APIS

Conference Abstract/Poster/Slides

From the Hive to the Clinic: Clinical Case Studies Illustrating the Use of Propolis in Dentistry

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ABSTRACT

Background

Propolis has been increasingly investigated in dentistry due to its antimicrobial, anti-inflammatory, analgesic, and regenerative properties. Several clinical applications have been reported; however, detailed case-based documentation remains limited.

Objective

This article presents a series of clinical case studies originally introduced at an international conference and subsequently expanded to provide a comprehensive description suitable for a scientific readership. The aim is to illustrate the clinical use of propolis-based treatments across different dental disease groups.

Materials and Methods

Clinical cases from daily dental practice were retrospectively analyzed. The cases included patients aged between 14 and 75 years and covered five main clinical categories: endodontic infections, periodontal disease, deep carious lesions, prosthetic-related fungal infections, and post-extraction wound management. Propolis was applied mainly as a 5% solution, either alone or in combination with other biomaterials such as calcium hydroxide, hydroxyapatite, or calcium alginate. Clinical and radiographic follow-up ranged from one week to one month, depending on the indication.

Results

In endodontic cases, propolis demonstrated effective antibacterial and anti-inflammatory activity, contributing to pain reduction and periapical healing. Periodontal applications showed visible improvement in gingival inflammation within one week. In deep carious lesions, propolis-supported treatments promoted pulp vitality and dentin bridge formation after one month. Prosthetic cases involving Candida albicans infection exhibited marked mucosal healing within 7–15 days. Post-extraction use of propolis combined with calcium alginate supported normal wound healing and helped prevent alveolar osteitis**.**

Conclusions

The presented case studies suggest that propolis is a safe and versatile adjunctive agent in various dental treatments. When standardized and properly applied, propolis may support infection control, inflammation reduction, and tissue regeneration. Further controlled clinical studies are warranted to confirm these observations and to establish standardized treatment protocols.

Keywords: Propolis; apitherapy; dentistry; endodontic infections; periodontal disease; deep carious lesions; oral wound healing; clinical case studies

INTRODUCTION

Propolis has a long history of medicinal use and has been extensively described in the apitherapy literature for its immunomodulatory, antimicrobial, anti-inflammatory, and regenerative properties. Foundational works have documented its biological activity and clinical relevance across a wide range of medical applications (Harnaj, 1982; Chung, 2015).

In the field of dentistry, propolis has been specifically investigated for oral and periodontal applications, including caries management, endodontic disinfection,

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periodontal therapy, and mucosal healing. These applications have been systematically reviewed and addressed in dedicated monographs and review articles focusing on oral healthcare (Fearnley & Wander, 2010; Zulhendri et al., 2021). Within this historical and scientific context, the present article presents a series of clinically documented cases that visually and clinically illustrate therapeutic effects of propolis that have been repeatedly described in the scientific and apitherapy literature over several decades.

Propolis exerts a broad spectrum of biological activities that are particularly relevant in dentistry, where microbial infection, inflammation, and tissue regeneration are closely interconnected. Its antimicrobial properties target oral biofilms and pathogenic microorganisms, while its anti-inflammatory and immune-modulatory effects support tissue healing and regeneration (Zulhendri et al., 2021). These combined mechanisms make propolis applicable across a wide range of dental conditions, including caries, endodontic infections, periodontal diseases, pulp-related pathologies, and post-surgical wound healing. A conceptual overview of these mechanisms and their clinical relevance is presented in Figure 1.

From a biological perspective, propolis is a complex resinous substance collected by honeybees from plant exudates and mixed with wax and salivary enzymes. It is primarily used by bees to seal cracks and gaps within the hive and to protect the colony against microbial threats. Its chemical composition and physical properties vary considerably depending on the botanical origin, which also influences its colour, ranging from yellow and brown to red or black. Owing to its antimicrobial, antioxidant, and anti-inflammatory properties, propolis has attracted increasing interest for biomedical and dental applications. In endodontic research, natural medicaments such as propolis have demonstrated significant anti-inflammatory effects compared with conventional materials (Sabir & Tabbu, 2004), as well as favourable biocompatibility, with lower cytotoxicity and reduced oxidative DNA damage in fibroblast cells relative to commonly used chemical disinfectants (Zulhendri et al., 2018).

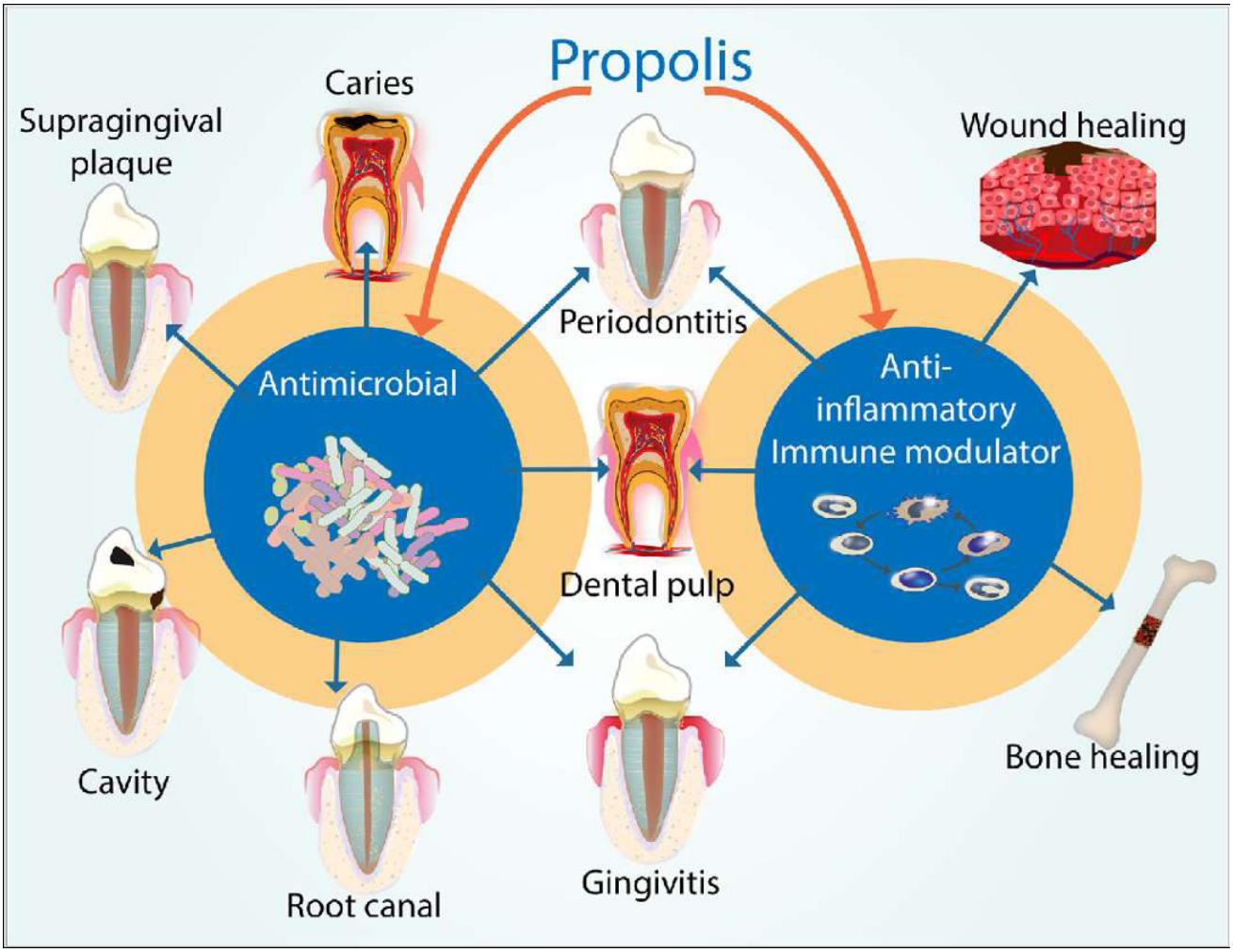

Figure 1. *Conceptual overview of the main biological actions of propolis and their relevance in dental diseases*. The diagram illustrates the dual antimicrobial and anti-inflammatory/immune-modulatory effects of propolis and their clinical relevance across major dental and oral conditions, including supragingival plaque, caries, root canal infections, gingivitis, periodontitis, dental pulp involvement, wound healing, and bone healing. This conceptual framework provides the biological rationale for the clinical case studies presented in the article.

Beyond its traditional use, propolis has increasingly been investigated within evidence-based biological and clinical frameworks in dentistry. In endodontics, experimental and in vitro studies have shown that propolis exhibits significant antimicrobial and anti-inflammatory effects while maintaining favourable biocompatibility. These properties support its potential use as an adjunctive intracanal medicament, particularly in situations where tissue preservation is critical. In this context, Jahromi et al. demonstrated that propolis exhibits significant antimicrobial activity against common endodontic pathogens and may serve as an effective alternative or adjunctive agent for root canal disinfection, with particular efficacy against *Enterococcus faecalis* (Jahromi et al., 2012).

In the management of deep carious lesions, where complete caries removal may jeopardize pulp vitality, both clinical and biological evidence support the use of natural materials. A randomized controlled clinical trial by Anani et al. (2023) demonstrated that natural materials applied to deep carious dentin showed significant antibacterial activity and promoted remineralization, with outcomes comparable or superior to synthetic alternatives. Importantly, preservation of pulp vitality was achieved under clinical conditions, providing high-level evidence for biologically oriented and minimally invasive caries management strategies.

At the cellular level, propolis-derived compounds have also been shown to actively support regenerative processes within the dentin–pulp complex. Liu et al. (2019) reported that caffeic acid phenethyl ester (CAPE), a major bioactive component of propolis, significantly upregulated vascular endothelial growth factor (VEGF) expression and production in odontoblastic cells without inducing cytotoxic effects. As VEGF plays a central role in angiogenesis and pulp tissue repair, these findings provide a mechanistic basis for the regenerative potential of propolis in pulp preservation and healing.

Taken together, these experimental, clinical, and mechanistic data provide a solid scientific foundation for the clinical case series presented in this article. The following cases should therefore be interpreted as practical clinical illustrations of well-documented biological effects of propolis when applied under routine dental practice conditions, rather than as isolated or exploratory findings.

PROPOLIS

Figure 2A. *Bees fill the gaps of the hive with a mixture of wax and propolis*. The colour of propolis depends on the dominant plant source and may range from brown and yellow to red or even black. In Uruguay, bees predominantly collect poplar-type propolis, which is characterized by a brownish colour. One of the most effective methods for harvesting propolis intended for food-grade and biomedical applications is the use of a food-grade propolis collection grid.

Figure 2B. *Some companies produce easy to handle products*

ROOT CANAL TREATMENT 1

Figure 3. *Preoperative clinical image of a 25-year-old female patient presenting with pain in tooth 31.*
The patient attended the dental clinic complaining of localized pain. Clinical examination suggested endodontic involvement.

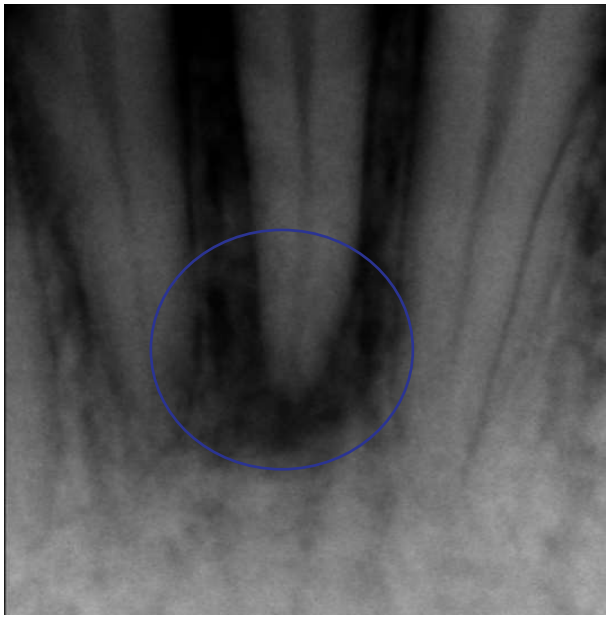

Figure 4. *Initial radiographic image showing a periapical area of infection associated with tooth 31.*
The radiograph demonstrates a radiolucent area consistent with periapical inflammation and infection.

Figure 5. *Buccal view of the affected tooth and surrounding soft tissues.*
The image illustrates the clinical condition of the area prior to treatment.

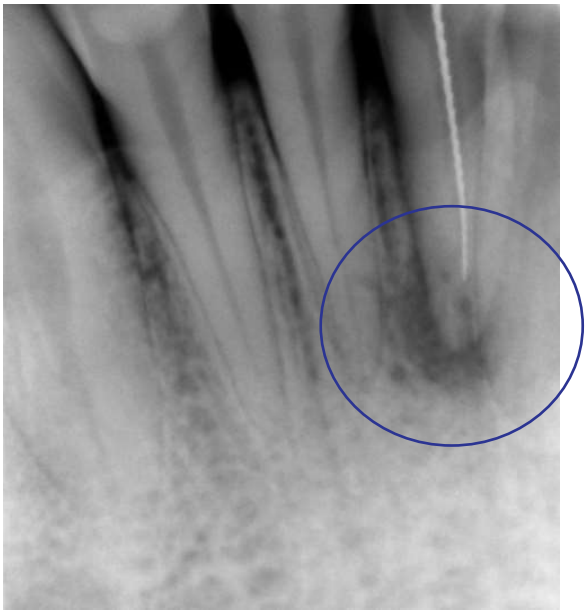

Figure 6. *Radiographic image obtained during working length determination.*
The image shows the root canal during conductometry, with an initial reduction of the infected periapical area.

Figure 7. *Placement of a 5% propolis solution into the root canal.*
The propolis solution was used as an intracanal medicament to provide antibacterial, analgesic, and anti-inflammatory effects.

Figure 8. *Clinical and radiographic images one week after the initiation of endodontic treatment.*
Early signs of healing can be observed, including a reduction in inflammatory changes.

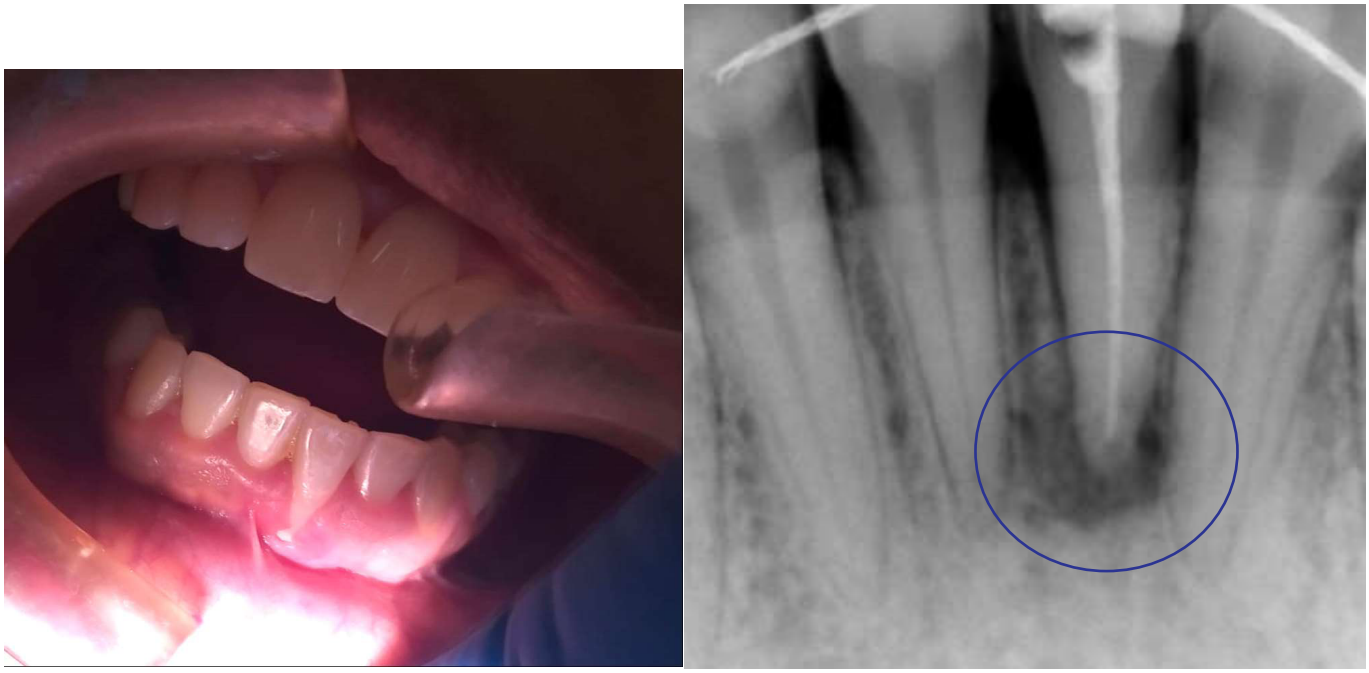

FIGURE 9. *Final clinical and radiographic images showing completed root canal obturation and bone regeneration.*

The images demonstrate successful endodontic treatment.

IMAGE-BASED SUMMARY OF ROOT CANAL TREATMENT IN THE PRESENT CASE

FIGURE 10. Before treatment

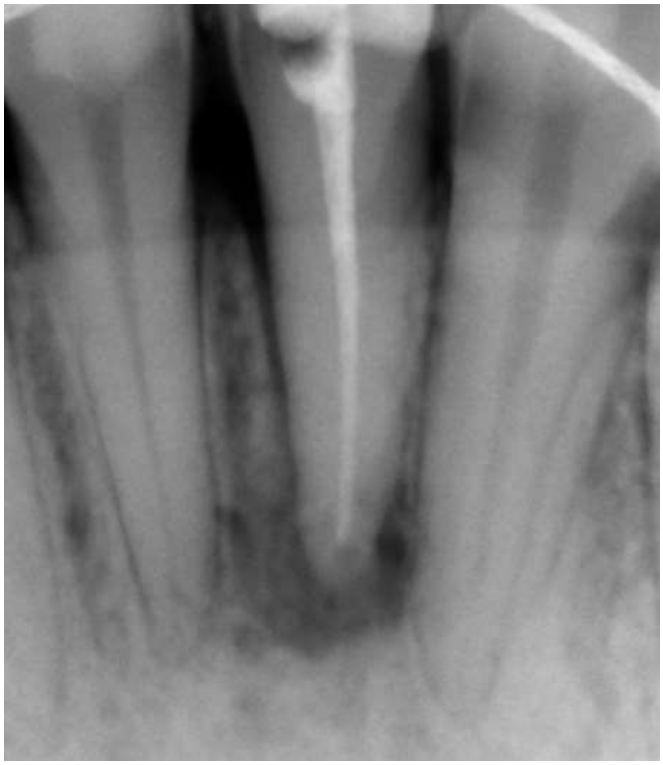

FIGURE 11. After 2 weeks treatment

ROOT CANAL TREATMENT 2

Male, 13 years old. Treatments on day 1, 7, 14. Check follow up after one year.

Figure 12. *Before treatment (day 1)*

Figure 13. *After treatment (day 14)*

Figure 14. *Follow up: One year after treatment*

PERIODONTAL TREATMENT 1

Male, 40 years old

Figure 15. *Preoperative clinical image obtained at the patient's initial presentation.*

Figure 16. *Ultrasonic activation during root canal treatment followed by the placement of a 5% propolis solution.*

Figure 17. *Preoperative clinical imagea obtained during the treatmernt*

Figure 18. *Final clinical image obtained one week after completion of the treatment.*

PERIODONTAL TREATMENT 2

Figure 19. *Intraoral clinical photograph showing the dentition with fixed orthodontic appliances in place at the patient's initial presentation.*

Figure 20. *Intraoral clinical photograph demonstrating localized gingival inflammation in the anterior region during orthodontic treatment, followed by topical application of a 5% propolis solution.*

Figure 21. Intraoral clinical photograph obtained at follow-up, showing improvement of the gingival condition.

Figure 22. *Intraoral clinical photograph providing an overall view of the dentition at follow-up during orthodontic treatment, demonstrating stable soft tissue conditions.*

OPERATIVE DENTISTRY

Deep carious treatment

Male, 14 Years old

Figure 23. *Clinical image of a deep carious lesion prior to treatment and after caries removal, illustrating the extent of the lesion and exposure of the underlying dentin.*

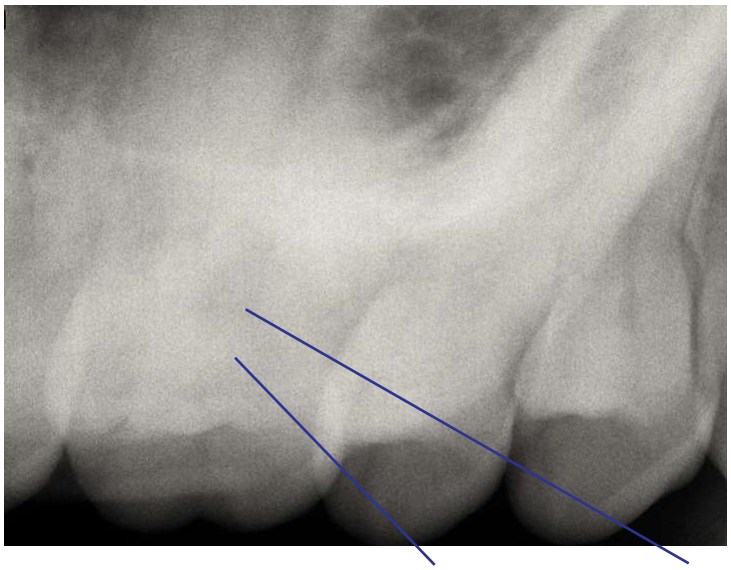

Figure 24. *Rx initial.* Distance between carious lesion and dental pulp

Figure 25. *Place propolis solution with hidroxiapatite*

Figure 26. *One month later*. Radiographic appearance suggestive of dentin bridge formation.

Figure 27 . *End of the treatment*

PROSTHETIC DENTISTRY

Figure 28 . *Clinical images of a 75-year-old male patient presenting with sub-prosthetic Candida albicans infection.*
Inflammation and fungal colonization were observed beneath the dental prosthesis

Figure 29. *Clinical image one week after treatment with a 5% propolis solution.*
A marked reduction in inflammation and fungal signs can be observed, in agreement with the documented antifungal properties of propolis (Zulhendri et al., 2021).

Figure 30. *Clinical image fifteen days after treatment.*
Further healing and restoration of healthy mucosal tissue are evident.

ALGINATE POST EXTRACTION

Figure 31. *Clinical image of a tooth indicated for extraction due to extensive caries.* The tooth exhibited severe structural damage requiring removal.

Figure 32. *Placement of calcium alginate combined with propolis into the extraction socket. The material w*as used to prevent dry socket and to support wound healing, consistent with previous reports on the biocompatibility of propolis.

Figure 33. *Clinical image of the extraction site with calcium alginate and propolis in place.* The image demonstrates correct placement of the material within the alveolus.

Figure 34. *Postoperative clinical image one week after tooth extraction.* Normal healing of the extraction site can be observed.

CONCLUSIONS

The present article expands previously reported conference cases into a structured clinical case series, providing a clearer and more detailed understanding of the practical application of propolis in dentistry. Across multiple dental disease groups—including endodontic infections, periodontal disease, deep carious lesions, prosthetic-related fungal infections, and post-extraction wound management—propolis demonstrated consistent antimicrobial, anti-inflammatory, and tissue-supportive effects when applied under routine clinical conditions.

The clinical observations suggest that propolis can serve as a valuable adjunctive agent in dental therapy, particularly in situations where infection control, inflammation reduction, and tissue regeneration are closely interconnected. The use of a standardized 5% propolis solution, either alone or in combination with established biomaterials, was associated with favorable clinical and radiographic outcomes over short-term follow-up periods.

Importantly, the cases presented should be interpreted as clinical illustrations of biological effects that have been extensively described in the scientific and apitherapy literature rather than as isolated or novel findings. Their value lies in demonstrating how these documented properties can be translated into everyday dental practice.

Despite the positive outcomes observed, the present work is limited by its descriptive, case-based design and the absence of control groups or long-term follow-up. Therefore, the findings should be considered exploratory. Future prospective, controlled clinical studies are required to further evaluate efficacy, define optimal indications, and establish standardized treatment protocols.

In conclusion, when quality, standardization, and appropriate clinical indication are ensured, propolis represents a safe and versatile complementary option in contemporary dental care. Its integration into evidence-based treatment strategies may contribute to improved clinical outcomes and patient-centered approaches in dentistry.

ETHICS STATEMENT

All clinical procedures were conducted in accordance with the ethical standards of routine dental practice. Written informed consent was obtained from all patients for the use of anonymized clinical and radiographic images for scientific publication.

FUNDING

This research received no external funding.

CONFLICT OF INTEREST STATEMENT

The author is a practicing dentist and reports that the clinical cases presented in this article originate from his own private dental practice. The author declares that he has no financial, commercial, or personal relationships with any company or organization that could be perceived as a potential conflict of interest in relation to this work.

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