CLINICAL EFFICACY OF PHYTOTHERAPY IN THE COMPREHENSIVE TREATMENT OF PERIODONTAL DISEASES

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Abstract

This article presents a review of the scientific literature on the clinical efficacy of phytotherapeutic agents in the comprehensive treatment of periodontal diseases. It examines biologically active compounds found in medicinal plants that possess potential anti-inflammatory, antioxidant, and antimicrobial properties, as well as their possible application as adjuncts to standard periodontal treatment. Particular attention is given to plant-derived preparations based on green tea, pomegranate, ginger, and rosemary, which have been investigated for their potential effects on gingival tissues and selected clinical parameters. The main criteria for assessing the effectiveness of phytotherapy are discussed, including the Plaque Index, Gingival Index, bleeding on probing, probing pocket depth, and clinical attachment level. The limitations of the existing scientific evidence, issues related to the standardization of herbal preparations, and their safety are also analyzed. The review suggests that selected phytotherapeutic agents may have potential as adjunctive approaches in the treatment of periodontal diseases. However, further standardized randomized controlled clinical trials with adequate follow-up periods are required to establish their clinical efficacy and safety.

Keywords: periodontal diseases, periodontitis, gingivitis, phytotherapy, medicinal plants, anti-inflammatory activity, clinical efficacy, periodontal indices.

КЛИНИЧЕСКАЯ ЭФФЕКТИВНОСТЬ ФИТОТЕРАПИИ В КОМПЛЕКСНОМ ЛЕЧЕНИИ ЗАБОЛЕВАНИЙ ПАРОДОНТА

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Аннотация

В статье представлен обзор научной литературы, посвящённой клинической эффективности применения фитотерапевтических средств в комплексном лечении заболеваний пародонта. Рассмотрены биологически активные вещества лекарственных растений, обладающие потенциальными противовоспалительными, антиоксидантными и антимикробными свойствами, а также возможности их применения в качестве дополнения к стандартным методам пародонтологического лечения. Особое внимание уделено растительным препаратам на основе зелёного чая, граната, имбиря и розмарина, изучаемым в контексте их влияния на состояние тканей десны и отдельные клинические показатели. Рассмотрены основные критерии оценки эффективности фитотерапии, включая индекс гигиены полости рта, гингивальный индекс, кровоточивость при зондировании, глубину пародонтальных карманов и уровень клинического прикрепления. Проанализированы ограничения существующих научных данных, вопросы стандартизации растительных препаратов и их безопасности. Сделан вывод о перспективности дальнейшего изучения отдельных фитотерапевтических средств в качестве дополнительных методов лечения заболеваний пародонта. Для подтверждения их клинической эффективности и безопасности необходимы стандартизированные рандомизированные клинические исследования с достаточной продолжительностью наблюдения.
Ключевые слова: заболевания пародонта, пародонтит, гингивит, фитотерапия, лекарственные растения, противовоспалительное действие, клиническая эффективность, пародонтологические индексы.

INTRODUCTION

Periodontal diseases represent a major public health concern and remain among the most common oral conditions worldwide. They encompass a range of inflammatory disorders affecting the supporting tissues of the teeth, including the gingiva, periodontal ligament, cementum, and alveolar bone. Gingivitis is generally characterized by reversible inflammation of the gingival tissues, whereas periodontitis involves progressive destruction of the periodontal attachment and supporting bone. If left untreated, advanced periodontitis may lead to tooth mobility, impaired masticatory function, tooth loss, and a substantial reduction in oral health-related quality of life.

The development and progression of periodontal diseases are associated with complex interactions between the dental biofilm, the host immune response, and individual risk factors. Although a dysbiotic microbial community initiates the

inflammatory process, subsequent tissue destruction is largely mediated by the host inflammatory response. Factors such as inadequate oral hygiene, smoking, diabetes mellitus, genetic susceptibility, and other systemic conditions may further influence disease severity and treatment outcomes. Therefore, effective periodontal management requires an integrated approach aimed at controlling the microbial biofilm, reducing inflammation, improving oral hygiene practices, and managing modifiable risk factors.

Current evidence-based periodontal treatment primarily relies on professional mechanical plaque removal, subgingival instrumentation when indicated, patient education, and long-term supportive periodontal care. The European Federation of Periodontology recommends a stepwise treatment approach that emphasizes biofilm control, behavioral changes, risk-factor management, and individualized maintenance [1]. Nevertheless, interest in adjunctive therapeutic approaches continues to grow, particularly those that may improve inflammatory control and complement conventional treatment.

In this context, phytotherapy has attracted increasing scientific interest as a potential adjunct in the comprehensive management of periodontal diseases. Phytotherapy involves the use of medicinal plants and plant-derived preparations containing biologically active compounds. Various plant constituents, including polyphenols, flavonoids, tannins, terpenoids, and essential oils, have demonstrated anti-inflammatory, antioxidant, and antimicrobial properties in experimental studies. These properties have encouraged researchers to investigate their potential role in controlling gingival inflammation, modifying oral microbial activity, and improving selected periodontal clinical parameters [2].

Relevance of the Study

The search for additional approaches that may improve the outcomes of periodontal treatment remains an important area of contemporary dental research. Phytotherapeutic agents are of particular interest because certain plant-derived compounds may influence inflammatory processes, oxidative stress, and the activity of selected oral microorganisms.

A systematic review published by Malcangi and colleagues in 2025 examined 17 studies concerning herbal medicines and their potential effects on oral health, gingivitis, and periodontitis. The review reported promising findings for some preparations while highlighting the need for better-standardized and longer-term clinical studies [2].

The clinical relevance of phytotherapy should be assessed not only by changes in gingival inflammation but also by its effects on plaque accumulation, bleeding on probing, probing pocket depth, and clinical attachment level. The evaluation of these outcomes may help clarify whether a particular preparation offers an additional benefit beyond conventional periodontal treatment.

Therefore, reviewing the available evidence on phytotherapy in periodontal care is relevant for identifying potential clinical applications, evaluating the strength and limitations of current evidence, and defining priorities for future research.

AIM OF THE REVIEW

The aim of this literature review is to analyze the available scientific evidence concerning the clinical efficacy of phytotherapeutic agents in the comprehensive treatment of periodontal diseases, with particular emphasis on their potential mechanisms of action, effects on periodontal clinical parameters, safety, and limitations of current evidence.

MATERIALS AND METHODS

This article was prepared as a narrative literature review. Relevant scientific publications concerning the use of medicinal plants and plant-derived preparations in the management of periodontal diseases were considered. The literature search framework included major scientific databases, such as PubMed, Scopus, and Web of Science, with a focus on clinical studies, systematic reviews, and evidence-based periodontal treatment recommendations.

The main topics considered during the literature assessment included:

- The biological properties of medicinal plants and their extracts relevant to oral health.
- The potential effects of phytotherapeutic preparations on gingival inflammation and dental plaque.
- The use of phytotherapy as an adjunct to conventional periodontal treatment.
- Clinical and periodontal indices used to evaluate treatment outcomes.
- The safety, tolerability, and limitations of plant-derived preparations.

Particular attention was given to the European Federation of Periodontology clinical practice guideline published in 2020, a systematic review of herbal medicines in oral health published in 2025, and a systematic review addressing herbal medicine as an adjunct in periodontal treatment published in 2024 [1–3].

As this is a narrative review, no independent clinical intervention or statistical meta-analysis was performed. The discussion is based on the findings and limitations reported in the selected publications.

RESULTS AND DISCUSSION

The Role of Phytotherapy in the Management of Periodontal Diseases

The potential role of phytotherapy in periodontal treatment is associated with the biological activity of compounds found in medicinal plants. These compounds may

influence inflammatory pathways, oxidative stress, and the activity of certain microorganisms involved in oral biofilm formation.

The systematic review by Malcangi and colleagues examined plant-derived preparations, including those obtained from green tea, pomegranate, ginger, and rosemary, in relation to oral health and periodontal conditions. Some of the included studies reported favorable changes in selected clinical parameters following the use of specific herbal preparations [2].

However, the clinical outcomes varied according to the plant species, chemical composition, formulation, concentration, application method, and duration of treatment. These differences limit the generalizability of the findings and make it difficult to determine whether one phytotherapeutic preparation is more effective than another.

Phytotherapy should therefore be considered a potential adjunct to evidence-based periodontal care rather than a substitute for professional mechanical plaque removal, appropriate periodontal instrumentation, or other indicated interventions.

4Biological Properties of Selected Medicinal Plants

Green Tea (*Camellia sinensis*)

Green tea contains catechins, including epigallocatechin gallate, which have been investigated for their antioxidant and anti-inflammatory properties. These compounds may influence inflammatory processes and certain microbial activities relevant to oral health. Clinical research has explored the potential effects of green tea-derived preparations on gingival inflammation and periodontal parameters. Nevertheless, the magnitude of any clinical benefit depends on the preparation, concentration, administration protocol, and quality of the supporting evidence [2].

Pomegranate (*Punica granatum*)

Pomegranate contains polyphenols and tannins associated with antioxidant activity and potential antimicrobial effects. Extracts derived from different parts of the plant have been investigated in oral health research. Although these findings provide a rationale for further clinical evaluation, the available evidence does not justify assuming that all pomegranate-based preparations are equally effective or can replace established periodontal interventions [2].

Ginger (*Zingiber officinale*)

Ginger contains gingerols and related bioactive compounds that have been studied for their potential influence on inflammatory pathways. These properties have prompted research into the possible application of ginger-derived preparations in oral healthcare. However, additional controlled clinical studies are needed to

determine the appropriate formulation, concentration, treatment duration, and long-term effects in patients with periodontal diseases [2].

Rosemary (*Rosmarinus officinalis*)

Rosemary contains phenolic compounds and essential oils that have demonstrated antioxidant and antimicrobial properties in experimental research. These biological characteristics make rosemary-derived preparations potential candidates for further investigation in oral healthcare. However, experimental activity alone cannot establish clinical effectiveness, and evidence from appropriately designed human studies is required before specific therapeutic recommendations can be made [2].

Overall, these plants represent areas of scientific interest in the development of adjunctive periodontal treatments. Their clinical value must be assessed individually, taking into account the quality of the available evidence and the characteristics of each preparation.

Clinical Parameters for Assessing Phytotherapeutic Efficacy

The clinical efficacy of phytotherapeutic agents should be evaluated using objective and reproducible periodontal measurements. The principal parameters include the following.

Gingival Index (GI). This index is used to assess the severity of gingival inflammation based on clinical features such as redness, swelling, and bleeding.

Plaque Index (PI). This measure evaluates the accumulation of dental plaque and provides information about oral hygiene status and changes following treatment.

Bleeding on Probing (BOP). This parameter assesses gingival bleeding following gentle periodontal probing and is commonly used as an indicator of gingival inflammation.

Probing Pocket Depth (PPD). This measurement records the depth of the gingival sulcus or periodontal pocket and is an important parameter in the clinical assessment of periodontitis.

Clinical Attachment Level (CAL). This measure assesses the position of the periodontal attachment relative to a fixed anatomical reference and is used to evaluate periodontal attachment loss.

These measures provide complementary information about gingival inflammation, plaque accumulation, periodontal pocketing, and attachment status. Their use in clinical studies can help determine whether a phytotherapeutic preparation provides additional benefits when combined with conventional treatment [2, 3].

A reduction in gingival redness, swelling, or bleeding may indicate improved inflammatory control. However, such changes should not automatically be interpreted as evidence of periodontal regeneration or recovery of previously lost supporting tissues. Clinical findings should be considered alongside baseline disease severity, treatment procedures, follow-up duration, and other relevant patient characteristics.

Phytotherapy as an Adjunct to Conventional Periodontal Treatment

The European Federation of Periodontology recommends a stepwise approach to periodontitis treatment that emphasizes oral hygiene instruction, professional mechanical plaque removal, subgingival instrumentation, management of risk factors, and supportive periodontal care [1].

Within this framework, phytotherapeutic agents may be considered as adjuncts when their use is supported by appropriate evidence and clinical indications. Their potential contribution should be evaluated in addition to, rather than instead of, established periodontal interventions.

The systematic review published in 2024 on herbal medicine as an adjunct in periodontal treatment examined randomized clinical studies involving plant-derived preparations in periodontal and peri-implant conditions [3]. Such reviews contribute to understanding the potential clinical applications of phytotherapy, but differences in study design, interventions, and outcome measures continue to limit the certainty of conclusions.

A meaningful assessment of adjunctive efficacy requires comparison between patients receiving standard periodontal treatment alone and those receiving the same treatment supplemented with a defined phytotherapeutic preparation. Ideally, such studies should use appropriate control groups, standardized outcome measures, adequate sample sizes, and sufficient follow-up periods.

Accordingly, the use of phytotherapy in periodontal practice should be individualized and evidence-based. Herbal preparations should not delay or replace necessary professional treatment, and their use should be accompanied by appropriate assessment of tolerability and safety.

Safety and Limitations of Phytotherapeutic Agents

Although plant-derived preparations are often perceived as natural alternatives, their natural origin does not guarantee safety. Depending on the formulation and individual susceptibility, potential adverse effects may include allergic reactions, local irritation of the oral mucosa, and intolerance to particular ingredients.

Several methodological limitations also affect the interpretation of the current evidence:

1. Differences in plant species, extraction methods, chemical composition, and active compound concentrations.
2. Variation in sample sizes and study populations.
3. Differences in treatment protocols, application frequency, and duration.
4. Inconsistent use of clinical outcome measures and control interventions.
5. Limited information about long-term outcomes and uncommon adverse effects.
6. Difficulties in distinguishing the independent effect of phytotherapy from the effect of conventional periodontal treatment.

The available systematic reviews indicate that further well-designed clinical trials are necessary to clarify the effectiveness and safety of specific phytotherapeutic preparations [2, 3].

Future research should prioritize standardized formulations, reproducible treatment protocols, adequately powered randomized controlled trials, and longer follow-up periods. Investigations should also report adverse events systematically and distinguish improvements in gingival inflammation from changes in periodontal attachment and supporting tissues.

CONCLUSION

The literature review indicates that phytotherapy represents a potentially valuable area of research in the comprehensive management of periodontal diseases. Certain medicinal plants contain bioactive compounds with anti-inflammatory, antioxidant, and antimicrobial properties that may be relevant to oral health.

Green tea, pomegranate, ginger, rosemary, and other plant-derived preparations have been investigated for their potential effects on gingival inflammation and selected periodontal clinical parameters. However, the available evidence is heterogeneous, and findings obtained with one preparation cannot automatically be generalized to other herbal products or patient populations.

The clinical evaluation of phytotherapeutic agents should include standardized measures such as the Gingival Index, Plaque Index, bleeding on probing, probing pocket depth, and clinical attachment level. These parameters should be interpreted in the context of baseline periodontal status, conventional treatment, follow-up duration, and potential adverse effects.

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