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Veterinary Medicine

Herbal Treatments for Dental Cysts: Insights from Traditional Iranian Medicine and Evidence from Animal and Clinical Models. A Review

Tratamentos Fitoterápicos para Cistos Dentários: Perspetivas da Medicina Tradicional Iraniana e Evidências de Modelos Animais e Clínicos. Uma Revisão

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Abstract: Dental cysts are epithelial lesions filled with fluid that form around the roots of teeth, often leading to inflammation and infection of surrounding tissues. Considering the limitations and side effects associated with conventional chemical therapies, the use of native Iranian medicinal plants as a complementary approach to manage inflammation and infection in these cysts has garnered increasing attention. The aim of this review is to identify and compile native Iranian medicinal plants that may help prevent and alleviate the symptoms of dental cysts. This descriptive-systematic review examined traditional medicine sources alongside international scientific databases to identify medicinal plants effective against dental cysts. Data collected included pharmacological effects, active compounds, and potential mechanisms of action, which were summarized in tables to provide a comprehensive reference for future research and clinical applications. The findings revealed a diverse array of native Iranian medicinal plants used for the prevention and symptomatic relief of dental cysts, including *Curcuma longa L., Melaleuca alternifolia (Maiden & Betche) Cheel, Trigonella foenum-graecum L., Syzygium aromaticum (L.) Merr. & L.M. Perry, Allium sativum L., Thymus vulgaris L., Malus domestica Borkh., Apium graveolens L., Citrus limon (L.) Osbeck, Glycyrrhiza glabra L., Camellia sinensis (L.)*

Kuntze, Aloe vera (L.) Burm.f., Matricaria chamomilla L., Lavandula angustifolia Mill., Origanum vulgare L., Cocos nucifera L., Rosa damascena Mill., Valeriana officinalis L., Silybum marianum (L.) Gaertn., Iris germanica L., Mentha piperita L., Salvia officinalis L., Foeniculum vulgare Mill., Viola odorata L., Boswellia sacra Flueck., Nigella sativa L., Elettaria cardamomum (L.) Maton, Cinnamomum verum J. Presl, Salix alba L. Leaves were the most commonly used plant part, followed by flowers, stems, and fruits, while seeds, roots, and rhizomes were less frequently applied. Plant families with the highest representation included Lamiaceae, Zingiberaceae, and Myrtaceae, with herbs and woody plants being the predominant growth forms. Most species thrived in garden and agricultural habitats. Native Iranian medicinal plants possess anti-inflammatory, antibacterial, and tissue-regenerative properties and can serve as complementary interventions to reduce inflammation and control infection in dental cysts. Nevertheless, conventional medical and dental treatments remain essential for complete cyst resolution and prevention of complications. This review provides a scientific foundation for future studies and the development of integrative therapeutic approaches.

Keywords: Dental cyst, Traditional medicine, Oral health, Medicinal plants, Iranian flora

Resumo: Os cistos dentários são lesões epiteliais preenchidas por líquido que se formam em torno das raízes dos dentes, frequentemente levando à inflamação e infeção dos tecidos adjacentes. Tendo em conta as limitações e os efeitos adversos associados às terapias químicas convencionais, o uso de plantas medicinais nativas do Irã como abordagem complementar para o controlo da inflamação e da infeção nesses cistos tem despertado um interesse crescente. O objetivo desta revisão foi identificar e compilar plantas medicinais nativas iranianas que possam contribuir para a prevenção e o alívio dos sintomas dos cistos dentários. Esta revisão descritivo-sistemática analisou fontes da medicina tradicional juntamente com bases de dados científicas internacionais, com o intuito de identificar plantas medicinais eficazes no tratamento dos cistos dentários. Os dados recolhidos incluíram efeitos farmacológicos, compostos ativos e potenciais mecanismos de ação, os quais foram organizados em tabelas para fornecer uma referência abrangente para futuras investigações e aplicações clínicas. Os resultados revelaram uma grande diversidade de plantas medicinais nativas do Irão utilizadas na prevenção e no alívio sintomático dos cistos dentários, incluindo *Curcuma longa* L., *Melaleuca alternifolia* (Maiden & Betche) Cheel, *Trigonella foenum-graecum* L., *Syzygium aromaticum* (L.) Merr. & L.M. Perry, *Allium sativum* L., *Thymus vulgaris* L., *Malus domestica* Borkh., *Apium graveolens* L., *Citrus limon* (L.) Osbeck, *Glycyrrhiza glabra* L., *Camellia sinensis* (L.) Kuntze, *Aloe vera* (L.) Burm.f., *Matricaria chamomilla* L., *Lavandula angustifolia* Mill., *Origanum* *vulgare* L., *Cocos nucifera* L., *Rosa damascena* Mill., *Valeriana officinalis* L., *Silybum marianum* (L.) Gaertn., *Iris germanica* L., *Mentha piperita* L., *Salvia officinalis* L., *Foeniculum vulgare* Mill., *Viola odorata* L., *Boswellia sacra* Flueck., *Nigella sativa* L., *Elettaria cardamomum* (L.) Maton, *Cinnamomum verum* J. Presl e *Salix alba* L. As folhas foram a parte da planta mais frequentemente utilizada, seguidas por flores, caules e frutos, enquanto sementes, raízes e rizomas foram menos frequentemente aplicados. As famílias botânicas com maior representatividade incluíram Lamiaceae, Zingiberaceae e Myrtaceae, sendo as ervas e as plantas lenhosas as formas de crescimento predominantes. A maioria das espécies desenvolve-se em ambientes de jardins e áreas agrícolas. As plantas medicinais nativas do Irão apresentam propriedades anti-inflamatórias, antibacterianas e regeneradoras de tecidos, podendo atuar como intervenções complementares na redução da inflamação e no controlo da infeção associada aos cistos dentários. No entanto, os tratamentos médicos e dentários convencionais continuam a ser essenciais para a resolução completa dos cistos e para a prevenção de complicações. Esta revisão fornece uma base científica para futuros estudos e para o desenvolvimento de abordagens terapêuticas integrativas.

Palavras-chave: cisto dentário, medicina tradicional, saúde oral, plantas medicinais, flora iraniana

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Introduction

Oral health is a fundamental component of public hygiene and overall quality of life, and the timely prevention of oral diseases such as dental caries and gingivitis can help prevent systemic complications and reduce associated healthcare costs (KAKUYI NEZHAD, GHAZNAVI, 2024; JAMALI et al, 2020; GHAZNAVI, YSIUK, 2024; YAVARI et al, 2017; JAMALI et al, 2020; GHAZNAVI et al, 2024).

Oral and dental diseases rank among the most prevalent health issues across societies, ranging from minor discomforts such as gingival inflammation and pain to more severe conditions, including extensive caries and tooth loss (Smith et al., 2020). These disorders not only diminish patients' quality of life but also impose substantial economic burdens on healthcare systems (SILK, 2014).

Dental cysts, as common pathological lesions in the jaw and teeth, develop as epithelial-lined cavities filled with fluid or semi-fluid material, typically forming around the tooth root (LI et al., 2023). Early stages of these lesions are often asymptomatic, becoming clinically evident only when they enlarge or lead to complications such as pain, swelling, or tooth displacement (Browne, 1975). Common types of dental cysts include radicular (periapical) cysts, periodontal cysts, dentigerous cysts, odontogenic keratocysts, and gingival cysts (BANU et al., 2014).

The formation of dental cysts primarily results from growth disturbances, tissue injury, or chronic inflammatory responses (COUNSELL, 1931). Frequent contributing factors include abnormal tooth development, impacted teeth, complications following root canal treatment, wisdom teeth, and certain genetic conditions, such as Gorlin syndrome (HARRIS & TOLLER, 1975). Cyst expansion, driven by fluid accumulation and epithelial proliferation along with protease activity, can lead to adjacent bone resorption and, in some cases, clinically apparent lesions (HARRIS & TOLLER, 1975).

Diagnosis of dental cysts relies on clinical examination and imaging techniques (VIJAYAKUMARI et al., 2012). Conventional radiography is usually the first diagnostic step, while CT scans, MRI, and, in cases with suspected malignancy, biopsy are recommended for larger or more complex lesions (VIJAYAKUMARI et al., 2012).

Common treatments include simple surgical excision, marsupialization, root canal therapy, laser therapy, cryotherapy, or tooth extraction, while pharmacological interventions mainly serve to manage pain and inflammation (FICKLING, 1965).

Medication-based approaches are primarily supportive, involving antibiotics, analgesics, and antiseptic mouthwashes to control temporary pain, inflammation, and infection, whereas definitive cyst treatment generally requires dental procedures such as surgery or root canal therapy (Bystedt & Nord, 1982). Chemical agents for dental cysts may cause adverse effects, including hypersensitivity, gastrointestinal disturbances, tooth discoloration, and mucosal thinning, and should be used under dental supervision (BASCONES-MARTÍNEZ, MUÑOZ-CORCUERA & BASCONES-ILUNDAIN, 2015). Traditional medicine and herbal therapy, employing anti-inflammatory and antibacterial plants such as turmeric, garlic, clove, and thyme through herbal mouth rinses or topical compresses, can aid in reducing inflammation and controlling infection (ARUMUGAM, SUBRAMANIAM & ALAGARAJ, 2020).

Nevertheless, for definitive treatment and prevention of complications, consultation with a dentist and adherence to conventional medical care remain essential (ARUMUGAM, SUBRAMANIAM & ALAGARAJ, 2020). The aim of this review is to identify and compile both scientific and traditional evidence regarding medicinal plants effective in managing dental cysts, providing a comprehensive reference for future research and clinical applications.

Methods

This study was conducted as a descriptive-systematic review with the aim of identifying and compiling both traditional and scientific evidence regarding native Iranian medicinal plants with potential effects in the management of dental cysts.

In the first step, classical texts of Iranian traditional medicine and reputable online sources related to medicinal plants were examined to identify plant species used for the prevention or treatment of dental cysts. This phase involved a thorough review of classical and authoritative references in traditional medicine

(AZADBAKHT, 2015; HOSSEINI-SHIRAZI, 2019; ELYASI, 2012; NEJATBAKHSH, 2016; SHAMS ARDAKANI, 2017; HOSSEINI-SHIRAZI, 2018; HAJISHARIFI, 2019; MEHRABI, 2020; KHEIRANDISH, 2018; TABRIZIAN, 2019).

Subsequently, a modern scientific search was conducted across international databases, including Web of Science, PubMed, Google Scholar, and ISC, to collect experimental and clinical evidence on the pharmacological effects of these plants. The search strategy incorporated both scientific and common plant names along with keywords such as “Dental cyst,” “Oral cyst,” “Herbal therapy,” and “Traditional medicine.”

Inclusion criteria:

The present review included studies published in either Persian or English that reported on the pharmacological effects of medicinal plants in the management of dental cysts. In addition, traditional references documenting the use of plants for oral and dental lesions were considered to provide a comprehensive overview of both modern pharmacological evidence and historical or ethnobotanical knowledge.

Exclusion criteria:

Studies were excluded if they focused solely on medicinal plants unrelated to oral or dental health. Articles that lacked full text or sufficient data were also excluded, as were non-scientific sources or websites without established academic credibility. Additionally, duplicate articles identified across multiple databases were removed to ensure the uniqueness and reliability of the included studies. Following the application of these criteria, extracted data including scientific names of plants, plant parts used, pharmacological effects, potential mechanisms of action, and other relevant information—were organized and summarized in tables, providing a comprehensive reference of medicinal plants effective in managing dental cysts.

Results

Review of traditional sources and scientific evidence revealed that a diverse array of native Iranian medicinal plants is used for the prevention and alleviation of dental cyst symptoms. Among these, plants such as turmeric (*Curcuma longa*), tea tree (*Melaleuca alternifolia*), fenugreek (*Trigonella foenum-graecum*), clove (*Syzygium aromaticum*), garlic (*Allium sativum*), and thyme (*Thymus vulgaris*) possess notable anti-inflammatory and antibacterial properties. Additionally, species including apple, celery, lemon, licorice (*Glycyrrhiza glabra*), green tea, and *Aloe vera* are employed as natural adjuncts to enhance oral health and reduce infections.

Other plants highlighted in both traditional texts and experimental studies include chamomile (*Matricaria chamomilla*), lavender (*Lavandula* spp.), oregano (*Origanum vulgare*), coconut, rose (*Rosa* spp.), valerian (*Valeriana officinalis*), milk thistle (*Silybum marianum*), iris, peppermint (*Mentha piperita*), sage (*Salvia officinalis*), fennel (*Foeniculum vulgare*), white violet (*Viola odorata*), frankincense (*Boswellia* spp.), black seed (*Nigella sativa*), cardamom (*Elettaria cardamomum*), cinnamon (*Cinnamomum verum*), and white willow (*Salix alba*).

These plants have been shown to contribute significantly to inflammation control and the facilitation of tissue repair around cystic lesions.

These findings indicate that the medicinal flora of Iran represents a valuable resource for complementary management of dental cysts and provides preliminary evidence to support future clinical investigations.

Table 1 lists native Iranian medicinal plants used for the prevention and symptomatic relief of dental cysts

Table 1. Iranian medicinal plants used for prevention and alleviation of dental cyst symptoms

Common English Name	Scientific Name	Plant Family	Plant Part Used
Turmeric	*Curcuma longa* L.	Zingiberaceae	Rhizome
Tea Tree	*Melaleuca alternifolia* (Maiden & Betche) Cheel	Myrtaceae	Leaf & Oil
Fenugreek	*Trigonella foenum-graecum* L.	Fabaceae	Seed & Leaf
Clove	*Syzygium aromaticum* (L.) Merr. & L.M. Perry	Myrtaceae	Flower Bud
Garlic	*Allium sativum* L.	Amaryllidaceae	Bulb
Thyme	*Thymus vulgaris* L.	Lamiaceae	Leaf & Stem
Apple	*Malus domestica* Borkh.	Rosaceae	Fruit
Celery	*Apium graveolens* L.	Apiaceae	Leaf & Stem
Lemon	*Citrus limon* (L.) Osbeck	Rutaceae	Fruit
Licorice	*Glycyrrhiza glabra* L.	Fabaceae	Root
Green Tea	*Camellia sinensis* (L.) Kuntze	Theaceae	Leaf
Aloe Vera	*Aloe vera* (L.) Burm.f.	Asphodelaceae	Leaf
Chamomile	*Matricaria chamomilla* L.	Asteraceae	Flower
Lavender	*Lavandula angustifolia* Mill.	Lamiaceae	Flower
Oregano	*Origanum vulgare* L.	Lamiaceae	Leaf & Stem
Coconut	*Cocos nucifera* L.	Arecaceae	Fruit
Damask Rose	*Rosa damascena* Mill.	Rosaceae	Flower
Valerian	*Valeriana officinalis* L.	Caprifoliaceae	Root
Milk Thistle	*Silybum marianum* (L.) Gaertn.	Asteraceae	Leaf & Seed
Iris	*Iris germanica* L.	Iridaceae	Rhizome & Flower
Peppermint	*Mentha piperita* L.	Lamiaceae	Leaf
Sage	*Salvia officinalis* L.	Lamiaceae	Leaf
Fennel	*Foeniculum vulgare* Mill.	Apiaceae	Seed & Leaf
White Violet	*Viola odorata* L.	Violaceae	Flower & Leaf
Frankincense	*Boswellia sacra* Flueck.	Burseraceae	Resin
Black Cumin	*Nigella sativa* L.	Ranunculaceae	Seed
Cardamom	*Elettaria cardamomum* (L.) Maton	Zingiberaceae	Seed
Cinnamon	*Cinnamomum verum* J. Presl	Lauraceae	Bark
White Willow	*Salix Alba* L.	Salicaceae	Bark & Leaf

Plant families with the highest frequency included Lamiaceae, represented five times, followed by Zingiberaceae, Myrtaceae, Fabaceae, Rosaceae, Apiaceae, and Asteraceae, each occurring twice. All other families were observed only once.

The most used plant parts were leaves. Plant parts used moderately included flowers, as well as combinations of leaves, stems, and fruits.

Less frequently used parts included seeds, seeds with leaves, and roots, while rhizomes, rhizomes with flowers, flower buds, flowers with leaves, bulbs/garlic, resins, bark, and bark with leaves were utilized very rarely. Table 2 summarizes the active compounds and proposed mechanisms of action of native Iranian medicinal plants in the management and improvement of dental cysts

Table 2. Active compounds and mechanisms of action of selected Iranian medicinal plants in the management and improvement of dental cysts

Scientific Name	Active Compounds	Mechanism of Action	Reference
Curcuma longa L.	Curcumin, Curcuminoids	Anti-inflammatory, Antioxidant, Tissue repair promotion	Okhovatfard et al., 2023
Melaleuca alternifolia (Maiden & Betche) Cheel	Terpenoids, Thiols	Antibacterial, Infection inhibition (delayed healing in animal models)	Kreuger et al., 2007
Trigonella foenum-graecum L.	Saponins, Flavonoids	Local protection, Reduces inflammation and pain	Ansari et al., 2022
Syzygium aromaticum (L.) Merr. & L.M. Perry	Eugenol	Antibacterial, Anti-inflammatory	Kaur & Chandrul, 2017
Allium sativum L.	Allyl sulfides, Allicin	Biofilm inhibition, Reduces bacterial acid production	Bin et al., 2020
Thymus vulgaris L.	Thymol, Carvacrol	Antibacterial, Anti-inflammatory, Antifungal	Gonçalves et al., 2011
Malus domestica Borkh.	Flavonoids, Polyphenols	Antioxidant Reduces oxidative stress	Patocka et al., 2020

Apium graveolens L.	Flavonoids, Linalool	Anti-inflammatory, Inhibits cancer cell growth	Hartono et al., 2024
Citrus limon (L.) Osbeck	Limonene, Vitamin C	Antioxidant, Nitric oxide inhibition, Teeth whitening	Jeong, 2021
Glycyrrhiza glabra L.	Glycyrrhizin	Anti-inflammatory, Antiviral, Antifungal	Sidhu et al., 2020
Camellia sinensis (L.) Kuntze	Catechins, Epigallocatechin gallate	Biofilm inhibition, Reduces dental caries	Goenka et al., 2013
Aloe vera (L.) Burm.f.	Aloin, Aloeic acid	Anti-inflammatory, Tissue repair, Antifungal	Mangaiyarkarasi et al., 2015
Matricaria chamomilla L.	Apigenin, Chamazulene	Anti-inflammatory, Pain relief	Machado et al., 2017
Lavandula angustifolia Mill.	Linalool, Linalyl acetate	Antifungal, Antibacterial, Antioxidant	Nasiri et al., 2022
Origanum vulgare L.	Carvacrol, Thymol	Antibacterial, Anti-biofilm, Anti-virulence	Idir et al., 2022
Cocos nucifera L.	Lauric acid, Polyphenols	Antibacterial, Oral moisturizer	Jose et al., 2014
Rosa damascena Mill.	Rose oil, Flavonoids	Anti-inflammatory, Antioxidant	Nlal et al., 2023
Valeriana officinalis L.	Valerenic acids, Valepotriates	Sedative, Local anti-inflammatory	Farah et al., 2019
Silybum marianum (L.) Gaertn.	Silymarin, Flavonoids	Antifungal, Anti-inflammatory, Tissue repair support	Qasim & Hashim, 2023
Iris germanica L.	Iridins, Flavonoids	Antibacterial Biofilm inhibition	Hoang et al., 2020
Mentha piperita L.	Menthol, Menthone	Antibacterial, Reduces dental caries	Fayed, 2019
Salvia officinalis L.	Salvian, Flavonoids	Anti-inflammatory, Antiviral, Antifungal	Eidi & Ghahramani, 2023

Foeniculum vulgare Mill.	Anethole, Flavonoids	Antibacterial, Anti-inflammatory, Antispasmodic	Golestannejad et al., 2018
Viola odorata L.	Saponins, Flavonoids	Antibacterial, Anti-inflammatory	Mehrabkhani et al., 2024
Boswellia sacra Flueck.	Boswellic acids	Antibacterial Reduces oral microbial load	Sabra & Al-Masoudi, 2014
Nigella sativa L.	Thymoquinone (TQ)	Anti-inflammatory, Antibacterial, Reduces plaque and gingivitis	Al-Wafi, 2014
Elettaria cardamomum (L.) Maton	1,8-Cineole, Terpenoids	Antibacterial, Anti-biofilm	Aneja & Joshi, 2009
Cinnamomum verum J. Presl	Cinnamaldehyde, Eugenol	Antibacterial, Anti-biofilm	Yanakiev, 2020
Salix Alba L.	Salicin	Anti-inflammatory, Analgesic, Tissue inflammation reduction	Majeed et al., 2016

Anti-inflammatory and antibacterial properties were identified as the most prominent and frequently reported effects and mechanisms of action among this collection of plants. Industrial and Technological Applications of Selected Medicinal Plants are shown in table 3.

Table 3. Industrial and Technological Applications of Selected Medicinal Plants

Scientific Name	Industrial and Technological Applications
Curcuma longa L.	Widely employed in the food industry as a natural colorant and flavor enhancer; in cosmetics and personal-care formulations for its antioxidant and anti-inflammatory properties; and in pharmaceuticals for the development of anticancer and anti-inflammatory agents.
Melaleuca alternifolia	The principal source of tea tree oil, extensively used in cosmetic products, disinfectants, topical creams, and oral- and body-care formulations.
Trigonella foenum-graecum L.	Utilized in nutraceuticals for cholesterol management, as a flavoring agent in the food industry, and in cosmetic preparations for its emollient and anti-aging effects.

Syzygium aromaticum (L.) Merr. & L.M. Perry (Clove)	The main natural source of eugenol, employed in pharmaceuticals (as an analgesic and antiseptic), in oral-care products, perfumery, and as a natural food preservative.
Allium sativum L.	Extensively applied as a flavoring and natural preservative in foods, and in pharmaceuticals for antibacterial, antiviral, and cardioprotective formulations.
Thymus vulgaris L.	Used in essential-oil extraction, perfumery, and food processing as a natural preservative and flavoring; also incorporated in medicinal products for antiseptic and antitussive purposes.
Malus domestica Borkh.	Applied in food industries (juice, powder, and extract production), in cosmetics for its polyphenolic content, and in dietary supplements as a natural antioxidant source.
Apium graveolens L.	Serves as a natural flavoring in food manufacturing and in pharmaceuticals for its diuretic and anti-inflammatory effects; also used in fragrance production.
Citrus limon (L.) Osbeck	Extensively employed across food, pharmaceutical, and cosmetic industries; a rich source of vitamin C and essential oils, and commonly used in natural cleansers and preservatives.
Glycyrrhiza glabra L.	The primary source of glycyrrhizin, used in pharmaceuticals for treating ulcers and inflammation, in cosmetics for skin-brightening effects, and in confectionery as a flavoring agent.
Camellia sinensis (L.) Kuntze	Valued in the beverage, cosmetic, and pharmaceutical sectors; its antioxidant constituents are used in anti-aging, anticancer, and dietary supplement formulations.
Aloe vera (L.) Burm.f.	Integral to cosmetic, pharmaceutical, and hygienic products—particularly moisturizing gels, wound-healing formulations, and anti-inflammatory preparations; also utilized in functional beverages.
Matricaria chamomilla L.	Used pharmaceutically in the production of sedative and anti-inflammatory medications, in cosmetics and skincare for soothing formulations, and in herbal teas.
Lavandula angustifolia Mill.	A key ingredient in perfumery, aromatherapy, pharmaceuticals, and cosmetics owing to its calming fragrance and antiseptic properties.

Origanum vulgare L.	A natural source of carvacrol and thymol; employed in food industries as a preservative and flavoring, and in pharmaceuticals for antimicrobial and antifungal products.
Cocos nucifera L.	Utilized food (oil, milk, and flour production), cosmetics (moisturizers and shampoos), and pharmaceuticals as a natural antioxidant and emollient.
Rosa damascena Mill.	The chief source of rose oil and rose water, used in perfumery, pharmaceuticals, cosmetics, and food products; valued for its soothing and antidepressant properties.
Valeriana officinalis L.	Applied in pharmaceuticals for the production of sedative and anxiolytic drugs, and in herbal supplements for improving sleep and reducing stress.
Silybum marianum (L.) Gaertn.	A rich source of silymarin, widely used in pharmaceuticals for liver protection and in antioxidant cosmetic and dietary products.
Iris germanica L.	The rhizomes are processed to extract “orris root” essential oil for perfumery; also utilized in cosmetics for its skin-softening effects.
Mentha piperita L.	Used as a flavoring in food industries, in pharmaceuticals for carminative and antispasmodic formulations, and in oral- and skin-care products for its cooling sensation.
Salvia officinalis L.	Employed in food, pharmaceutical, and cosmetic industries; recognized for its antioxidant, antimicrobial, and memory-enhancing properties; commonly used in mouthwashes and dietary supplements.
Foeniculum vulgare Mill.	Used in food and pharmaceutical products for digestive health and bloating relief, and in cosmetics as a natural essence and flavoring component.
Viola odorata L.	Incorporated in perfumery and cosmetics for its delicate fragrance, and in pharmaceuticals for cough syrups and anti-inflammatory formulations.
Boswellia sacra Flueck.	The resin is processed for perfumery, aromatherapy, and pharmaceuticals, particularly in anti-inflammatory and anticancer products.
Nigella sativa L.	Applied in pharmaceutical and food industries as a natural antioxidant and antimicrobial agent, and in cosmetics and nutraceuticals.
Elettaria cardamomum (L.) Maton	Used in food industries as a flavoring and aromatic additive, in perfumery, and in pharmaceuticals for digestive and respiratory remedies.

Cinnamomum verum J. Presl	Commonly employed in foods as a flavoring and natural preservative, and in cosmetics and pharmaceuticals for its antibacterial and antioxidant potential.
Salix alba L.	The natural source of salicin, a precursor in aspirin synthesis; utilized in pharmaceuticals for anti-inflammatory drugs and in cosmetics for skin-soothing products.

This compilation underscores the diverse industrial and technological applications of 27 medicinal plants across multiple sectors. Species such as *Curcuma longa*, *Zingiber officinale*, and *Cinnamomum verum* are extensively utilized in the food industry as natural flavoring agents, colorants, and preservatives. Plants like *Aloe vera*, *Lavandula angustifolia*, and *Rosa damascena* play a crucial role in the cosmetics and perfumery industries owing to their moisturizing, soothing, and aromatic properties. Several herbs, including *Thymus vulgaris*, *Origanum vulgare*, and *Nigella sativa*, have gained prominence in pharmaceutical formulations for their antimicrobial, anti-inflammatory, and antioxidant effects.

Other species, such as *Silybum marianum* and *Salix alba*, are valuable in drug development due to their hepatoprotective and analgesic compounds. Moreover, bioactive constituents such as polyphenols, glycyrrhizin, and eugenol have driven significant advancements in nutraceutical innovation.

Collectively, these plants serve as a crucial bridge between traditional herbal knowledge and modern biotechnological and industrial applications. Table 4 summarizes the reported effects of medicinal plants in traditional medicine across animal models, human, and preclinical models, highlighting their therapeutic potential.

Table 4. Effects of Medicinal Plants and Their Extracts/Essential Oils on Oral Health: Experimental, Animal, and Human Models

Scientific Name	Model Type	Extract/Product Type	Description	Ref.
Curcuma longa L.	Human	Extract / Curcumin	Improves symptoms and slows the progression of OLP via antioxidant, anti-inflammatory, and antimicrobial effects; administered orally or topically at various dosages	Purwaningrum et al., 2024
Melaleuca alternifolia	Animal (Rat)	Essential oil (Tea tree oil)	Delays dental cavity healing and increases necrosis; applied at a 20% concentration	Kreuger et al., 2007
Syzygium aromaticum	Laboratory / Chemical	Essential oil (flower, leaf, stem)	Exhibits antibacterial and therapeutic effects in periodontal care; eugenol content ranges from 72–97% depending on the plant part	Kaur & Chandrul, 2017
Allium sativum L.	Human & Laboratory	Garlic extract	Demonstrates antimicrobial and therapeutic properties in oral health, primarily due to allicin and S-allylcysteine	Sasi et al., 2021
Thymus vulgaris L.	Laboratory / Oral	Essential oil	Enhances oral hygiene and exhibits anti-inflammatory activity	Gonçalves et al., 2011
Apium graveolens L.	Laboratory (in vitro)	Ethanolic extract & seed oil	Displays antibacterial activity against *S. mutans*; the extract is effective at all tested concentrations, and the oil at 100 µg/mL	Moshaverinia et al., 2025
Citrus limon (L.) Osbeck	Cellular & Laboratory	Extract	Reduces oxidative toxicity and nitric oxide production; provides safe whitening effects, particularly when combined with $NaHCO_3$	Jeong, 2021
Matricaria chamomilla L.	Human	Cream + Low-level laser	Alleviates severe oral mucositis, reduces pain, and improves nutritional intake; 6.2 J/cm^2	Machado et al., 2017
Lavandula angustifolia Mill.	Laboratory	Extract for ZnNP synthesis	Exhibits potent antifungal activity against *C. albicans* and is non-toxic to normal cells	Nasiri et al., 2022

Origanum vulgare L.	Laboratory	Essential oil & gel extract	Inhibits *S. mutans* biofilm formation by up to 98%; shows strong antimicrobial activity against bacteria and fungi	Badekova et al., 2021
Cocos nucifera L.	Human / Laboratory	Coconut oil & water	Provides antibacterial, antifungal, and antiviral effects; supports oral health and reduces inflammation	Kishore & Verma, 2020
Silybum marianum (L.) Gaertn.	Animal (Rat)	Aqueous extract	Exhibits anti-candidal activity and promotes oral wound healing; comparable to fluconazole	Qasim & Hashim, 2023
Iris germanica L.	–	–	–	–
Mentha piperita L.	Laboratory	Leaf essential oil	Exhibits antibacterial and anti-biofilm effects (MIC: 3.125–12.5 µL/mL; BIC_{50}: 100 µL/mL)	Karicheri & Antony, 2016
Salvia officinalis L.	Human	Mouthwash extract	Reduces gingival inflammation and oral ulcers; efficacy comparable to saline solution	Fawzi et al., 2017
Viola odorata L.	Laboratory	Hydroalcoholic extract ± ZnO	Enhances antibacterial activity when combined with 500 ppm ZnO; effects comparable to *Salvadora persica* mouthwash	Mehrabkhani et al., 2024
Boswellia sacra	Human	Resin & essential oil	Reduces salivary microbial load and improves oral hygiene; safe and cost-effective	Sabra & Al-Masoudi, 2014
Nigella sativa L.	Animal (Rat)	Oral gel / Drinking solution	Reduces plaque, caries, and gingival inflammation; exhibits preventive anticariogenic effects	Al-Wafi, n.d.
Cinnamomum verum J. Presl	Laboratory	Leaf & bark essential oil	Exhibits potent antimicrobial activity against bacterial biofilms; a safe alternative for infection control	Wijesinghe et al., 2020

Discussion

Dental cysts, as common epithelial lesions surrounding the tooth root, not only cause pain and inflammation but can also disrupt oral function through bone tissue destruction and alterations in tooth structure. Conventional treatments, such as surgery and root canal therapy, are effective yet invasive and costly, while pharmacological approaches primarily provide symptomatic relief and temporary control of inflammation. In this context, the use of medicinal plants as a complementary approach, with their antibacterial, anti-inflammatory, antioxidant, and tissue-regenerative properties, may play a significant role in preventing and mitigating the complications associated with these lesions.

Recent studies indicate that a wide range of medicinal plants exert direct or indirect effects on oral infections and lesions. For instance, turmeric and its derivatives have been shown to reduce symptoms of oral diseases such as lichen planus by inhibiting inflammatory pathways and oxidative stress) OKHOVATFARD et al., 2023).

This anti-inflammatory property may also be beneficial in the context of dental cysts by reducing inflammation and supporting tissue repair.

Conversely, tea tree oil, while possessing antibacterial properties, has been reported in animal models to delay the healing of infected lesions, highlighting the need for careful, evidence-based selection of herbal therapies) KREUGER et al., 2007)

Plants such as fenugreek (*Trigonella foenum-graecum*) and clove (*Syzygium aromaticum*) have demonstrated protective local effects and antibacterial activity, respectively, contributing to pain reduction, inflammation control, and management of oral infections) ANSARI et al., 2022; KAUR & CHANDRUL, 2017 .) Additionally, garlic (*Allium sativum*) and green tea (*Camellia sinensis*) can inhibit biofilm formation and reduce acid production by cariogenic bacteria, thereby preventing secondary infections and the progression of cystic lesions BIN et al., 2020; GOENKA et al., 2013.

Moreover, plants such as licorice (*Glycyrrhiza glabra*), aloe vera (*Aloe vera*), and sage (*Salvia officinalis*) possess broad-spectrum anti-inflammatory, antiviral, and antifungal effects, making them applicable both in the prevention and treatment of oral diseases SIDHU et al., 2020; MANGAIYARKARASI et al., 2015; EIDI & GHAHRAMANI, 2023).

By reducing microbial load and improving inflammatory responses, these herbs may facilitate the healing of tissues surrounding dental cysts.

Interestingly, certain plant-derived compounds, such as thymoquinone (TQ) from black seed (*Nigella sativa*), have been shown in animal models of gingivitis to reduce plaque formation and caries while alleviating gingival inflammation [AL-WAFI, 2014]. These findings suggest that natural compounds may potentially modulate inflammatory and microbial pathways relevant to dental cysts.

Studies on cinnamon (*Cinnamomum* spp.), cardamom (*Amomum subulatum*, *Elettaria cardamomum*), and oregano (*Origanum vulgare*) have demonstrated their antibacterial and anti-biofilm activities against pathogens involved in caries and periodontal disease) YENAKIIEVE, 2020; ANEJA & JOSHI, 2009; IDIR et al., 2022).

Since these pathogens can contribute to infection and exacerbate dental cysts, incorporating these herbs into mouth rinses or topical gels may offer potential clinical benefits.

Overall, the accumulated evidence suggests that native Iranian medicinal plants and other herbal agents with disinfectant, anti-inflammatory, and tissue-regenerative properties hold significant potential not only for oral disease prevention but also as complementary therapies in the management of dental cysts.

However, most current studies are limited to in vitro or animal models; clinical trials in humans are necessary to confirm their efficacy and safety.

Conclusion

Dental cysts, as common epithelial lesions, can lead to inflammation, pain, and damage to surrounding tissues. Given the limitations and side effects of chemical therapies, the use of Iranian medicinal plants as a complementary and safe approach to manage inflammation and infection associated with dental cysts has gained attention. Both traditional medicine texts and modern scientific studies indicate that many of these plants possess anti-inflammatory, antimicrobial, and tissue-regenerative properties, potentially contributing to improved clinical outcomes.

Therefore, integrating traditional knowledge with contemporary scientific research offers a promising avenue for minimally invasive, effective management of dental cysts and provides a foundation for broader clinical studies and the development of targeted herbal therapeutics

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The authors have no competing interests to declare that are relevant to the content of this article.

Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

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REFERENCES

AL-WAFI, H.A. *Benefits of thymoquinone, a Nigella sativa extract in preventing dental caries initiation and improving gingival health* (Master's thesis, Tufts University School of Dental Medicine).2014.

AL-WAFI, H. A. *Benefits of thymoquinone, a Nigella sativa extract in preventing dental caries initiation and improving gingival health* (Master's thesis, Tufts University School of Dental Medicine).

ANEJA, K. R.; JOSHI, R. Antimicrobial activity of Amomum subulatum and Elettaria cardamomum against dental caries causing microorganisms. **Ethnobotanical Leaflets**. 2009;2009(7):3.

ANSARI, M.; HASHEMIPOUR, M.; FARSINEJAD, A.; MOHAMADI, N.; HAJEBRAHIMI, S.; KARIMI-AFSHAR, H.; DERAKHSHANI, A.; SHARIFIFAR, F. Clinical efficacy of a buccoadhesive paste from Fenugreek seeds (Trigonella foenum graecum L.) on recurrent aphthous stomatitis: in-vitro assessment of non-toxic concentration and pilot trial. **Advances in Integrative Medicine**. 2022 Mar 1;9(1):17-21.

ARUMUGAM, B.; SUBRAMANIAM, A.; ALAGARAJ, P. A review on impact of medicinal plants on the treatment of oral and dental diseases. Cardiovascular & Hematological Agents in Medicinal Chemistry (Formerly Current Medicinal Chemistry-Cardiovascular & Hematological Agents). 2020 Nov 1;18(2):79-93.

AZADBAKHT, M.; MOFRADAT, T. E. B. B IRANI [Persian Traditional Medicine Materia Medica]. Tehran: Arjmand Publishing; 2015.

BADEKOVA, K. Z.; ATAZHANOVA, G. A.; KACERGIUS, T.; AKHMETOVA, S. B.; SMAGULOV, M. K. Formulation of an Origanum vulgare based dental gel with antimicrobial activity. **Journal of Taibah University Medical Sciences**. 2021 Oct 1;16(5):712-8.

BANU, A. F.; KAYALVIZHI, M.; ARUMUGAM, B.; GURUNATHAN, U. Texture based classification of dental cysts. In2014 International Conference on Control, Instrumentation, Communication and Computational Technologies (ICCICCT) 2014 Jul 10 (pp. 1248-1253). IEEE.

BASCONES-MARTÍNEZ, A.; MUÑOZ-CORCUERA, M.; BASCONES-ILUNDAIN, C. Side effects of drugs on the oral cavity. **Medicina Clínica** (English Edition). 2015 Feb 2;144(3):126-31.

BIN, C.; AL-DHABI, N. A.; ESMAIL, G. A.; AROKIYARAJ, S.; ARASU, M. V. Potential effect of Allium sativum bulbs for the treatment of biofilm forming clinical pathogens recovered from periodontal and dental caries. **Saudi journal of biological sciences.** 2020 Jun 1;27(6):1428-34.

BROWNE, R. M. The pathogenesis of odontogenic cysts: a review. Journal of Oral Pathology & Medicine. 1975 Jan;4(1):31-46.

BYSTEDT, H.; NORD, C. E. Concentration of phenoximethylpenicillin, clindamycin and tinidazole in dental cysts. **International Journal of Oral Surgery.** 1982 Apr 1;11(2):106-9.

COUNSELL, A. C. "The Pathology of Dental Cysts." (1931): 201-206.

EIDI, M.; GHAHRAMANI, R. Therapeutic Activity of Salvia officinalis L. Hydro-Ethanolic Extract from Aerial Parts on Dental Disease. **Pharmacological Studies in Natural Oral Care**. 2023 Oct 3:703-12.

ELYASI, L.; RAJABI KABOODCHESHMEH, A.; RAYEH SALAMAT, 1: Scientific Principles of Nutrition in Islamic and Traditional Medicine. Tehran: Kelid Amoozesh; 2012.

FARAH, G. J.; FERREIRA, G. Z.; DANIELETTO-ZANNA, C. F.; LUPPI, C. R.; JACOMACCI, W. P. Assessment of Valeriana officinalis l. (Valerian) for conscious sedation of patients during the extraction of impacted mandibular third molars: a randomized, split-mouth, double-blind, crossover study. **Journal of Oral and Maxillofacial Surgery**. 2019 Sep 1;77(9):1796-e1.

FAWZI M, KAMEL Z, FARHAN S. Anti-inflammatory effect of sage (Salvia officinalis) extracts abstracts on oral health. **Iraqi Dental Journal**. 2017 Apr 13;39(1):1-6.

FAYED, M. A. Mentha Piperita L.-A promising dental care herb mainly against cariogenic bacteria. **Universal Journal of Pharmaceutical Research**. 2019 Jul 9.

FICKLING, B. W. "Cysts of the jaw: a long-term survey of types and treatment." (1965): 847-854.

GHAZNAVI, A.; LYSIUK, R. Anti-Toothache Medicinal Plants Used in Ethnobotanical Knowledge. pbp 2024; 6 (2) :103-107. URL: http://pbp.medilam.ac.ir/article-1-234-en.html

GHAZNAVI, A.; PISHVA, S. S.; HEYDARLOU, M. J. Phytotherapy in oral candidiasis: A review of the most important native Iranian medicinal plants effective against Candida albicans, the cause of oral thrush. A review. **Revista Brasileira de Higiene e Sanidade Animal**: RBHSA. 202;18(4):8. http://dx.doi.org/10.5935/1981-2965.20240027

GOENKA, P.; SARAWGI, A.; KARUN, V.; NIGAM, A.G.; DUTTA, S.; MARWAH, N. Camellia sinensis (Tea): Implications and role in preventing dental decay. **Pharmacognosy reviews**. 2013 Jul;7(14):152.

GOLESTANNEJAD, Z.; GAVANJI, S.; MOHAMMADI, E.; MOTAMEDI, A.; BAHRANI, M.; REZAEI, F.; LARKI, B.; MOJIRI, A.; BAKHTARI, A. Comparison of antibacterial activity of essential oils of Foeniculum vulgare Mill, Mentha arvensis and Mentha piperita against Streptococcus mutans. **Future Natural Products**. 2018 Jan 31;4(1):3-13.

GONÇALVES, G. M.; BOTTARO, M.; NILSON, A. C. Effect of the Thymus vulgaris essential oil on the growth of Streptococcus mutans. **Revista de Ciencia's farmacêuticas Basica e Aplicada**. 2011 Sep 1;32(3).

GONÇALVES, G. M.; BOTTARO, M.; NILSON, A. C. Effect of the Thymus vulgaris essential oil on the growth of Streptococcus mutans. **Revista de Ciencia's Farmacêuticas Basica e Aplicada**. 2011 Sep 1;32(3).

HAJISHARIFI, A. Encyclopedia of Herbal Therapy in Iran. Tehran: **DigiKetab**; 2019.
HARRIS, M.; TOLLER, P. The pathogenesis of dental cysts. British medical bulletin. 1975 May 1;31(2):159-63.

HARTONO, T.; SANDRA, F.; HAYUNINGTYAS, R. A.; JAUHARI, S.; SUDIONO, J. Potential anticancer properties of Apium graveolens Linn. against oral cancer. In Quality Improvement in Dental and Medical Knowledge, Research, Skills and Ethics Facing Global Challenges 2024 Feb 22 (p. 407-413). CRC Press.

HOANG, L.; BENEŠ, F.; FENCLOVÁ, M.; KRONUSOVÁ, O.; ŠVARCOVÁ, V.; ŘEHOŘOVÁ, K.; BALDASSARRE ŠVECOVÁ, E.; VOSATKA, M.; HAJŠLOVÁ, J.; KAŠTÁNEK, P.; VIKTOROVA, J. Phytochemical composition and in vitro biological activity of iris spp. (iridaceae): A new source of bioactive constituents for the inhibition of oral bacterial biofilms. **Antibiotics**. 2020 Jul 11;9(7):403.

HOSSEINI-SHIRAZI, M. J. Illustrated Atlas of Medicinal Plants of Azerbaijan and Northwest Iran. Tehran: **DigiKetab**; 2018.

HOSSEINI-SHIRAZI, M. J. Iranian Traditional Medicine, Herbal Medicine; Vol. 1. Tehran: **Taqcheh;** 2019.

IDIR, F.; VAN GINNEKEN, S.; COPPOLA, G.A.; GRENIER, D.; STEENACKERS, H. P.; BENDALI, F. Origanum vulgare ethanolic extracts as a promising source of compounds with antimicrobial, anti-biofilm, and anti-virulence activity against dental plaque bacteria. **Frontiers in Microbiology**. 2022 Nov 2; 13:999839.

JAMALI, S.; KHOSRAVI, S.; SHADMANPOUR, M.; GHARIBPOUR, F.; PAYAHOO, S.; DARVISH, M. Hyalinization and Molecular Pathways Involved in Orthodontic Tooth Movement: A Systematic Review and Meta-Analysis. **Pesquisa Brasileira em Odontopediatria e Clínica Integrada.** 2020 Sep 7;20: e5408.

JAMALI, S.; NASRABADI, N.; PAYAHOO, S.; DARVISH, M.; AHMADIZADEH, H.; KHOSRAVI, S. Management of the maxillary sinus complications after dental implantation: a systematic review and meta-analysis. **Braz. dent. sci**. 2020:1-0.

JEONG, S. J. Effects of Citrus limon extract on oxidative stress-induced nitric oxide generation and bovine teeth bleaching. **Journal of dental hygiene science**. 2021 Jun 30;21(2):96-103.

JEONG, S. J. Effects of Citrus limon extract on oxidative stress-induced nitric oxide generation and bovine teeth bleaching. **Journal of dental hygiene science**. 2021 Jun 30;21(2):96-103.

JOSE, M.; CYRIAC, M. B.; PAI, V.; VARGHESE, I.; SHANTARAM, M. Antimicrobial properties of Cocos nucifera (coconut) husk: An extrapolation to oral health. **Journal of natural science, biology, and medicine**. 2014 Jul;5(2):359.

KAKUYI NEZHAD, M.; GHAZNAVI, A, A. Review of the Most Important Medicinal Plants for Reducing Dental Plaque in Traditional Iranian Medicine. **Plant Biotechnol Persa** 2024; 6 (1) :69-75 doi: 10.61186/pbp.6.1.69

KARICHERI, R.; ANTONY, B. Antibacterial and antibiofilm activities of peppermint (Mentha piperita Linn) and menthol mint (Mentha arvensis Linn) essential oils on Aggregatibacter Actinomycetemcomitans isolated from orodental infections. **Eur. J. Pharm. Med. Res.** 2016 Jul; 3:577-81.

KAUR, D.; CHANDRUL, K. K. Syzygium aromaticum L. (Clove): A vital herbal drug used in periodontal disease. **Indian Journal of Pharmaceutical and Biological Research**. 2017 Jun 30;5(02):45-51.

KHEIRANDISH, M. Islamic Traditional Medicine. Tehran: Maktabkhaneh; 2018.

KISHORE, N.; VERMA, A. K. Coconut palm (Cocos nucifera L.) is a natural gift to humans for dental ministration. **Natural Oral Care in Dental Therapy.** 2020 Jan 30:271-84.

KREUGER, M. R.; TERNES, C. E.; MELLO, L. L.; CRUZ, A. B.; LEITE, S. N.; TAMES, D. R. The influence of the essential oil of Melaleuca alternifolia on the healing of infected dental alveoli: a histological study in rats. Revista Brasileira de Farmacognosia. 2007; 17:349-55.

KREUGER, M.R.; TERNES, C. E.; MELLO, L. L.; CRUZ, A. B.; LEITE, S. N.; TAMES, D. R. The influence of the essential oil of Melaleuca alternifolia on the healing of infected dental alveoli: a histological study in rats. **Revista Brasileira de Farmacognosia**. 2007; 17:349-55.

LI P ZHAO, Y.; YOU, Y.; LIN, L.; YU, D.; ZHAO, W. Current perspectives on paradental cyst: a literature review. **Dentistry Journal.** 2023 Dec 5;11(12):281.

MACHADO, P.V.; ALEXANDRE, C.N.; PORTUGAL, L.D.; DE ALBUQUERQUE, C.X.; QUEIROZ, P.R.; CARDOSO, E.C.; BRASIL, L. Laser therapy and Chamomilla Recutita extract on the treatment of Oral mucositis. **Oral surgery, oral medicine, oral pathology and oral radiology.** 2017 Aug 1;124(2): e106-7.

MACHADO, P. V.; ALEXANDRE, C.N.; PORTUGAL, L. D.; DE ALBUQUERQUE, C. X.; QUEIROZ, P. R.; CARDOSO, E. C.; BRASIL, L. Laser therapy and Chamomilla Recutita extract on the treatment of Oral mucositis. **Oral surgery, oral medicine, oral pathology and oral radiology**. 2017 Aug 1;124(2): e106-7.

MAJEED, S.; KHANDAY, M. Green synthesis of silver nanoparticles using bark extract of Salix alba and its antimicrobial effect against bacteria isolated from dental plaque. **Oriental Journal of Chemistry**. 2016 Jun 1;32(3):1611-8.

MANGAIYARKARASI, S.P.; MANIGANDAN, T.; ELUMALAI, M.; CHOLAN, P.K.; KAUR, R.P. Benefits of Aloe vera in dentistry. **Journal of Pharmacy and Bioallied Sciences**. 2015 Apr 1;7(Suppl 1): S255-9.

MEHRABI, S. M. Iranian Medicine: Therapeutic Prescriptions of Over 80 Iranian Physicians, Hakims, and Scholars. Tehran: DigiKetab; 2020.

MEHRABKHANI, M.; MOVAHHED, T.; BAGHERI, H.; TAJZADEH, P.; HAMEDI, S. S.; GOLI, M, DEHGHANITAFTI S. Antimicrobial effect of Viola odorata extract with or without zinc oxide nanoparticles on Streptococcus mutans. **Journal of Dental Materials & Techniques.** 2024 Sep 1;13(3).

MEHRABKHANI, M.; MOVAHHED, T.; BAGHERI, H.; TAJZADEH, P.; HAMEDI, S. S.; GOLI, M.; DEHGHANITAFTI, S. Antimicrobial effect of Viola odorata extract with or without zinc oxide nanoparticles on Streptococcus mutans. **Journal of Dental Materials & Techniques.** 2024 Sep 1;13(3).

MOSHAVERINIA, M.; NAJARKARIMI, F.; KARIMZADEH, D.; LAVAEE, F.; ZARSHENAS, M. M.; MOTAMEDIFAR, M. Comparison of the Antibacterial Effect of the Essence and Hydroalcoholic Extract of Celery (Apium graveolens) Against Streptococcus mutans in Vitro. Shiraz E-**Medical Journal**. 2025;26(26): e159673.

NASIRI, S.; MAHMOUDVAND, H.; SHAKIBAEI, M.; MOUSAVI, S. A.; SEPAHVAND, A. Antifungal effects of zinc nanoparticles green synthesized by Lavandula angustifolia extract, alone and combined with nystatin against Candida albicans, a major cause of oral candidiasis. **Journal of Herbmed Pharmacology**. 2022 Sep 21;11(4):540-5.

NASIRI, S.; MAHMOUDVAND, H.; SHAKIBAIE, M.; MOUSAVI, S. A.; SEPAHVAND, A. Antifungal effects of zinc nanoparticles green synthesized by Lavandula angustifolia extract, alone and combined with nystatin against Candida albicans, a major cause of oral candidiasis.

Journal of HerbMed Pharmacology. 2022 Dec 10.

NEJATBAKHSH F, SIAHPOOSH MB. Handbook of Iranian Traditional Medicine: Diagnosis and Treatment of Diseases. Tehran: Jahad Daneshgahi; 2016.

NLAL B, NEELAKANTAN A. Evaluation of the effect of Rosa Damascena and Jasminum Sambac on Dental Plaque Regrowth Inhibition. **Journal of Stomatology & Dental Research.** 2023 Aug 17;1(1):1-5.

OKHOVATFARD M, REZAZADEH H. Effect of Curcuma longa and its derivatives, curcumin and curcuminoids on treatment of oral lichen planus: A systematic review of clinical evidence. **Caspian Journal of Environmental Sciences**. 2023 Jul 1:1-2.

PATOCKA J, BHARDWAJ K, KLIMOVA B, NEPOVIMOVA E, WU Q, LANDI M, KUCA K, VALIS M, WU W. Malus domestica: A review on nutritional features, chemical composition, traditional and medicinal value. **Plants**. 2020 Oct 22;9(11):1408.

PURWANINGRUM VW, ELIZABETH LD, PRATIWI CB, NURUL NUGRAHA IY, SETIAWAN KE, MAULINA SZ, RAHMAH SA, SHALLOMITHA AG, FIRJANI PN, SUPANDJI RR, SALSABILA AR. Curcumin in turmeric (Curcuma longa L.) for treatment of oral lichen planus: A narrative review. Indonesian **Journal of Dental Medicine.** 2024 Jan 1;7(1).

QASIM ZS, HASHIM ZA. Activity of Silybum marianum in oral candidiasis of Albino rats. **Journal of Medicinal and Chemical Sciences**. 2023 Jan 1;6(5):976-85.

QASIM, Z. S.; HASHIM, Z. A. Activity of Silybum marianum in oral candidiasis of Albino rats. **Journal of Medicinal and Chemical Sciences**. 2023 Jan 1;6(5):976-85.

SABRA, S. M.; AL-MASOUDI, L. M. The effect of using frankincense (Boswellia sacra) chewing gum on the microbial contents of buccal/oral cavity, taif, KSA**. J Dent Med Sci**. 2014 Jan;13(4):77-82.

SABRA, S. M.; AL-MASOUDI, L. M. The effect of using frankincense (Boswellia sacra) chewing gum on the microbial contents of buccal/oral cavity, Taif, KSA. **J Dent Med Sci.** 2014 Jan;13(4):77-82.

SASI, M.; KUMAR, S.; KUMAR, M.; THAPA, S.; PRAJAPATI, U.; TAK, Y.; CHANGAN, S.; SAURABH, V.; KUMARI, S.; KUMAR, A.; HASAN, M. Garlic (Allium sativum L.) bioactives and their role in alleviating oral pathologies. **Antioxidants**. 2021 Nov 21;10(11):1847.

SHAMS ARDAKANI MKH. KHOLASEH AL-TAJAROB [Summary of Experiences]. Tehran: Jahad Daneshgahi; 2017.

SIDHU, P.; SHANKARGOUDA, S.; RATH, A, RAMAMURTHY, P. H.; FERNANDES, B.; SINGH, A. K. Therapeutic benefits of liquorice in dentistry. **Journal of Ayurveda and integrative medicine**. 2020 Jan 1;11(1):82-8.

SILK, H. Diseases of the mouth. Primary care: Clinics in office practice. 2014 Mar 1;41(1):75-90.

SILK, H. Diseases of the mouth. Primary care: Clinics in office practice. 2014 Mar 1;41(1):75-90.

TABRIZIAN, H. Islamic Medicine. Tehran: Maktabkhaneh; 2019.

VIJAYAKUMARI, B.; ULAGANATHAN, G.; BANUMATHI, A.; BANU, A. F.; KAYALVIZHI, M. Dental cyst diagnosis using texture analysis. In2012 International Conference on Machine Vision and Image Processing (MVIP) 2012 Dec 14 (p. 117-120). IEEE.

WIJESINGHE, G. K. DE OLIVEIRA, T. R.; MAIA, F. C.; DE FEIRIA, S. B.; JOIA, F.; BARBOSA, J. P.; BONI, G. C.; HÖFLING, J. F. Cinnamomum verum (true cinnamon) leaf essential oil as an effective therapeutic alternative against oral and non-oral biofilm infections: A brief review. **Brazilian Journal of Natural Sciences.** 2020 Dec 1;3(3):556-.

YANAKIEV, S. Effects of cinnamon (Cinnamomum spp.) in dentistry: A review. **Molecules**. 2020 Sep 12;25(18):4184.

YAVARI, H.; GHASEMI, N.; DIVBAND, B.; REZAEI, Y.; JABBARI, G.; PAYAHOO, S. The effect of photodynamic therapy and polymer solution containing nanoparticles of g/ZnO on push-out bond strength of the sealers AH-Plus and MTA Fillapex. **Journal of Clinical and Experimental Dentistry**. 2017 Sep 1;9(9): e1109.