THERAPEUTIC EFFECT OF NATURAL HERBS IN DENTISTRY: A NARRATIVE REVIEW

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Abstract
Objectives*:* Natural herbs have increased attention due to their therapeutic and general health-improving qualities as reported in the literature. This review paper aims to explore the therapeutic effects of natural herbs in dentistry and to describe the various herbal sources, active compounds and its dental applications. ***Methodology****:* A literature search was conducted using WoS, Pubmed, and Scopus with the search terms 'herbal' AND 'dentistry' AND 'alternative treatment'. Articles related to natural herbs and dental applications from the past 15 years until September 2023 were gathered. The inclusion criteria for this study were in-vitro experiments and clinical studies. ***Result****:* 512 articles were extracted from the search with 128 falling under the inclusion criteria (86 in-vitro experiments and 42 clinical studies). It was observed that 15 therapeutic properties were extensively examined, with antimicrobial studies being the most prevalent (50.0%), while the least explored properties were pulp-capping and obturation material (0.8%). Diseases such as denture stomatitis, oral candidiasis, and gingivitis were highly reported to have benefited from natural herbal medicine as an alternative treatment option. Herbals such as propolis, green tea, ginger, *Zataria multiflora*, chitosan, garlic, *Artemisia*, *Schinus terebinthifolius* Raddi, *Uncaria tomentosa*, *Punica granatum*, and *Ricinus communis* were found to be useful in the treatment of denture stomatitis*. Rhizoma imperatae* extract has been added to oral care products and has shown an excellent effect on reducing gingivitis. *Pistacia atlantica* extract mouthwash was reported to be effective against dental plaque bacteria and subgingival microorganisms. ***Conclusion****:* Numerous natural herbs have been extensively documented to have therapeutic effects in certain dental diseases as supported by laboratory and clinical studies. However, comprehensive guides such as the clinical indications, therapeutic doses and application methods were with minimal evidence that can be derived from the literature. More extensive clinical trials are to be conducted on the therapeutic efficacy of natural herbs in dentistry.

Keywords: Natural Product, Traditional Herbs, Natural Remedies, Alternative Medicine

Introduction

Dentistry, a field traditionally dominated by synthetic materials and pharmaceuticals, is increasingly embracing the therapeutic potential of natural herbal remedies. This shift is driven by a growing body of research underscoring the efficacy and biocompatibility of natural products in oral healthcare. Herbal remedies, with their rich history in traditional medicine, offer a plethora of active compounds known for their anti-inflammatory, analgesic, and antimicrobial properties. These natural agents were being explored for a range of dental applications, from combating oral pathogens and managing gingival diseases in promoting wound healing and alleviating postoperative discomfort. The integration of herbal remedies into dentistry not only aligns with the rising preference for natural and holistic health solutions among patients but also opens new horizons for safer, more sustainable, and potentially less invasive dental treatments. This burgeoning interest underscores a significant shift towards an approach in dentistry that harmonizes

modern scientific practices with ancient herbal wisdom, offering a promising pathway for enhancing oral health care.

Throughout history, plants and herbs have played a prominent role in medical therapies since ancient societies utilized their characteristics to address various health conditions. *Syzygium polyanthum*, also known as Serai kayu, Serai kayu hutan, and daun salam (bay leaf) in Malaysia, has been confirmed to possess medicinal properties for treating hypertension, diarrhoea, diabetes, and (1-3). In the field of dentistry, Lavanga oil can alleviate gingivae irritation when used topically as an antiseptic in mouthwash. Furthermore, the oil has also been suggested to mitigate the pain linked to dry sockets and temporary restorative materials (4, 5).

In denture stomatitis condition, nystatin was the medication of choice by many practitioners. However, the unfavourable effects of nystatin were found in eight out of the eleven clinical trials. The most often reported side effects were its poor taste with an incidence of 61.5% in one study, and gastrointestinal responses such as vomiting, nausea, diarrhoea, anorexia, and abdominal discomfort, with an incidence ranging from 0.01% to 0.06% in four investigations (6). A recent publication about natural products for treating denture stomatitis showed that propolis, green tea, ginger, *Zataria multiflora*, chitosan, garlic, *Artemisia, Schinus terebinthifolius* Raddi, *Uncaria tomentosa, Punica granatum*, and *Ricinus communis* appeared to have similar efficacy and safety when compared with nystatin or miconazole in treating denture stomatitis (7). This review paper aims to explore the therapeutic effects of traditional herbs in dentistry and to describe the various herbal sources, active compounds, and their specific applications. With the global shift towards green and sustainable solutions, coupled with an increasing number of patients seeking organic alternatives to conventional dental treatments, knowing the alternative options has never been more critical.

Methodology

An electronic search was conducted in September 2023 using WoS, PubMed and Scopus databases and the search terms used were 'herbal' AND 'dentistry' AND 'alternative treatment' (Figure 1). The articles were retrieved, reviewed, and sorted based on the following inclusion and exclusion criteria below:

- Articles that were published in English to uphold uniformity in language and ease of access.
- Articles that have been released within the last 15 years. The selected period is intended to guarantee the currency of the knowledge and its alignment with recent progress in dentistry research and herbal uses.
- Exclusively on in vitro and clinical research, as these offer the most direct and dependable information regarding the effectiveness and safety of herbal treatments in dentistry.
- A topic that primarily emphasizes the utilization of herbs in the field of dentistry. The emphasis on this matter is vital to directly tackle the increasing interest and possible utilization of herbal medicines in dental care, including illness prevention as well as treatment and recovery procedures.

For the exclusion criteria, case reports were excluded as they tend to focus on specific cases that may not offer the broader insights needed for the review. Questionnaire research was also excluded as it may not correspond with the objective of the study.

Result

512 articles were obtained through the search where 226 papers investigated the use of natural herbal remedies in dentistry were identified and subsequently categorized into 84 review articles, 86 in-vitro experiments, 42 clinical studies, 6 case reports, and 8 questionnaires. Only 128 articles (86 in-vitro experiments and 42 clinical studies) were reviewed for this study.

The comprehensive studies of natural herbs utilized in dentistry were then listed based on the therapeutic properties and the delivery form of the active components (Table 1). It was found that there were 15 therapeutic properties heavily investigated with the highest therapeutic study being for antimicrobial (50.0%) followed by anti-fungal properties (13.3%) and anti-inflammatory properties (7.0%), and the least properties investigated were pulp-capping and obturation material (0.8%) (Table 1).

It can be observed that the active ingredients were delivered in multiple forms, with the most common delivery method being the solution of the herbal extract which was used for the in vitro study with other forms like mouthwash, toothpaste, gel, and tablets. Certain methods for delivery form have been developed where herbal extracts are incorporated with other materials, enhancing the properties of these materials example; incorporated herbal extract in glass ionomer cement (GIC), incorporated in soft denture liner and incorporated in provisional luting cement.

Discussion

This review provides a comprehensive exploration of the properties of various natural remedies. These remedies have been tested against a range of pathogens, and the results suggest potential applications in the field of dentistry and general health. Common pathogens tested in most of the in-vitro studies were *Escherichia coli, Staphylococcus aureus, Enterococcus faecalis, Streptococcus mutans, Candida albicans, Lactobacillus casei, Actinomyces viscosus, Prevotella intermedia*, and *Porphyromonas gingivalis*. These microorganisms are known to cause various infections, particularly in oral cavity (134, 135).

Herbal therapies in different fields of dentistry

Based on the findings, the use of herbal therapies can be categorized according to their possible applications in specific disciplines in dentistry. In endodontic applications, herbs that were found to exhibit therapeutic applications were green tea, turmeric, miswak, aloe vera, muringa seed, potato peel, garlic, grape seed, bromelain, propolis, neem, black pepper, ginger, Pancha tulsi, nutmeg, clove, Fufang bingpeng, ajwain, oregano, proanthocyanidins, watercress, *Morinda citrifolia,*

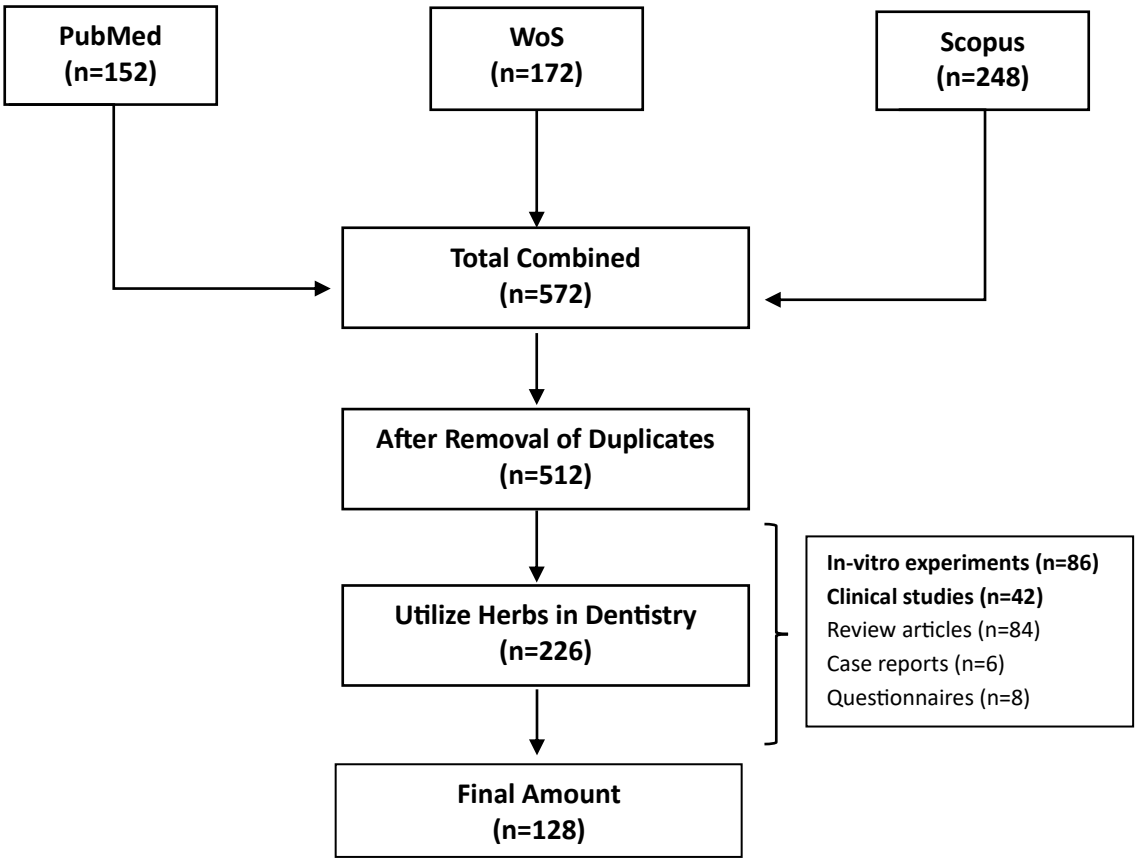

Figure 1: Articles screening from a search conducted using WoS, Pubmed, and Scopus with the search terms 'herbal' AND 'dentistry' AND 'alternative treatment'.

Table 1: Natural herbs investigated for their therapeutic properties and the delivery form of the active ingredient.

Therapeutic properties	Herbal (scientific name)	Delivery form	Authors	Percentage of study (%)
Anti-plaque	*Tripahala curna*	HiOra-GA gel Mouthrinse solution	(8) (9)	3.9%
	Curcumin, Curcuma longa (Tumeric)	Gel	(10)	
	Salvadora persica L. (Miswak)	Mouthrinse solution	(11)	
	Eucalyptus globulus	Gel	(8)	
	Cymbopogon citratus (Lemongrass)	Mouthwash	(12)	
Anti-microbial	*Triphala curna*	Solution Endodontic irrigant solution	(13) (14, 15)	50%
	Morinda citrifolia	Endodontic irrigant solution	(13, 14, 16)	
	Camellia sinensis (green tea)	Endodontic irrigant solution Mouthwash solution Solution	(13) (17, 18) (19)	
	Curcumin, Curcuma longa (Tumeric)	Gel Solution Endodontic irrigant solution	(20) (21, 22) (16)	
	Punica granatum (Pomegranate)	Gel/chip Solution	(23) (24)	
	Salvadora persica L. (Miswak)	Incorporated in GIC Solution	(25) (26, 27)	
	Aloe barbadensis (Aloe vera)	Toothpaste	(28)	
	Moringa oleifera (Muringa seed)	Solution	(24, 29)	
	Solanum tuberosum (Potato peel)	Solution	(29)	
	Pfaffia paniculata	Solution	(30)	
	Hamamelis virginiana	Solution	(30)	
	Stryphnodendron barbatiman	Solution	(30)	
	Gymnema sylvestre	Solution	(30)	
	Tropaeoli maji herba (Nasturtium herb)	Solution	(31)	
	Armoraciae rusticanae radix (Horseradish)	Solution	(31)	
	Allium sativum (Garlic)	Solution Oil Mouthwash	(32, 33, 34) (35) (17)	
	Acacia nilotica	Solution	(36, 37)	
	Murraya koenigii L. Sprengel	Solution	(36)	
	Eucalyptus hybrid	Solution	(36)	
	Eucalyptus globulus	Solution	(38)	
	Psidium guajava (Guava)	Solution Mouthwash	(36) (39)	
	Vitis vinifera (Grape seed)	Solution	(40)	
	Carvacrol	Solution	(41)	
	Glycyrrhiza glabra	Lollipop	(42)	

	(Liquorice)			
	Chamomile	Mouthwash	(43, 44)	
	Bromelain	Paste	(45)	
	Mangifera indica (Mango)	Mouthwash	(46)	
	Propolis	Solution	(21, 47)	
	Azadirachta indica (Neem)	Solution Periodontal chip	(40, 48) (49)	
	Piper nigrum (Black pepper)	Solution	(50)	
	Zingiber officinale Roscoe (Ginger)	Solution	(50, 51)	
	Zingiber zerumbet	Solution	(52)	
	Ocimum tenuiflorum (Pancha Tulsi)	Solution Gel	(53) (54)	
	Ocimum sanctum L.	Solution	(55)	
	Mentha piperita (Peppermint)	Solution	(56)	
	Myristica fragrans (Nutmeg)	Solution	(57)	
	Syzigium aromaticum (Clove)	Endodontic irrigant solution Essential-oil-loaded Nanoemulsion	(38) (58)	
	Fufang bingpeng	Endodontic irrigant solution	(59)	
	Trachyspermum ammi (Ajwain)	Oil Incorporated in provisional luting cement	(60) (61)	
	Syzigium aromaticum (Clove)	Solution	(62)	
	Nigella sativa	Solution	(63)	
	Calendula Officinalis L.	Mouthwash	(64)	
	Proanthocyanidins	Solution	(48)	
	Nasturtium officinale (Watercress)	Oil	(65)	
	Cranberry	Thermoreversible gel	(66)	
	Achyranthus aspera	Solution	(67)	
	Alternanthera sessilis	Solution	(67)	
	Pistacia atlantica Var. mutica	Mouthwash	(68)	
	Artemisia herba-alba (Shih)	Solution	(69)	
	F. carica leaves	Solution	(27)	
	Diospyros blancoi	Solution	(70)	
	Phoenix dactylifera	Solution	(70)	
	Morus nigra	Solution	(70)	
	Uncaria tomentosa	Micropulverized	(71)	
	Albizia myriophylla	Solution	(55)	
	Glycyrrhiza glabra	Soft-liner paste	(72)	
	Plantago lanceolata	Mouthrinse	(73)	
	Peganum harmala (Zygophyllaceae)	Solution	(74)	
	Caesalpinia pulcherrima (L)	Solution	(75)	
	Piper betle Leaf	Solution	(76)	
Anti-fungal	*Triphala curna*	Denture cleanser solution	(77)	13.3%
	Camellia sinensis (green tea)	Mouthwash solution	(78)	
	Curcumin, Curcuma longa (Tumeric)	Soft-liner paste	(79)	
	Cuminum cyminum (Cumin)	Essential oil Solution	(80) (81)	

	Punica granatum (Pomegranate)	Paste	(82)	
	Salvadora persica L. (Miswak)	Solution	(83)	
	Equisetum giganteum	Denture adhesive paste	(82)	
	Allium sativum (Garlic)	Solution	(84)	
	Azadirachta indica (Neem)	Powder	(85)	
	Ocimum sanctum L	Oil	(86)	
	Syzigium aromaticum (Clove)	Emulgel	(87)	
	Origanum vulgare (Oregano)	Oil	(88)	
	Rosmarinus officinalis (Rosemary)	Solution	(89, 90)	
	Cinnamon	Emulgel	(87)	
	Tea tree	Solution	(81)	
	Sesame	Solution	(81)	
	Galenia african	Solution	(91)	
	Satureja hortensis	Oil	(92)	
	Achillea asiatica	Solution	(93)	
Anti-inflammatory	*Curcumin, Curcuma longa* (Tumeric)	Paste	(94)	7.0%
	Chamomile	Mouthwash	(95)	
	Carica papaya	Toothpaste & Mouthwash	(96)	
	Cymbopogon citratus (Lemongrass)	Mouthwash	(97)	
	Cinnamon	Tablet	(98)	
	Jaft (Oak fruit hull)	Mouthwash	(99)	
	Tea tree	Ointment	(100)	
	Rhizoma Chuanxiong	Toothpaste	(101)	
	Rhizoma Imperatae	Toothpaste	(101)	
	Citrus aurantifolia Swingle	Periodontal pack	(102)	
Remineralizing agent	*Curcumin, Curcuma longa* (Tumeric)	Cream	(103)	4.7%
	Aloe barbadensis (Aloe vera)	Toothpaste Gel	(104) (105)	
	Vitis vinifera (Grape seed)	Solution	(106)	
	Zingiber officinale Roscoe (Ginger)	Cream	(103)	
	Malaleuca Alternifolia	Toothpaste	(107)	
	Psoralea corylifolia L.	Solution	(108)	
Osteoinductive agent & soft tissue healing	*Aloe barbadensis* (Aloe vera)	Sponge Gel	(109) (110)	2.3%
	Purslane	Paste	(111)	
Stimulate proliferation / antioxidant to periodontal tissue	*Allium sativum* (Garlic)	Solution	(112)	2.3%
	Mimusops elengi Linn	Solution	(113)	
	Centela asiatica	Solution	(114)	
Chemotherapeutic agent / anti-cancer	*Cudrania tricuspidata*	Solution	(115)	5.5%
	Kalonji	Solution	(83)	
	Antler's extract	Cocktail	(116)	
	Saussurea lappa	Solution	(117)	
	Usnea barbata (L.)	Mucoadhesive oral patches	(118)	

	Coptidis rhizoma	Solution	(119)	
	Fritillaria ussuriensis	Solution	(120)	
Pulpotomy agents	*Terminalia chebula*	Gel	(121)	1.6%
	Aloe barbadensis (Aloe vera)	Gel	(35)	
	Myristica fragrans (Nutmeg)	Gel	(121)	
Pulp-capping material	*Aloe barbadensis* (Aloe vera)	Paste	(122)	0.8%
Smear layer removal	*Tripahala curns*	Solution	(123)	1.6%
	Propolis	Endodontic irrigant solution	(124)	
	Azadirachta indica (Neem)	Endodontic irrigant solution	(124)	
Anti-anxiety/sedation	*Passiflora incarnata L*	Tablet	(125, 126)	1.6%
	Erythrina mulungu	Tablet	(126)	
Obturating material	*Azadirachta indica* (Neem)	Oil	(127)	0.8%
Dentin microhardness	*Sapindus mukorossi*	Solution	(128)	1.6%
	Calendula Officinalis L.	Solution	(129)	
Analgesic	*Mentha piperita* (Peppermint)	Oil	(130)	3.1%
	Aconitum (Wolf's bane)	Injection	(131)	
	Swedish herbal	Orally	(132)	
	Goreisan	Tablet	(133)	

Pfaffia paniculate, Hamamelis virginiana, Stryphnodendron barbatiman, Gymnema sylvestre, *Eucalyptus globulus, Sapindus mukorossi, Nigella sativa, Calendula Officinalis L., F. carica* leaves. Most of these herbal remedies primarily focused on antibacterial capabilities, which were utilized as intracanal medicaments or endodontic irrigants, specifically targeting *Enterococcus faecalis*. Recommended herbs within the field of prosthodontics were tumeric, pomegranate, garlic, neem, ajwain, *Equisetum giganteum, Ocimum sanctum L, Glycyrrhiza glabra*. They are primarily used as an antifungal agent targeting *Candida albicans* where these herbs were integrated into denture adhesive and utilized as a denture cleaning agent.

In the field of oral medicine, common herbs investigated were green tea, tumeric, cumin, miswak, aloe vera, garlic, mango, peppermint, nutmeg, clove, oregano, rosemary, kalonji, cinnamon, oak fruit hull, *Purslane*, tea tree, sesame, cranberry, *Morinda citrifolia, Carvacrol, Chamomile, Zingiber zerumbet, Mimusops elengi Linn, Uncaria tomentosa, Albizia myriophylla, Usnea barbata (L.), Plantago lanceolata, Peganum harmala, Galenia African, Caesalpinia pulcherrima (L), Satureja hortensis* and *Achillea asiatica*. These herbs were reported to effectively treat oral diseases such as recurring aphthous ulcers, lichen planus, and oral candidiasis, as well as provide analgesic properties (94, 95, 130).

The recommended herbs for periodontics field includes tumeric, pomegranate, muringa seed, Nasturtium herb, Horseradish, garlic, guava, propolis, neem, Pancha tulsi, lemongrass, *Acacia nilotica, Murraya koenigii L. Sprengel, Eucalyptus hybrid, Eucalyptus globulus, Carica papaya, Pistacia atlantica Var. mutica, Rhizoma Chuanxiong, Rhizoma Imperatae, Citrus aurantifolia Swingle, Artemisia herba-alba* (Shih), *Centela asiatica*. Most of these herbs were primarily utilized as a mouthwash with antibacterial properties aiding in the reduction of gingivitis and the treatment of chronic periodontitis (47, 96, 97). Additionally, herbal remedies play a significant role in biofilm management, a crucial aspect in preventing oral diseases. A study by Sreenivasan et al. indicated that certain natural compounds can disrupt oral biofilms effectively without harming the oral mucosa (136).

When looking into the restorative field, herbs such as miswak, aloe vera, grape seed, liquorice, ginger, *Malaleuca Alternifolia, Achyranthus aspera, Alternanthera sessilis, Diospyros blancoi, Phoenix dactylifera, Morus nigra, Psoralea corylifolia L.* were used topically in toothpaste or gel to act against oral

microorganisms that cause caries. Other applications were the use of *Curcumin* (turmeric), *Zingiber officinale roscoe* (ginger), herbs that integrated into dental materials to increase the remineralization of teeth with early caries lesions (103).

In the field of oral surgery, investigated herbs such as aloe vera, peppermint, Wolf's bane, Swedish herbal, cinnamon, Goreisan, *Passiflora incarnata L, Erythrina mulungu, Cudrania tricuspidate*, Antler's extract, *Saussurea lappa, Usnea barbata (L.), Coptidis rhizome, Fritillaria ussuriensis* were found to exhibit therapeutic effect. The utilization of these herbs was evident in the cellular-level investigation of cancer studies, namely oral malignancies where the naturally occurring compounds derived from herbs offered promising potential and alternatives for the treatment of oral cancer.

Therapeutic properties and efficacy of herbal remedies

Based on the findings 50% of the therapeutic properties that were investigated in the literature were anti-microbial, this may be due to the fact some herbs exhibit a broad spectrum of antimicrobial activity, targeting a wide range of pathogens efficiently. This versatility makes them attractive candidates for research and potential use in dental applications. Additionally, it may exhibit more efficient results than chemical products. Numerous investigations have been conducted to compare the efficacy of herbal extracts with traditional clinical approaches. A notable example is the study by Abirami et al. (35), which focused on comparing the use of herbal extracts to formocresol in pulpotomy medicaments. The findings of this study indicated no significant differences in outcomes between the experimental groups treated with *Aloe barbadensis* gel and *Allium sativum* oil and the control group treated with formocresol. This suggests the potential of these herbal extracts as viable alternatives to formocresol in pulpotomy treatments.

In another study led by Beegam et al. (60), the antimicrobial efficacy of *Trachyspermum ammi* oil, when utilized as an irrigant solution, was evaluated against *E. faecalis* biofilms of 2-week and 4-week duration formed on tooth substrates. The findings indicated that teeth treated with *T. ammi* oil and sodium hypochlorite exhibited complete eradication of both 2-week-old and 4-week-old *E. faecalis* biofilms. These results suggest the potential of *T. ammi* oil as a viable alternative to sodium hypochlorite for use in root canal irrigant solutions.

The therapeutic properties least examined involve their use as pulp-capping and obturation materials, accounting for just 0.8% of the total studies. For pulp capping, the materials currently in use, such as Dycal and Biodentine, shown to be highly effective, with studies like those by Sahin et al. (137) indicating a 100% success rate, thus looking for alternative materials may not be out of interest for the researchers.

The advantages of herbal remedies in dental applications

The primary reason for the high interest in traditional herbs studies was the rise in antimicrobial resistance, which necessitates for an alternative treatment. The widespread use of antibiotics has altered how resistance developed, mainly due to the strong selective pressures on bacteria in human and animal microbiomes and antibiotic-polluted environments. This leads to the widespread transfer of antibiotic- resistance genes (ARGs) among disease-causing bacteria (138). Natural products, with their unique mechanisms of action, were found to be effective against resistant strains as demonstrated in a study exploring the antimicrobial activity of tea tree oil against oral bacteria (139).

Other benefits from the natural remedies were the reduced side effects compared to synthetic dental products. Lesser issues such as tooth staining, altered taste perception, or mucosal irritation were reported in comparison with synthetic products. This was highlighted in the research by Arami et al, which showed that *Pistacia atlantica* extract had reduced side effects while maintaining antimicrobial efficacy compared to chlorhexidine (CHX) (68). The use of chlorhexidine mouth rinse caused several side effects, with the most common being brown stains on teeth and the tongue due to the reactions of the chemical component with the food intake stain. Other common side effects reported include the build-up of dental calculus, mouth sores, and changes in taste perception (140). However, some studies did report on the side effects of certain natural remedies such as Manuka honey and *Chamomilla recutita* in the treatment of oral mucositis. The feeling of nausea and burning sensation in the mouth were reported in a clinical

trial study on cancer patients undergoing treatment. However, as these two side effects were also closely related to radiotherapy, relying only on reported side effects might not give a complete picture of the situation (141).

Natural remedies are more cost-effective and environmentally sustainable than many synthetic alternatives, making them important in developing countries or for individuals with limited access to healthcare. A systematic review of randomized clinical trials was conducted to evaluate the cost-effectiveness of natural remedies compared to conventional medicine. The study aimed to provide insights for patients, physicians, and policymakers regarding the economic viability of using natural remedies in healthcare. The study concluded that natural remedies may offer cost-effective solutions in certain areas, particularly in preventing complications associated with surgery, although further research was recommended to confirm their effectiveness in other conditions (142).

Culture and traditional beliefs may also influence the use of natural remedies. Herbs such as tumeric which is highly used in Indian daily lifestyle and dishes were found useful to expel phlegm with good anti-inflammatory properties. Incorporating the use of these remedies is easy in the Indian cultured community due to their traditional daily use. Another example is *Salvadora persica* extract harvested from the roots, twigs, stems, or bark of the plant known in Saudi Arabia as miswak or siwak. It is commonly used as a traditional toothbrush and known to have good antimicrobial and antioxidant properties (25, 83). Traditionally, aloe vera and pomegranate were some of the herbs widely used in treating diseases such as ulcers, skin abrasion, minor burns, and irritations by the older generations. The efficacy was reported in the study by Subramaniam et al. (142). These advantages and findings highlighted the potential of integrating traditional remedies into modern dental applications.

Conclusion

This review provides valuable insights into the realm of natural remedies and their potential therapeutic properties. The extensive list of references and the range of herbs discussed on the dental application and the investigated therapeutic properties. As antibiotic resistance and medication allergies are becoming a growing concern globally other than side effects given by pharmaceutical products, the findings from this document exhibited the importance of exploring alternative and complementary solutions from nature.

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Competing Interests

The authors declare that they have no competing interests.

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