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PHYTOMEDICINES IN PERIODONTAL TREATMENT: A REVIEW

Dentistry

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ABSTRACT

Periodontitis is an inflammatory disease of the periodontium, which destroys the periodontal ligament and alveolar bone with either an increase in probing depth, recession, or both). Most of periodontal patients can be managed by non-surgical therapies along with proper maintenance of oral hygiene by patients. However, Total plaque removal cannot be achieved by mechanical oral hygiene procedures whether performed by patients or dentists. Hence various adjuncts to SRP such as mouthwashes are being added to the periodontics to aid in the non-surgical therapies. Due to the rise in disease incidence, antibiotic resistance, systemic toxicity, opportunistic infection in immunocompromised patients, and higher cost phytomedicines are being tried for the treatment of periodontitis as an adjunct to SRP to overcome above mentioned complications. This article aims to review the data available on the effectiveness of various phytomedicines as an adjunct to SRP.

KEYWORDS

Phytomedicines, Periodontal Disease, SRP, Periodontitis, Adjunctive Therapy

INTRODUCTION

One of the most common diseases of mankind in terms of global prevalence is periodontitis. (1, 2) Periodontitis is an inflammatory disease of the periodontium, which destroys the periodontal ligament and alveolar bone with either an increase in probing depth, recession, or both. (3) Clinically, varying degrees of redness and swelling may be associated with periodontitis. Destruction of periodontal tissues is caused due to the periodontal micro-organisms. (4) B and T lymphocytes, neutrophils, monocytes, and macrophages initiate host response against these microorganisms triggering the production of inflammatory mediators such as cytokines, chemokines, arachidonic acid metabolites, and other enzymes which causes destruction of tooth-supporting tissues causing periodontitis. (5)

Along with the micro-organisms, free radicals also play a vital role in the pathogenesis of chronic periodontitis. The neutrophils which are the first line of defense neutralize the offending pathogenic micro-organisms by either non-oxidative or oxidative process. Non-oxidative neutralizing is completed by various lysosomal enzymes, peptides, and proteins, including, lysozyme, bactericidal/permeability-increasing proteins, cationic proteins, defensins, and lactoferrin. Oxidative neutralization is carried out by the production of Reactive Oxygen Species (ROS) such as superoxide, hydrogen peroxide, hydroxyl radicals, hypochlorous acid, and chloramines. These produced ROS not only neutralize the micro-organisms but also cause collateral damage and contribute to tissue damage resulting in inflammation.(6)

Scaling and root planning (SRP) is the mainstay of successful periodontal treatment which removes the dental plaque and calculus, the primary etiological factors for causation of periodontitis. (7) Most of periodontal patients can be managed by non-surgical therapies along with proper maintenance of oral hygiene by patients. However, Total plaque removal cannot be achieved by mechanical oral hygiene procedures whether performed by patients or dentists. (8) Consequently, this led to the adjunctive use of antimicrobials/ chemotherapeutic agents (either locally or systemically), assuming that chemical aids would compensate for the technical shortcomings and prevent early recolonization of pathogens to ensure the best chance for clinical improvement. (9) Hence various adjuncts to SRP such as mouthwashes are being added into the periodontics to aid in the non-surgical therapies.(10)

Chemotherapeutic drugs that are currently in use are highly efficacious in managing periodontitis but have various side effects such as increased antibiotic-resistant micro-organisms, adverse drug reactions, and uncertain patient compliance. Due to several side effects of conventional medicines, herbal products are now being used as an alternative as they are safer to use, have natural activity, and are more cost-effective.

Ayurveda has been practiced since the 12th century BC and is the oldest medical science which has started in India. Ayurveda is intended to achieve physical, mental, and social well-being by means of adopting a preventive, health-promoting, and holistic approach to life. Recently various ayurvedic drugs are being used for oral and dental health. (11) As many adverse effects are associated with conventional chemotherapeutic drugs, a search for alternative phytochemicals derived from plants is underway and is a better alternative. Due to the rise in disease incidence, antibiotic resistance, systemic toxicity, opportunistic infection in immunocompromised patients, and also higher cost, the global need for safer and effective, alternative preventive and therapeutic treatment options has increased. (12, 13)

This article aims to review the data available on the effectiveness of phytomedicines as an adjunct to SRP.

A. Curcuma Longa (turmeric)

Turmeric belongs to the ginger family and is a rhizomatous perennial plant. Curcumin is the most important polyphenol obtained from the rhizome of Curcuma species. Turmeric has been traditionally used in many cultures for its medicinal properties. Turmeric is known to have antioxidant, anti-inflammatory, and antimicrobial properties. (14)

A systematic review was carried out by Zhang et al to find out the Anti-inflammatory efficacy of curcumin as an adjunct to non-surgical periodontal therapy. The results showed a significant reduction in the Gingival index and sulcus bleeding index and based on the results authors concluded that curcumin is a good candidate as an adjunct to SRP with fewer side effects (15).

In another systematic review carried out by Oliveira et al to search for the effect of curcumin as an adjunct to SRP, The result showed a reduction in pocket depth after 90 days of treatment in the test group. And concluded that curcumin can be used as an adjunct to non-surgical periodontal therapy (16).

Siddharth et al in a randomized controlled trial observed statistically significant improvement in periodontal and microbiologic parameters in the 2% curcumin gel group compared to the 0.2% chlorhexidine group (17).

Perez-Pacheco et used Curcumin nanoparticles as an adjunct to scaling and root planing and found out that PPD, CAL, and BOP were significantly improved in both the test and control groups and concluded that the addition of curcumin as an adjunct to SRP had no added advantage. (18).

Muglikar et al used Curcumin mouthwash as an adjunct to SRP in the treatment of chronic gingivitis and observed clinical improvement in all the study groups and stated that Curcumin is comparable to chlorhexidine as an anti-inflammatory mouthwash. Hence it can be considered as an effective adjunct to mechanical periodontal therapy (19).

An RCT by Raghava et al, found that local application of curcumin gel when used as an adjunct to SRP showed a significant improvement in periodontal parameters and had a beneficial effect in patients with chronic periodontitis (20).

Ivanaga et al used antimicrobial photodynamic therapy along with curcumin irrigation in the treatment of residual pockets in chronic periodontitis patients having type II diabetes mellitus, results showed short-term clinical benefits (3 months) regarding CAL gain. (21)

Also, a mouthwash containing essential oil and curcumin was effective in reducing periodontal and rheumatoid arthritis disease activity. (Anusha et al) (22).

***B. Azadirachta Indica (*Neem)**

Neem belongs to the Meliaceae family. It contains a variety of constituents such as nimbin, nimbidin, nimbolide, and limonoids. Neem has been reported to have anti-inflammatory, antipyretic, and antibacterial activity. (23)

A study conducted by K N Abhishek et al showed Neem containing toothpaste reduces in Gingival Index (GI) and Plaque Index (PI) (24).

10% *Azadirachta indica* was used by K. Vennila et al as a chip as an adjunct to SRP and showed improvement in clinical parameters and reduction in the presence of P. gingivalis strains (25).

Also, similar results in the improvement of clinical parameters in gingivitis patients were observed by Chatterjee et al (26) and Balappanavar et al (27) after the use of *Azadirachta Indica*.

C. Psidium Guajava (guava Plant)

Psidium guajava, commonly referred to as guava, is a shrub-like tree that belongs to the family of Myrtaceae family. Each part of this plant has a different medicinal value. It has Anti-inflammatory, antibacterial, and Immunomodulatory, properties. (28)

Nayak et al used mouthwash containing guava leaf extract in comparison with chlorhexidine and placebo mouthwash and observed a reduction in the GI, PI, and microbial count in both guava mouth rinse and chlorhexidine compared to the placebo group (29).

3% *Psidium guajava* gel used by Sharma et al showed a significant overall improvement in clinical parameters used in chronic periodontitis patients as an adjunct to SRP. (30)

Additionally, In a study done by Shetty et al, Aqueous and ethanolic extracts of guava were effective against common periodontopathogens namely, Porphyromonas gingivalis and Aggregatibacter actinomy cetemcomitans. (31)

D. Punica Granatum

Punica granatum commonly called pomegranate, belongs to the family of Monogeneric family, Punicaceae. Punica granatum contains a variety of phytochemicals that possess various medicinal properties such as Anti-inflammatory property and antioxidant properties. (32)

Separate studies by Pratha et al (33) and Champaneri et al (34) found a significant reduction in mean PI and GI scores after the use of *Punica granatum* mouthwash.

Punica granatum fruit seed extract mouthwash used by Kiany et al (35) and *Punica granatum* peel extract mouthwash used by Eltay et al (36) both showed a significant improvement in clinical periodontal indices.

In a randomized controlled trial by P Tyagi et al, subgingivally delivered *Punica granatum* chip and gel and observed improvement in the clinical periodontal parameter being a more favorable outcome in the chip group (37).

E. Matricaria Chamomilla

Matricaria chamomilla (Chamomile) belongs to the family of Asteraceae which is an annual herb, found widely around the world. Chamomile has been traditionally used to treat conditions such as gastrointestinal disorders, common cold, liver disorders, neuropsychiatric problems, against pain and infections. It is known to have Antioxidant activity, antibacterial activity, and anti-inflammatory activity. (38)

Pouabbas et al used *Matricia chamomilla* mouthwash in gingivitis patients and observed a significant reduction in PI and GI. (39)

A blind randomized placebo-controlled trial conducted by Agarwal et al used *Matricaria chamomilla* as a mouth rinse and observed a significant reduction in PI, GI, sulcus bleeding index, PPD, and CAL in comparison to placebo mouth rinse but nonsignificant improvement in POD and CAL compared to chlorhexidine group (40).

F. Ocimum Sanctum

Ocimum sanctum commonly referred to as Tulsi, belongs to the family Lamiaceae. It has been used in Ayurveda for long. It is known to have wound-healing activity, antioxidant properties, antimicrobial properties, Immunomodulatory effects, and anti-inflammatory effects. (41)

In separate studies conducted by Gupta et al (42) and Penmetsa et al (43), *Ocimum sanctum* mouthwash was found to be as effective as chlorhexidine mouthwash in reducing plaque and gingival indices.

Gaur et al used Intra-pocket irrigation of *Ocimum sanctum* extract in chronic periodontitis patients, showing a significant reduction in all periodontal indices. (44)

An in vitro study conducted by Eswar et al found an antimicrobial activity of *Ocimum sanctum* against Aggregatibacter actinomy cetemcomitans. (45)

G. Combination Of Phytomedicines

A study by Nandlal B et al, used a novel herbal toothpaste containing *Syzgium Aromaticum, Aloe barbadenis, Emblica officinalis, Azadirachta indica, Ocimum basillicum, Apis mellifera* along with zinc salts and fluoride in against dentifrice formulated with fluoride alone and observed reduction in PI, GI, and bleeding index in herbal toothpaste group (46).

Patil et al conducted a study in which they used Irimedadi oil containing a *combination of many phytomedicines* as an adjunct to scaling and found out that Irimedadi oil is effective in reducing GI and bleeding index scores in comparison to scaling alone (47).

In a study by Kaur et al, systemically administered curcumin, lycopene, and piperine showed better resolution of inflammation as compared to SRP alone (48).

Pradeep et al used Triphala as a mouthwash in an RCT and showed that Triphala mouthwash decreases inflammatory parameters comparable to that of chlorhexidine mouthwash (49).

A commercially available herbal anti-inflammatory immuno modulator containing *Balsamodendron mukul*, *Maharasnadi quath*, *Trikuta*, *Tinospora cordifolia*, *Phyllanthus emblica*, *Saussurea lappa*, *Rubia cordifolia*, and *Glycyrrhiza glabra* used as a dietary supplement along with SRP showed improvement in clinical parameters of periodontitis in a study conducted by Deore et al (50).

An herbal gel composed of the bark of *Mimusops elengi* (Bakul), the bark of *Acacia arabica* (Babul), and an extract of *Punica granatum* (Pomegranate) used as an adjunct to SRP showed a reduction in clinical periodontal parameters and results were comparable to that of xanthan based chlorhexidine mouthwash in a study carried out by Phogat et al (51).

CONCLUSION:

This article aimed to review the data available on the effectiveness of phytomedicines as an adjunct to SRP. Many phytomedicines have been tested clinically regarding their efficacy in the treatment of Periodontal diseases as an adjunct to scaling and root planning and The conclusions from this review suggest that many of the tested phytomedicines are equally effective as current standard chemotherapeutic agents without any profound side effects. However, more clinical trials are necessary to establish them as an alternative to a standard chemotherapeutic agent.

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