to 10.4% and 33.3%, respectively, without any treatment, and 15% and 40%, respectively, with standard treatments.[16]

1.7. Triphala

Triphala In the Indian system of medicine (ISM), triphala is a well-known powdered concoction that has been utilized in Ayurveda since ancient times. Triphala have Anti caries activity , it is also used as a root canal irritant. Na OCL is a common irritant but it have unpleasant taste , high toxicity Triphala has shown significant anti-bacterial activity as a root canal irritant.[17] Another study demonstrated that using triphala juice as a root canal irrigant led to a substantial reduction in colony-forming units of E. faecalis and Candida albicans. Additionally, when triphala mouth rinse was used in combination with scaling and root planing, there was a notable decrease in plaque, gingival, and oral hygiene indices at 1, 4, and 6 weeks. These results were comparable to those achieved with chlorhexidine mouth rinse used alongside scaling and root planing.[18]

1.8. Bee Glue (Propolis)

A naturally occurring, non-toxic resinous substance, propolis has antibacterial, antiviral, anticancer, antifungal, and anti-inflammatory qualities. Propolis, an ingredient in toothpaste, greatly improves oral health by preventing dental plaque, which is the main cause of many oral illnesses. Toothpastes with propolis as an ingredient are advised as adjuncts for people who are more susceptible to periodontal problems. Studies conducted in vivo and in vitro have demonstrated propolis's strong anti-inflammatory properties, which qualify it for usage as a pulp capping agent. Because they block the lipoxygenase and arachidonic pathways, flavonoids and caffeic acid are primarily responsible for their anti-inflammatory qualities.[19]

1.9. Aloe Vera

Aloe vera, also known as Aloe barbadensis, is a member of the Liliaceae family of succulent plants. The Arabic term "Alloeh," which means brilliant bitter substance, and the Latin word "vera," which means true, are the sources of the name Aloe. Although the aloe plant has more than 300 species, the Aloe barbadensis species has the most beneficial medical qualities.[20].

Use of Aloe vera in various oral diseases-

Aphthous Ulcers- According to reports, acemannan hydrogel lessens the pain and speeds up the healing process of aphthous ulcers.

Oral Lichen Planus- Numerous researches have tested the effectiveness of aloe vera in treating oral lichen planus. Aloe vera was found to enhance patients' overall quality of life scores when they had Oral lichen Palanus(OLP).

Gingivitis- Aloe vera has shown promise in treating gingivitis in a number of trials that have been done, and the results are encouraging. With the right taste and shelf life adjustments, aloe vera mouthwash can be a potent antiplaque agent and a reasonably priced herbal alternative.[21]

1.10. Althaea officinalis (marsh mallow)

A perennial herbaceous plant in the Malvaceae family, marshmallow is known for its therapeutic qualities. The white, velvety, toothed leaves of this plant are distinctive. Because of its mucilage, the plant has emollient, laxative, and antitussive qualities. Its flavonoids and tannins also have anti-itch and anti-inflammatory actions, making it beneficial for dermatological disorders and conditions including bronchitis, colitis, and cystitis.

In the past, Pliny the Elder claimed in his "Natural History" that marshmallows could cure toothaches and bad breath. He said that applying the fresher root to a sore tooth would help. Dioscorides also mentioned the benefits of marshmallow for toothaches, cuts, parotid gland inflammation, abscesses, dysentery, burns, and bites. Although marshmallow lacks natural analgesic qualities, it can lessen pain indirectly by lowering inflammation, which in turn reduces discomfort associated with the inflammation.[11]Traditionally, Althaea officinalis has been used to treat respiratory issues such as coughing. When combined with other plant extracts in various dosage forms, A. officinalis may be a useful option for treating respiratory conditions such as cough and sore throat.[22]

1.11. Vaccinium macrocarpon (Cranberry)

Cranberry is known for its numerous medicinal properties, primarily due to its polyphenol and flavonoid content. These compounds have been documented to possess anticarcinogenic, antibacterial, antiviral, antifungal, and antioxidant effects. Cranberry's antiadhesive properties make it effective in combating periodontal disease, dental caries, and oral squamous cell carcinoma. Additionally, there are no known reports of adverse effects associated with its use.[23]

1.12. Sanguinaria canadensis (Bloodroot)

The main chemical component is sanguinarine, which possesses antifungal, antibacterial, and anti-inflammatory qualities. mostly used for periodontal disease and gingivitis, illness, acute sore throat, and remineralization of enamel lesions. Children and women who are pregnant or nursing should not use it. Extended usage may result in vertigo, glaucoma, edema, cardiac problems, diarrhoea, abdominal pain, vision abnormalities, and paralysis.[24]

1.13. Nigella sativa

It is an annual flowering plant belonging to the Ranunculaceae family. It functions as a spice. Often referred to as black cumin, black seed, or kalonji, Panacea means "cure all" in Latin. It has long been utilized for medical purposes. Both the therapeutic efficacy of oil and seed extracts is well established. It possesses antiseptic, anti-oxidant, anti-mutagenic, anti-inflammatory, and anti-cancer qualities. It was discovered to be useful in aphthous ulcer pain relief.[25]

1.14. Camellia sinesis

Tea is made from the leaves and leaf buds of Camellia sinensis. Based on the fermentation process, green tea has a higher catechin content compared to black tea. Unfermented green tea contains polyphenols such as epicatechin, epigallocatechin, epicatechin gallate, and epigallocatechin gallate, with epigallocatechin-3-gallate being the primary component. These secondary metabolites help protect against dentin loss by preventing erosive damage to vulnerable hard tooth surfaces. Plaque-induced gingivitis, the most prevalent form of periodontal disease, results from the buildup of microbial plaque that harbors over 300 different bacterial species. Using green tea mouthwash could be a safe and effective supplementary treatment for inflammatory periodontal diseases.[26]

Conclusion :

Medicinal herbs offer promising alternatives for the treatment and prevention of oral diseases and problems. Their natural properties, including anti-inflammatory, antimicrobial, analgesic, antifungal, and antioxidant effects, make them effective in enhancing oral health and hygiene. The historical and contemporary evidence supports the efficacy of plant-derived compounds in addressing issues such as dental caries, periodontal disease, and other oral infections. As synthetic drugs pose challenges such as side effects and antibiotic resistance, the integration of herbal remedies into dental care provides a safer, cost-effective, and efficient approach. Continued research and development of these natural therapies could lead to innovative solutions for maintaining oral health and managing oral diseases. Oral medicines have been extensively used for many years, with plant-based compounds showing significant effects on oral health. Numerous studies highlight the antioxidant, antimicrobial, and anti-inflammatory properties of medicinal herbs and their active ingredients. Given the role of bacteria in oral and dental issues, medicinal plants offer a valuable therapeutic option. The phytochemical constituents in these plants are crucial in combating oral and dental diseases.

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