

# From Roots to Remedies: The Science of Phytotherapy in Periodontics

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**Abstract**—Periodontal diseases are long-lasting inflammatory conditions that affect the structures supporting the teeth. They are mainly caused by microbial biofilm and tissue damage due to the body's response. Traditional periodontal treatment mostly involves mechanical cleaning along with additional antimicrobial and anti-inflammatory medications. While these treatments work, using them for a long time can cause side effects, alter the normal oral microbiota, and contribute to the growing issue of antimicrobial resistance. Recently, phytotherapy has drawn attention as a supportive option in periodontal care because of the healing properties of medicinal plants. Herbal products have many biological activities, such as antimicrobial, anti-inflammatory, antioxidant, pain-relieving, anti-collagenase, and wound-healing effects. These activities help control periodontal inflammation and promote tissue repair. A narrative review of the literature was conducted, including published in-vitro studies, animal experiments, clinical trials, and systematic reviews that focus on herbal agents used in periodontology. We evaluated medicinal plants and natural products like green tea, miswak, propolis, pomegranate, amla, aloe vera, triphala, oil pulling agents, licorice, Arimedadi Taila, noni, betel leaf, chamomile, cranberry, curcumin, and Nigella sativa for their mechanisms of action, clinical applications, benefits, and limitations as additions to conventional periodontal treatment. Evidence from clinical studies shows that many phytotherapeutic agents can significantly improve periodontal indicators, such as plaque index, gingival index, bleeding on probing, probing pocket depth, and microbial load when used alongside scaling and root planing. Several herbal

formulations produce results similar to those of conventional chemical agents, often with fewer side effects and greater patient acceptance. However, differences in herbal formulations, variations in dosage, lack of standardization, and insufficient long-term clinical trials are significant drawbacks. More well-designed randomized clinical studies are needed to establish standardized treatment protocols and reinforce the evidence for including phytotherapy in modern periodontal care.

**Index Terms**—Phytotherapy, Alternate therapy, periodontitis, adjuvant therapy, punica granatum, glycyrrhiza glabra, Phyllanthus emblica, Camellia Sinensis

## I. INTRODUCTION

Periodontal diseases are chronic inflammatory conditions affecting the structures that support the teeth. They remain a significant global oral health issue. The main cause is the buildup of subgingival microbial biofilm, which triggers an inflammatory response from the body. This response leads to ongoing destruction of periodontal tissues and eventually tooth loss<sup>1,2</sup>.

Traditional periodontal treatment usually involves removing plaque mechanically through scaling and root planing, often along with antimicrobial agents and chemical plaque control methods. Although these treatments are effective, long-term use can lead to side

effects, disruption of normal oral microbiota, and concerns about antimicrobial resistance. As a result, there is growing interest in safe, effective, and biologically compatible complementary therapies<sup>3,4</sup>. Phytotherapy, which uses medicinal plants and herbal products for healing, has gained renewed attention in dentistry for its antimicrobial, anti-inflammatory, antioxidant, and wound-healing effects. Various medicinal plants, such as *Phyllanthus emblica*, *Aloe vera*, *Curcuma longa*, *Camellia sinensis*, and *Salvadora persica*, have shown positive effects in managing periodontal disease<sup>5,6</sup>. Therefore, this review intends to compile and assess the current scientific evidence on commonly used herbal agents in periodontal therapy, focusing on their anti-inflammatory and pain-relieving properties while highlighting gaps and future possibilities for integrating phytotherapy into evidence-based periodontal care.

## II. PUNICA GRANATUM

*Punica granatum*, commonly known as pomegranate, is a medicinal plant known for its wide range of biologically active compounds. These include polyphenols, flavonoids, tannins, ellagic acid, and punicalagin. These phytochemicals contribute significantly to its strong antioxidant, antimicrobial, and anti-inflammatory properties. The health benefits of pomegranate mainly come from its ability to neutralize reactive oxygen species, reduce oxidative stress, and modulate inflammatory pathways by blocking pro-inflammatory mediators. Moreover, pomegranate extracts can prevent microbial adhesion and biofilm formation, which helps limit the growth of harmful microorganisms. Because of these properties, *Punica granatum* has been extensively studied in various medical fields, such as cardiovascular health, metabolic disorders, cancer prevention, and neurodegenerative diseases, where oxidative stress and inflammation play crucial roles<sup>7</sup>.

In dentistry, pomegranate extracts have gained attention as potential natural supplements for treating periodontal diseases. Products like mouthwashes, gels, and toothpastes containing *Punica granatum* have shown antimicrobial effects against bacteria associated with periodontal issues. They have also been linked to reductions in dental plaque, gum inflammation, and bleeding during probing. When

these products are used alongside standard periodontal treatments, such as scaling and root planing, they may help improve clinical outcomes and promote the healing of periodontal tissues. Additionally, research has explored other dental uses for pomegranate. Studies indicate its ability to reduce dental plaque and gingivitis, inhibit cavity-causing bacteria like *Streptococcus mutans*, manage oral thrush, and assist with healing in conditions like denture stomatitis and oral mucositis.

The benefits of pomegranate come from its natural source, strong antioxidant properties, and broad antimicrobial effects, while generally being low in toxicity. However, concentrated forms may cause mild side effects, such as stomach upset, allergic reactions, or irritation of the mouth lining in some individuals<sup>8</sup>.

## III. GREEN TEA

Green tea, which comes from the leaves of *Camellia sinensis*, contains polyphenolic catechins like epigallocatechin-3-gallate (EGCG), epicatechin, and epigallocatechin. These compounds provide antioxidant, antimicrobial, and anti-inflammatory effects. They help by neutralizing reactive oxygen species, blocking inflammatory pathways like NF- $\kappa$ B, and reducing the production of pro-inflammatory cytokines. Additionally, catechins help limit bacterial adhesion and biofilm growth, thus controlling microbial development. Due to these actions, research has looked into green tea's potential in various medical areas, such as cardiovascular diseases, metabolic issues, cancer prevention, and neurodegenerative diseases, where oxidative stress and inflammation are significant factors<sup>9</sup>.

In dentistry, green tea extracts have been added to mouth rinses, gels, and toothpaste as supplementary treatments to traditional methods. Research suggests that green tea can help lower plaque buildup, reduce gingival inflammation, cut down on bleeding during probing, and decrease periodontal pocket depth. It achieves this by inhibiting harmful periodontal bacteria and moderating the body's inflammatory responses. Moreover, studies show that green tea can suppress cavity-causing bacteria like *Streptococcus mutans*, decrease dental plaque formation, and help manage bad breath. Its advantages include being a natural source, having strong antioxidant properties, and being relatively low in toxicity; however,

excessive consumption or concentrated extracts may occasionally lead to mild gastrointestinal discomfort or caffeine-related effects<sup>10</sup>.

#### IV. PROPOLIS

Propolis is a resinous substance made by honey bees from plant resins mixed with beeswax and enzymes. It contains several bioactive compounds, including flavonoids, phenolic acids, terpenoids, and caffeic acid phenethyl ester (CAPE), which contribute to its antimicrobial, antioxidant, and anti-inflammatory effects. These compounds work by scavenging reactive oxygen species, blocking inflammatory mediators, and disrupting bacterial cell membranes and enzyme activity, which helps prevent microbial growth and biofilm formation. Because of these actions, propolis has been studied in various medical fields, including wound healing, dermatology, metabolic disorders, and cancer research, where it aids immune modulation and tissue repair<sup>11</sup>.

In dentistry, propolis has been included in mouthwashes, toothpaste, gels, and varnishes due to its ability to control oral microorganisms and inflammation. Studies have shown that propolis has antimicrobial effects against periodontal pathogens like *Porphyromonas gingivalis* and *Prevotella intermedia* and it can decrease plaque accumulation, gingival inflammation, and bleeding during probing when used as a supplement to scaling and root planing. Propolis has also been researched for other dental purposes, such as preventing dental caries by inhibiting *Streptococcus mutans*, managing oral mucosal lesions, and improving healing after oral surgeries. Although propolis is generally safe, some individuals sensitive to bee products may experience allergic reactions. Variations in its botanical source may also affect its chemical composition and therapeutic effectiveness<sup>12</sup>.

#### V. MISWAK

Miswak comes from the twigs and roots of *Salvadora persica*. It has been used for centuries as a natural aid for oral hygiene. The plant contains several active compounds like benzyl isothiocyanate, tannins, flavonoids, silica, alkaloids, and natural fluoride. These compounds help provide its antibacterial, antioxidant, and anti-inflammatory effects. Miswak

works through both mechanical and chemical actions. Its fibrous structure helps physically remove dental plaque, while its phytochemicals stop bacterial growth, block microbial adhesion, and lessen inflammation in oral tissues. Because of these properties, *Salvadora persica* has also been studied in traditional medicine for controlling infections and maintaining mucosal health<sup>13</sup>.

In dentistry, miswak has proved effective in reducing plaque buildup and gum inflammation. Research shows that using miswak regularly can lower plaque and gum indices and bleeding on probing. In some cases, it may work as well as traditional tooth brushing. Additionally, miswak extracts have shown antibacterial effects against cavity-causing bacteria like *Streptococcus mutans*, indicating a potential role in preventing cavities. Miswak has also been added to herbal mouth rinses and toothpaste to help control oral biofilm and maintain oral hygiene. However, improper use or too much pressure can cause gum recession, cervical abrasion, or tooth wear. Differences in the plant's composition may affect its effectiveness in practice<sup>14</sup>.

#### VI. CHAMOMILE

Chamomile (*Matricaria chamomilla*) is a popular medicinal herb containing bioactive phytochemicals such as flavonoids like apigenin, luteolin, and quercetin, along with sesquiterpenes like  $\alpha$ -bisabolol and chamazulene. These compounds provide strong anti-inflammatory, antioxidant, antibacterial, and healing properties. Chamomile extracts can block inflammatory signals and reduce oxidative stress by scavenging reactive oxygen species. This protection helps tissues avoid inflammatory damage and encourages cellular repair. These healing properties make chamomile particularly useful for managing inflammation, including periodontal diseases<sup>15</sup>.

In dentistry and periodontal therapy, chamomile has gained popularity for its positive effects on gum tissue. Chamomile-based mouth rinses, gels, and herbal products used with scaling and root planing have shown less gum inflammation, reduced bleeding on probing, and less microbial plaque. Its antibacterial effects help limit periodontal pathogens, while its anti-inflammatory properties help decrease gum swelling and support healing. Because of its soothing effects

and minimal side effects, chamomile is well-received by patients as a natural addition to periodontal care<sup>16</sup>.

#### VII. CRANBERRY

Cranberry (*Vaccinium macrocarpon*) is high in polyphenols, flavonoids, and special A-type proanthocyanidins that show strong antibacterial, antioxidant, and anti-adhesive properties. One of the unique aspects of cranberry compounds is their ability to prevent bacteria from sticking to host tissues. A-type proanthocyanidins disrupt bacterial surfaces, stopping their attachment and clumping on oral surfaces. This anti-adhesive effect interferes with biofilm development and reduces the colonization of periodontal pathogens, which are vital in starting and worsening periodontal disease<sup>17</sup>.

In periodontology, cranberry extracts have shown the ability to inhibit important periodontal pathogens like *Porphyromonas gingivalis*. These compounds can also alter inflammatory responses by lowering the release of pro-inflammatory signals and blocking matrix metalloproteinases that contribute to periodontal tissue damage. When added to mouth rinses or topical treatments alongside standard periodontal care, cranberry extracts can help decrease plaque buildup, gum inflammation, and bleeding on probing<sup>18</sup>.

#### VIII. CURCUMIN

Curcumin is the main polyphenolic component from *Curcuma longa* (turmeric). It is well-known for its strong anti-inflammatory, antioxidant, antibacterial, and host-modulating effects. It achieves its therapeutic benefits by blocking nuclear factor- $\kappa$ B signaling pathways and reducing the production of pro-inflammatory cytokines like interleukin- $1\beta$ , interleukin-6, and tumor necrosis factor- $\alpha$ . Curcumin also lowers oxidative stress and inhibits matrix metalloproteinases that break down collagen, thus protecting periodontal tissues from inflammatory damage<sup>19</sup>.

In periodontal treatment, curcumin has been studied as a natural addition to standard therapies like scaling and root planing. Curcumin-based gels, mouth rinses, and local drug delivery systems have shown improvements in clinical periodontal measures, including less gum inflammation, reduced bleeding on probing, less

periodontal pocket depth, and lower bacterial load. Its extra pain-relieving and antioxidant properties enhance patient comfort and promote faster healing of periodontal tissues. Despite these benefits, curcumin's effectiveness can be limited by its low absorption in the body, necessitating better formulations<sup>20</sup>.

#### IX. KALONJI SEEDS

*Nigella sativa*, known as kalonji or black seed, is a medicinal plant with various active compounds, particularly thymoquinone, and includes alkaloids, flavonoids, and essential oils. Thymoquinone is mainly responsible for the plant's anti-inflammatory, antioxidant, antibacterial, and immune-boosting properties. These compounds block inflammatory pathways, reduce pro-inflammatory signals, and neutralize reactive oxygen species, thus protecting tissues from oxidative stress and inflammation<sup>21</sup>.

In oral and periodontal health, *Nigella sativa* has shown promising therapeutic potential. Extracts and topical products with black seed have displayed antibacterial effects against oral pathogens and anti-inflammatory activity that helps decrease gum inflammation and bleeding. When used with standard periodontal treatments like scaling and root planing, products containing *Nigella sativa* may enhance periodontal healing and lower microbial plaque. However, more long-term clinical studies are needed to standardize dosages and formulations for regular periodontal use<sup>22</sup>.

#### X. AMLA

Amla (*Phyllanthus emblica*), known as Indian gooseberry, is a medicinal plant widely used in traditional Ayurvedic medicine. The fruit is rich in bioactive compounds like vitamin C, tannins, flavonoids, gallic acid, and emblicanin A and B, which provide strong antioxidant and anti-inflammatory effects. These phytochemicals neutralize reactive oxygen species and reduce oxidative stress, a key factor in damaging periodontal tissues. By lessening oxidative harm and inflammation, Amla assists in protecting periodontal connective tissues and supporting gum health. The antioxidant capabilities of *Phyllanthus emblica* have been well-documented in studies, emphasizing its therapeutic role in managing inflammation<sup>23</sup>.

In dentistry and periodontology, Amla has gained recognition as a natural supplement for supporting oral health. Research indicates that extracts of *Phyllanthus emblica* have antibacterial activity against oral bacteria and can minimize inflammatory reactions linked to gum disease. Herbal products with Amla, like mouthwashes, gels, or toothpastes, have shown the ability to lower plaque buildup, gum inflammation, and bad breath when used alongside standard periodontal treatments. These benefits stem from its antibacterial properties and its role in regulating host inflammatory responses<sup>24</sup>.

Amla is also widely utilized in systemic medicine for boosting immunity, regulating metabolism, and protecting the gastrointestinal system due to its antioxidant and anti-inflammatory effects. It is available in various forms, including powders, extracts, and herbal products, making it easy to use for treatment. Although generally safe, excessive amounts may occasionally cause minor stomach irritation because of its acidity. Therefore, Amla is regarded as a beneficial and affordable complement for preventive oral health care.

#### XI. ALOE VERA

Aloe vera (*Aloe barbadensis* Miller) is a succulent plant known for its healing and anti-inflammatory properties. The plant contains many bioactive compounds, including polysaccharides, acemannan, vitamins, amino acids, enzymes, and anthraquinones. These components have antimicrobial, antioxidant, and wound-healing activities that make Aloe vera effective in periodontal therapy. Aloe vera works by inhibiting cyclooxygenase pathways, reducing prostaglandin production, and promoting fibroblast growth and collagen synthesis. Together, these effects support the repair and regeneration of periodontal tissue<sup>25,26</sup>.

In periodontal care, Aloe vera has been used in gels, mouthwashes, toothpastes, and local drug-delivery systems. Clinical studies show that Aloe vera mouthwash can significantly reduce plaque buildup, gum inflammation, and bleeding during probing. This indicates its effectiveness in managing gingivitis and early periodontal disease. Its antimicrobial effects also help control harmful oral bacteria that contribute to periodontal inflammation<sup>25,26</sup>.

Besides dental uses, Aloe vera is commonly used in medicine for treating burns, skin disorders, gastric ulcers, and metabolic diseases due to its anti-inflammatory and healing effects. It is usually considered safe and well tolerated, though rare hypersensitivity reactions may occur. Thanks to its soothing properties and minimal side effects, Aloe vera is widely accepted as a natural aid in periodontal therapy.

#### XII. TRIPHALA

Triphala is a traditional Ayurvedic herbal mix made from three fruits: *Emblica officinalis*, *Terminalia chebula*, and *Terminalia bellirica*. These fruits contain high levels of polyphenols, flavonoids, tannins, and gallic acid derivatives, which have strong antioxidant, antimicrobial, and anti-inflammatory effects. Triphala helps reduce oxidative stress and blocks matrix metalloproteinases, which contribute to the breakdown of periodontal connective tissue. By limiting oxidative damage and inflammation, Triphala helps protect periodontal tissues and may slow down the progression of periodontal disease<sup>27,28</sup>.

Triphala also shows antimicrobial properties against oral bacteria and prevents bacterial adhesion and biofilm formation. In dentistry, Triphala mouthwash has been studied as a natural alternative to chlorhexidine. Clinical trials indicate that Triphala mouthwash significantly reduces plaque and gum indices, with results on par with conventional chemical mouthwashes. Since it is made from natural plant sources, Triphala offers additional benefits like minimal side effects and long-term safety<sup>28,29</sup>.

In general medicine, Triphala is traditionally used as a digestive aid, detoxifier, and immune booster. It comes in various forms, including powders, tablets, capsules, and liquid extracts. While it is generally safe, its bitter taste can affect patient compliance, and differences in preparation methods may impact its phytochemical content and effectiveness.

#### XIII. OIL PULLING

Oil pulling is a traditional Ayurvedic oral hygiene practice that involves swishing edible oils, such as sesame or coconut oil, in the mouth for several minutes. This process is believed to clean the oral cavity by mixing the oil with saliva and trapping

bacteria and debris. Coconut oil, in particular, contains lauric acid, which has strong antimicrobial effects that can disrupt bacterial cell membranes and reduce plaque formation. These actions help lessen the microbial load linked to gingivitis and periodontal disease<sup>30,31</sup>.

Oil pulling also helps reduce inflammation and oxidative stress in gum tissues. Regular practice has been shown to lower plaque index, gum index, and bad breath when combined with regular oral hygiene practices, like brushing and flossing. Some studies suggest that its effectiveness in reducing plaque and gingivitis is comparable to certain chemical mouthwashes but with fewer side effects.

The benefits of oil pulling include its low cost, easy access, and lack of synthetic chemicals. However, the practice requires patient commitment and sufficient time, typically 10 to 20 minutes per session. Poor technique may lead to mild discomfort, nausea, or jaw fatigue if not done correctly. Despite these drawbacks, oil pulling remains a simple and natural addition to oral hygiene.

#### XIV. ADHIMATHURAM

Adhimathuram, commonly known as licorice (*Glycyrrhiza glabra*), is a medicinal herb used in traditional medicine systems like Ayurveda, Siddha, and traditional Chinese medicine. The root is the primary source of its healing properties. It contains various active compounds, such as glycyrrhizin, flavonoids, saponins, liquiritin, and glabridin. These compounds contribute to its anti-inflammatory, antimicrobial, antioxidant, and immune-boosting effects. Licorice works by blocking inflammatory signals, slowing microbial growth, and reducing oxidative stress. These factors are crucial in the development of periodontal disease. Glycyrrhizin and flavonoids in licorice show strong antibacterial effects against oral bacteria like *Streptococcus mutans* and *Porphyromonas gingivalis*, helping manage dental plaque and gingivitis<sup>32</sup>.

In general medicine, licorice is often used to treat respiratory problems, gastric ulcers, sore throats, liver issues, and inflammation due to its protective and anti-inflammatory qualities. It is available in various forms, including powder, extracts, syrups, capsules, and herbal teas. In dentistry and periodontology, licorice is recognized as a natural remedy because it can prevent

plaque-forming bacteria and reduce gum inflammation. It has been incorporated into herbal toothpastes, mouthwashes, gels, lozenges, and chewing sticks to maintain oral health. Studies show that licorice extracts can reduce plaque buildup and improve gum health when used with regular oral care<sup>32</sup>.

Licorice has benefits such as being a natural source with antimicrobial properties that support healing in mucous membranes. However, excessive use or prolonged use can lead to side effects like high blood pressure, fluid retention, or electrolyte imbalance due to glycyrrhizin content. So, its use should be managed and viewed as a supplement, not a substitute for standard periodontal treatment.

#### XV. NONI

Noni, also called *Morinda citrifolia*, is a tropical plant that has been used in traditional medicine, particularly in Polynesian and Southeast Asian cultures. The fruit, leaves, and roots of this plant contain several bioactive compounds like flavonoids, alkaloids, scopoletin, iridoids, anthraquinones, and polysaccharides. These compounds offer Noni various therapeutic benefits, including antioxidant, anti-inflammatory, antimicrobial, and immune-modulating properties. Noni can help by reducing inflammation, lowering oxidative stress, and fighting harmful microorganisms. These actions may be useful in managing inflammation linked to periodontal disease and in supporting the healing of damaged gum tissues. The antioxidant properties of Noni help to neutralize harmful free radicals and protect periodontal tissues from damage<sup>34</sup>.

In general medicine, Noni is used to boost the immune system, promote wound healing, manage infections, ease pain, and support metabolic health. It comes in different forms such as juice, capsules, extracts, powders, and herbal blends. In the field of dentistry and periodontology, Noni is becoming more popular as a natural treatment option due to its ability to combat oral bacteria and reduce gum inflammation. Noni extracts are often found in mouthwashes, gels, and herbal toothpastes, which are used together with standard periodontal treatments like scaling and root planing to reduce plaque, gum inflammation, and bacterial growth. The benefits of Noni include its natural origin, antioxidant effects, and support for

tissue healing. However, consuming too much Noni can lead to stomach discomfort or allergic reactions in some individuals. Therefore, it is best seen as a helpful herbal supplement rather than a replacement for professional periodontal care.

#### XVI. BETEL

Betel, also known as betel leaf, is a medicinal plant used in traditional systems of medicine such as Ayurveda and Siddha. The leaves contain active compounds like phenols, flavonoids, alkaloids, tannins, and essential oils, including eugenol, chavicol, and hydroxychavicol. These compounds give betel leaf antimicrobial, antioxidant, anti-inflammatory, and antiseptic properties. Betel leaf helps by stopping harmful microorganisms, reducing inflammation, and neutralizing free radicals. These effects help control microbial growth and reduce inflammation in oral tissues, which is important in preventing and treating periodontal diseases. The strong antibacterial properties of betel leaf extracts effectively fight oral pathogens that cause dental plaque and gum inflammation<sup>36</sup>.

In general medicine, betel leaf is used for aiding digestion, acting as an antimicrobial agent, and promoting wound healing. It is also beneficial in treating respiratory problems, minor infections, and inflammatory conditions. Betel leaf is available in different forms such as fresh leaves, extracts, powders, oils, and herbal blends. In dentistry and periodontology, researchers have explored its potential in supporting oral hygiene and managing periodontal infections. Betel leaf extracts are used in mouthwashes, gels, herbal toothpastes, and local treatments to reduce plaque, gum inflammation, and oral bacteria when used with standard periodontal treatments. The benefits of betel leaf include its natural antibacterial qualities, antioxidant effects, and support for healing oral tissues. However, excessive or improper use of betel products, especially when combined with tobacco or areca nut, can lead to harmful effects in the mouth. Therefore, betel leaf extracts should be used carefully and only as complementary herbal options for oral health.

#### XVII. ARIMEDADI TAILA

Arimedadi Taila is a traditional Ayurvedic herbal oil used for oral hygiene and in treating various oral and periodontal conditions. This formulation is made from a combination of medicinal herbs such as *Acacia catechu*, *Rubia cordifolia*, *Glycyrrhiza glabra*, and *Syzygium aromaticum*, which are mixed in a base of sesame oil. These ingredients are rich in bioactive compounds like tannins, flavonoids, alkaloids, and essential oils, which give the oil antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties. Arimedadi Taila works by inhibiting harmful oral bacteria, reducing inflammation, and promoting healing of damaged tissues. Tannins and essential oils help control bacterial growth and reduce plaque formation, while anti-inflammatory components soothe inflamed gums and support repair of periodontal tissues<sup>38</sup>.

In general medicine, Arimedadi Taila is commonly used in Ayurvedic treatments for conditions like oral ulcers, sore throat, bad breath, and inflammatory mouth disorders. It is primarily used in an oil form for traditional practices such as *gandusha* (oil holding) and *kavala* (oil gargling), which are methods for cleaning the mouth. In dentistry and periodontology, Arimedadi Taila is valued as a natural supplement for maintaining oral hygiene and improving periodontal health. It can be used for oil pulling or applied directly to the gums to reduce plaque buildup, gum inflammation, bleeding gums, bad breath, and the number of microbes in the mouth. Regular use may also strengthen gum tissues and aid in the healing of minor oral injuries. The benefits of Arimedadi Taila include its herbal composition, antimicrobial properties, and ability to lubricate and protect oral tissues. However, drawbacks include its strong taste, potential difficulty in compliance, and the need for consistent use. For this reason, Arimedadi Taila should be considered a supportive addition to standard periodontal treatment and not as a replacement for professional dental care.

#### XVIII. MORINGA

Moringa (*Moringa oleifera*), often called the “Miracle Tree,” is a medicinal plant well-known for its many therapeutic properties in traditional and modern medicine. It contains a variety of bioactive

constituents such as flavonoids, phytosterols, glycosides, tannins, amino acids, and phenolic compounds that contribute to its antimicrobial, anti-inflammatory, antioxidant, and antitumor activities. The way it works involves stopping periodontal pathogens, reducing inflammatory mediators, and neutralizing oxidative stress, which helps prevent tissue destruction associated with periodontal disease. In general medicine, Moringa is used to improve overall health, boost immunity, and manage systemic conditions due to its rich nutritional and pharmacological profile. It is available in different forms like leaf powder, extracts, and gel formulations. In dentistry and periodontology, Moringa has been studied as a local drug delivery agent, particularly in gel form, where it has shown significant antimicrobial activity against periodontal pathogens using disc diffusion methods, with effectiveness comparable or slightly less than chlorhexidine. It is used alongside scaling and root planing to enhance periodontal therapy outcomes. The benefits of Moringa include its natural origin, affordability, antimicrobial effectiveness, and ability to promote oral health. However, limitations include the need for further clinical validation and standardization of formulations. Overall, Moringa oleifera shows promising potential as a phytotherapeutic agent in managing periodontal issues<sup>40</sup>.

#### XIX. TRIDAX

Tridax procumbens (coat buttons) is a medicinal herb rich in bioactive constituents such as flavonoids (quercetin, luteolin), tannins, alkaloids, and carotenoids, which form the main source of its therapeutic effects. It works by disrupting bacterial cell membranes and inhibiting prostaglandins and cytokines, thus reducing inflammation. It also enhances wound healing by promoting fibroblast proliferation, collagen synthesis, and blood vessel formation. In general medicine, it is widely used for wound healing, managing infections, and treating inflammatory conditions, often in the form of leaf extracts, juices, or topical formulations. In dentistry, particularly periodontology, it has shown inhibitory effects against oral pathogens and is considered a potential adjunct in managing plaque-induced gingivitis and periodontitis due to its combined antimicrobial and healing properties. The benefits of

Tridax procumbens include its natural origin, affordability, minimal side effects, and dual action of antimicrobial and healing properties. However, drawbacks include a lack of standardized formulations and inadequate large-scale clinical trials; reported side effects are minimal but may include mild local irritation or occasional hypersensitivity<sup>41</sup>.

#### XX. CONCLUSION

Phytotherapy is a valuable and biologically sound addition in managing periodontal diseases. The herbal agents reviewed show significant antimicrobial, anti-inflammatory, antioxidant, analgesic, and modulating effects that tackle key harmful aspects of periodontal disease. When used alongside conventional mechanical therapy, these natural products can improve periodontal results, enhance patient comfort, and potentially reduce dependence on synthetic drugs. The growing body of evidence supports the integration of selected herbal therapies into periodontal care, particularly for long-term maintenance, preventive measures, and populations with limited access to standard treatments. However, phytotherapy should not replace established periodontal treatments but rather serve as a complementary approach that enhances conventional care. Future research should prioritize the standardization of herbal formulations, well-designed randomized controlled trials with long-term follow-up, and the creation of evidence-based clinical guidelines. Additionally, incorporating phytotherapy education into dental programs and continuing professional development is crucial to address current knowledge gaps among clinicians. With rigorous scientific support and responsible clinical use, phytotherapy could play a significant role in evidence-based, patient-centered periodontal care<sup>6</sup>.

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## REFERENCES

- [1] G. Malcangi, A. Patano, D. Di Venere et al., "Effectiveness of herbal medicines with anti-inflammatory properties in the management of periodontal disease: A systematic review," *Int. J. Dent. Hyg.*, 2025.
- [2] G. S. Chatzopoulos, A. Tsiouris, and G. A. Kotsakis, "Clinical effectiveness of herbal oral care products in the management of periodontal diseases: A systematic review," *J. Periodontol.*, vol. 93, no. 4, pp. 489–503, 2022.
- [3] M. S. Refaey, M. Hassan, and A. Abdallah, "Exploring the therapeutic potential of medicinal plants and phytoconstituents for oral diseases," *Phytother. Res.*, 2024.
- [4] S. Amanpour, H. Bakhshi, and M. Sadeghi, "Medicinal plants and herbal products for improving oral health: A systematic review," *Complement. Ther. Med.*, vol. 72, p. 102889, 2023.
- [5] A. N. Abu Tamam, A. Alsharif, and L. Al-Harhi, "Herbal medicine as an adjunct in the treatment of periodontal diseases," *J. Herb. Med.*, 2024.
- [6] A. S. Gawish, H. El-Sharkawy, and R. El-Sharkawy, "Phytotherapy in periodontics as an effective and sustainable therapeutic approach," *J. Periodontal Implant Sci.*, 2023.
- [7] G. Marrone, F. G. Vaccaro, G. Bianco et al., "Healthy effects of pomegranate (*Punica granatum L.*) in chronic diseases," *Appl. Sci.*, vol. 14, p. 1125, 2024.
- [8] J. J. L. Bezerra, M. Ferreira, and M. Silva, "Dental applications of *Punica granatum* in the treatment of gingivitis: Ethnomedicinal uses and antibacterial potential," *J. Ethnopharmacol.*, 2025.
- [9] M. Paczkowska-Walendowska, D. Szymanowska, and J. Cielecka-Piontek, "Green tea: A novel perspective on the traditional plant's potential in managing periodontal diseases," *Pharmaceuticals*, vol. 18, p. 115, 2025.
- [10] C. Musial, A. Kuban-Jankowska, and M. Gorska-Ponikowska, "Beneficial properties of green tea catechins," *Int. J. Mol. Sci.*, vol. 21, p. 1744, 2020.
- [11] M. Sycińska-Dziarnowska, A. Paradowska-Stolarz et al., "Propolis as a natural remedy in reducing dental plaque and gingival inflammation: A systematic review and meta-analysis," *J. Funct. Biomater.*, 2025.
- [12] H. Alghutaimel, K. Al-Aali, and A. Al-Qahtani, "Propolis in dentistry: A narrative review of its applications," *Int. Dent. J.*, 2024.
- [13] I. Vejjendla, S. Reddy et al., "Antibiofilm properties of miswak (*Salvadora persica*): A systematic review of randomized controlled trials," *BMC Oral Health*, 2025.
- [14] H. S. Halawany, "A review on miswak (*Salvadora persica*) and its effect on various aspects of oral health," *Saudi Dent. J.*, vol. 24, no. 2, pp. 63–69, 2012.
- [15] A. El Mihaoui, L. M. Estevinho et al., "Chamomile (*Matricaria chamomilla L.*): A review of ethnomedicinal use, phytochemistry and pharmacological uses," *Life*, vol. 12, p. 479, 2022.
- [16] A. Srivastava, R. Gupta, and S. Kumar, "Therapeutic applications of chamomile (*Matricaria chamomilla*): A comprehensive review," *J. Herbal Med.*, 2022.
- [17] V. D. La, A. Howell, and D. Grenier, "Anti-*Porphyromonas gingivalis* and anti-inflammatory properties of cranberry polyphenols," *J. Antimicrob. Chemother.*, vol. 65, no. 5, pp. 1046–1053, 2010.
- [18] P. Khuntia and S. Pattnaik, "Cranberry: A boon in periodontal therapy," *J. Indian Soc. Periodontol.*, vol. 24, no. 3, pp. 203–207, 2020.
- [19] S. M. Solomon, H. P. Raghuvver et al., "Curcumin as a natural approach of periodontal adjunctive therapy," *Clin. Oral Investig.*, 2022.
- [20] R. Al-Kattan and A. Al-Ghamdi, "The role of curcumin in periodontal therapy: An update," *Dent. J.*, 2024.
- [21] M. Ahmad, M. A. Khan et al., "Nigella sativa and thymoquinone: A review on pharmacological properties and therapeutic potential," *Biomed. Pharmacother.*, vol. 135, p. 111164, 2021.
- [22] E. M. Yimer, K. B. Tuem, A. Karim, N. Ur-Rehman, and F. Anwar, "Nigella sativa and its active constituent thymoquinone: Pharmacological activities and therapeutic potential," *Phytother. Res.*, vol. 34, no. 11, pp. 2804–2821, 2020.
- [23] C. Lu, L. Qing, and L. Yin, "Phyllanthus emblica fruit extract alleviates halitosis and reduces inflammatory response to oral bacteria," *J. Ethnopharmacol.*, 2024.
- [24] A. T. Prananda, "Phyllanthus emblica: A comprehensive review of its phytochemistry and therapeutic potential," *Phytomedicine*, 2023.

- [25] N. H. Hamonari, S. A. Al-Maweri, and M. N. Alhaji, "Effectiveness of chlorhexidine and aloe vera mouthwash in patients with periodontal disease," *BMC Oral Health*, 2024.
- [26] A. Komchornrit, "Antimicrobial effects of aloe vera mouthwash in adults with oral diseases," *J. Dent. Sci.*, 2025.
- [27] A. Singaraju, S. Nuvvula, and V. R. K. Rudravaram, "Efficacy of Triphala mouthwash on gingival inflammation: A systematic review," *J. Ayurveda Integr. Med.*, 2024.
- [28] G. Minervini et al., "Comparative anti-plaque and anti-gingivitis efficiency of Triphala and chlorhexidine mouthwashes," *Clin. Oral Investig.*, 2024.
- [29] S. D. Bharathi et al., "Comparative evaluation of Triphala and curcumin mouthwashes in gingivitis management," *J. Indian Soc. Periodontol.*, 2024.
- [30] F. C. Peedikayil, V. Remy, and S. John, "Evaluation of coconut oil pulling therapy on plaque-induced gingivitis: A randomized controlled trial," *J. Clin. Diagn. Res.*, 2020.
- [31] J. Nagilla, S. Kulkarni, and P. R. Madupu, "Oil pulling therapy as an adjunct oral hygiene measure," *J. Clin. Diagn. Res.*, 2021.
- [32] Y. Li, Y. Chen, and J. Wang, "Antimicrobial and anti-inflammatory properties of Glycyrrhiza glabra in oral health applications," *Front. Pharmacol.*, 2021.
- [33] L. Wang, R. Yang, and B. Yuan, "Glycyrrhiza glabra and its bioactive compounds: Pharmacological properties and therapeutic potential," *Molecules*, vol. 27, p. 1901, 2022.
- [34] A. C. Brown, "Antioxidant and antimicrobial properties of Morinda citrifolia in oral health applications," *J. Herbal Med.*, 2020.
- [35] O. Potterat and M. Hamburger, "Morinda citrifolia (Noni): Recent advances in pharmacology and therapeutic applications," *Nutrients*, vol. 13, p. 372, 2021.
- [36] S. Das, R. Parida et al., "Phytochemical and antimicrobial properties of Piper betle leaf in oral health management," *J. Ethnopharmacol.*, 2021.
- [37] D. Chakraborty and B. Shah, "Therapeutic potential of Piper betle: A comprehensive review," *Biomed. Pharmacother.*, vol. 146, p. 112540, 2022.
- [38] R. Saini, S. Sharma et al., "Evaluation of herbal oil formulations including Arimedadi Taila in the management of periodontal diseases," *J. Ayurveda Integr. Med.*, 2021.
- [39] S. Patil and R. S. Rao, "Role of Ayurvedic herbal formulations in oral health care: A clinical perspective," *J. Herbal Med.*, 2023.
- [40] K. Sumathy, V. K. Vijay, D. S. Sakthi Ganesh, "The wonder leaf with magical properties – Moringa oleifera," *Int. J. Dent. Med. Sci. Res.*, vol. 7, no. 5, pp. 370–374, 2025.
- [41] P. S. Jadhav, P. H. Shinde, and J. A. S. Mulla, "Formulation and evaluation of Tridax procumbens-loaded phospholipid complex (phytosome) gel for wound healing and antimicrobial activities," *RSC Pharm.*, vol. 3, pp. 237–246, 2026.