Plant Biotechnology Persa
Ilam University of Medical Sciences
Online ISSN: 2676-7414
Homepage: https://pbp.medilam.ac.ir

Herbal Flora of Iran's Against Gum Bleeding: A Review of the Mechanisms of Action of Medicinal Plants

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Article Info

Article type:
Review Article

Article History:
Received: 01 Mar 2026
Revised: 29 Mar 2026
Accepted: 15 Apr 2026
Published Online: 20 Apr 2026

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A B S T R A C T

Objective: Gums play a pivotal role in maintaining oral health by acting as a protective barrier against infection, bleeding, inflammation, and dental erosion. Although proper oral hygiene is the most effective strategy for preserving gum health, various factors can compromise it, leading to disease and bleeding. In addition to oral hygiene practices, certain foods and medicinal plants have been traditionally used to strengthen the gums. This study aims to identify medicinal plants native to Iran that have been traditionally employed to manage gum bleeding.

Methodology: A systematic literature review was conducted using keywords such as "medicinal plants," "gum bleeding," "traditional medicine," and "Iran." Relevant sources were retrieved from databases including Google Scholar, SID, Magiran, PubMed, and Scopus, as well as from books on traditional medicine and specialized websites.

Results: The most frequently cited medicinal plants reported to have beneficial effects on gum bleeding include *Citrus limon (L.) Burm.f., Aloe barbadensis Mill., Punica granatum L., Syzygium aromaticum (L.) Merr. & L.M.Perry, Mentha piperita L., Melaleuca alternifolia (Maiden & Betche) Cheel, Olea europaea L., Sesamum indicum L., Malus domestica Borkh., Daucus carota L., Cucumis sativus L., Citrus paradisi Macfad., Ananas comosus (L.) Merr., Thymus vulgaris L., Zingiber officinale Roscoe, Curcuma longa L., Borago officinalis L., Rosa spp. L., Matricaria chamomilla L., Cocos nucifera L., Vaccinium macrocarpon Aiton, Elaeagnus angustifolia L., Echinacea purpurea (L.) Moench, Glycyrrhiza glabra L., Urtica dioica L., Portulaca oleracea L., Salvia officinalis L.*.

Conclusion: Medicinal plants from Iran's natural environment represent effective and natural options for managing gum bleeding. Through their anti-inflammatory, antioxidant, and antimicrobial properties, these plants can accelerate the healing of gum tissue, enhance immune function, and improve overall oral health, thereby reducing the risk of recurrent infections and inflammation.

Keywords: Oral cavity, gums, bleeding, medicinal plants, traditional therapy, Iran

➢ **How to cite this paper**
Seyed Ashrafi M. Herbal Flora of Iran's Against Gum Bleeding: A Review of the Mechanisms of Action of Medicinal Plants. Plant Biotechnology Persa. 2026; 8(2): 249-256.

DOI: 10.61882
Publisher: Ilam University of Medical Sciences

Introduction

Gum bleeding typically arises due to the accumulation of harmful dental plaque and the millions of bacteria it harbors, which trigger inflammation along or around the gum line (1). The most common cause of gum bleeding is periodontal disease. Recurrent bleeding may indicate more serious underlying health issues, including periodontitis (an advanced form of gum disease), leukemia, vitamin deficiencies, or platelet function disorders (2). While gum bleeding is the most frequent symptom of periodontal disease, it may also signal systemic health problems. Occasionally, bleeding results from using an improper toothbrush or applying excessive pressure during brushing. Other contributing factors include advanced periodontal disease, leukemia, nutritional deficiencies, and impaired platelet function (3).

Symptoms of gum bleeding include bleeding during flossing or brushing, halitosis, gum recession, inflammation and swelling, infection, discoloration of the gums, and, ultimately, tooth loss (4). Diagnosis of gum disease is primarily based on clinical signs such as bleeding, pain, swelling, redness, halitosis, and gum recession. Since not all individuals exhibit every symptom, professional dental evaluation is essential for accurate diagnosis (5). If left untreated, periodontal disease can lead to complications including gum recession, tooth loosening, jawbone loss, and eventual tooth loss (5).

Preventive care is of paramount importance, as preventing gum problems is far more effective than treating them. Recommended preventive measures include proper brushing at least twice daily, daily use of mouthwash, flossing after meals, regular dental check-ups every six months, professional dental cleaning as needed, avoidance of tobacco and alcohol, and maintaining a balanced diet (6). Management of gum bleeding requires diligent oral hygiene, including brushing twice daily with a soft-bristled toothbrush and daily flossing (7). Additional strategies such as antibacterial mouth rinses, abstinence from smoking, and a diet rich in essential vitamins further support gum health, while routine dental visits allow for early detection and management of emerging issues (7).

Traditional medicine has long been employed to manage gum bleeding and promote oral health. Natural remedies, including medicinal plants, herbal distillates, and vitamin-rich foods, can strengthen the gums and reduce inflammation (8). Plants such as *Aloe vera*, turmeric, and green tea exhibit notable anti-inflammatory and antimicrobial properties, which aid in mitigating gum bleeding and preventing infections (9). Moreover, traditional medicine emphasizes lifestyle and dietary modifications such as increased consumption of fruits and vegetables, stress reduction, and complementary therapies as effective adjunctive strategies for preventing and managing gum disease. This holistic approach not only alleviates symptoms but also enhances overall oral health (10).

Medicinal plants, in particular, play a crucial role in managing gum bleeding and improving oral health. Their anti-inflammatory and antimicrobial properties reduce gum inflammation and combat infection (11). These natural remedies can be applied topically or consumed as herbal teas and distillates, offering effective means of controlling gum bleeding and supporting oral well-being. Incorporating such strategies contributes to the maintenance of healthy gums and the prevention of oral diseases (12).

The objective of this article is to review medicinal plants and natural strategies that effectively support gum health and prevent gum bleeding.

Methodology

This review focused on the role of medicinal plants and traditional medicine in the management of gum bleeding. Relevant literature was identified using keywords such as "medicinal plants," "gum bleeding," "traditional medicine," and "Iran." Major academic databases, including Google Scholar, SID, Magiran, PubMed, and Scopus, were systematically searched. Additionally, traditional medicine texts and online resources related to the use of medicinal

plants were reviewed to complement database findings.

Results

Among the most significant medicinal plants reported to be effective in managing gum bleeding are *Citrus limon* (L.) Burm.f., *Aloe barbadensis* Mill., *Punica granatum* L., *Syzygium aromaticum* (L.) Merr. & L.M.Perry, *Mentha × piperita* L., *Melaleuca alternifolia* (Maiden & Betche) Cheel, *Olea europaea* L., *Sesamum indicum* L., *Malus domestica* Borkh., *Daucus carota* L., *Cucumis sativus* L., *Citrus paradisi* Macfad., *Ananas comosus* (L.) Merr., *Thymus vulgaris* L., *Zingiber officinale* Roscoe, *Curcuma longa* L., *Borago officinalis* L., *Rosa* spp. L., *Matricaria chamomilla* L., *Cocos nucifera* L., *Vaccinium macrocarpon* Aiton, *Elaeagnus angustifolia* L., *Echinacea purpurea* (L.) Moench, *Glycyrrhiza glabra* L., *Urtica dioica* L., *Portulaca oleracea* L., *Salvia officinalis* L.. Further details regarding these plants and their specific applications in traditional Iranian medicine are summarized in Table 1 (13–24).

Table 1: Medicinal plants effective in managing gum bleeding based on traditional Iranian medicine sources

Common Name	Scientific Name	Family	Plant Type	Mechanism of Action
Lemon	*Citrus limon* (L.) Burm.f.	Rutaceae	Shrub	Antiseptic, immune-system boosting
Aloe vera	Aloe barbadensis Mill.	Asphodelaceae	Perennial herb	Accelerates tissue repair, anti-inflammatory
Pomegranate	Punica granatum L.	Lythraceae	Shrub	Antioxidant, antiseptic
Clove	*Syzygium aromaticum* (L.) Merr. & L.M.Perry	Myrtaceae	Shrub	Antiseptic, anti-inflammatory
Peppermint	Mentha piperita L.	Lamiaceae	Perennial herb	Antiseptic, cooling effect
Tea tree	*Melaleuca alternifolia* (Maiden & Betche) Cheel	Myrtaceae	Shrub	Antibacterial, antifungal
Olive	Olea europaea L.	Oleaceae	Shrub	Antibacterial, antioxidant
Sesame	Sesamum indicum L.	Pedaliaceae	Annual herb	Anti-inflammatory, cell-protective
Apple	Malus domestica Borkh.	Rosaceae	Tree	Antioxidant, anti-inflammatory
Carrot	Daucus carota L.	Apiaceae	Biennial herb	Supports gum tissue, antioxidant
Cucumber	Cucumis sativus L.	Cucurbitaceae	Annual herb	Anti-inflammatory, cooling effect
Grapefruit	Citrus paradisi Macfad.	Rutaceae	Shrub	Antioxidant, antiseptic
Pineapple	Ananas comosus (L.) Merr.	Bromeliaceae	Perennial herb	Anti-inflammatory, antioxidant
Thyme	Thymus vulgaris L.	Lamiaceae	Perennial herb	Antiseptic, antibacterial
Ginger	Zingiber officinale Roscoe	Zingiberaceae	Perennial herb	Anti-inflammatory, antioxidant

Turmeric	Curcuma longa L.	Zingiberaceae	Perennial herb	Anti-inflammatory, antioxidant
Borage	Borago officinalis L.	Boraginaceae	Annual herb	Anti-inflammatory, soothing
Rose	*Rosa* spp. L.	Rosaceae	Shrub	Antiseptic, anti-inflammatory
Chamomile	Matricaria chamomilla L.	Asteraceae	Annual herb	Anti-inflammatory, antiseptic
Coconut	Cocos nucifera L.	Arecaceae	Tree	Antibacterial, antioxidant
Cranberry	Vaccinium macrocarpon Aiton	Ericaceae	Shrub	Antioxidant, antiseptic
Russian olive	Elaeagnus angustifolia L.	Elaeagnaceae	Shrub	Anti-inflammatory, tissue-strengthening
Echinacea	Echinacea purpurea (L.) Moench	Asteraceae	Perennial herb	Immune-boosting, anti-inflammatory
Licorice	Glycyrrhiza glabra L.	Fabaceae	Perennial herb	Anti-inflammatory, antiseptic
Nettle	Urtica dioica L.	Urticaceae	Perennial herb	Anti-inflammatory, strengthening
Purslane	Portulaca oleracea L.	Portulacaceae	Annual herb	Anti-inflammatory, antioxidant
Sage	Salvia officinalis L.	Lamiaceae	Perennial herb	Antibacterial, anti-inflammatory

Among the plant families represented, Lamiaceae (the mint family) is the most frequently occurring, with four species included in the study. This is followed by Myrtaceae, Rutaceae, Rosaceae, and Zingiberaceae, each represented by two species. Other families, including Asphodelaceae, Lythraceae, Oleaceae, and several others, are represented by a single species.

These results highlight the prominence of the Lamiaceae family, which is widely utilized in herbal medicine due to its notable antiseptic and anti-inflammatory properties. Across the studied plants, anti-inflammatory activity emerged as the most frequently reported mechanism of action, reflecting its central role in managing gum diseases and other inflamed tissues. Antiseptic activity was the second most common mechanism, demonstrating the antibacterial and antifungal properties that help prevent microbial infections. Antioxidant activity also plays a critical role in neutralizing free radicals and protecting cellular health. Certain plant families, particularly Lamiaceae and Zingiberaceae, exhibit multiple therapeutic properties, combining anti-inflammatory, antiseptic, and antioxidant effects.

Analysis of plant types shows that perennial herbs constitute the largest group (37.04%), followed by shrubs (33.33%), emphasizing their ecological and medicinal significance. In comparison, annual herbs and biennial herbs account for 18.52% and 3.70%, respectively, indicating lower prevalence, while trees are the least represented (7.41%), likely reflecting environmental conditions that favor smaller plant forms.

Overall, these findings underscore the diversity of the regional flora and the central role of perennial herbs and shrubs both in maintaining ecological balance and as sources of medicinal compounds effective for promoting gum health and managing inflammatory conditions.

Discussion

The relationship between medicinal plants and the environment is of considerable significance. Being derived from natural and renewable resources, medicinal plants play a vital role in maintaining ecosystem balance. Substituting medicinal plants for synthetic drugs can reduce environmental pollution, as the production and consumption of chemical pharmaceuticals are often associated with ecological degradation and hazardous waste generation. Moreover, the sustainable cultivation and utilization of medicinal plants can help preserve biodiversity and alleviate pressure on non-renewable natural resources (25).

Lemon has long been recognized in traditional medicine for its effectiveness in reducing gum bleeding and inflammation, primarily due to its high content of vitamin C and flavonoids, which enhance blood circulation and strengthen gum tissue (26). Aloe vera, containing aloin and anthraquinones, is traditionally used to treat inflammation and relieve gum bleeding, promoting faster healing of wounds and inflamed tissue (27). Pomegranate, rich in tannins and polyphenols, has historically been employed to strengthen gums and reduce bleeding, contributing to tissue reinforcement and anti-inflammatory effects (28).

Clove, with eugenol and flavonoid content, exhibits analgesic and anti-bleeding properties, effectively reducing inflammation and soothing gum pain (29). Peppermint, containing menthol and flavonoids, alleviates inflammation and gum bleeding while improving oral freshness and overall gum health (30). Tea tree, with terpinene-4-ol and cineole, supports the management of gum infections and bleeding through its antiseptic properties, thereby accelerating tissue healing (31). Olive, rich in polyphenols and tocopherols, contributes to gum strengthening and inflammation reduction (32), while sesame, containing lignans and tocopherols, supports tissue repair and mitigates gum bleeding (33).

Apple, due to its polyphenols and vitamin C, functions as a natural gum-strengthening agent, reducing inflammation and promoting tissue repair (34). Carrot, with beta-carotene and vitamin A, helps reduce inflammation and bleeding while supporting immune function and tissue regeneration (35). Cucumber, rich in silica and vitamin C, alleviates inflammation and aids tissue repair (36). Grapefruit, abundant in flavonoids and vitamin C, reinforces gum tissue and reduces inflammation (37).

Pineapple, containing bromelain and vitamin C, facilitates tissue healing and reduces inflammation (38). Thyme, with thymol and carvacrol, exhibits anti-inflammatory and antiseptic properties, aiding in the management of gum bleeding (39). Ginger, due to gingerols and shogaols, helps control inflammation and promotes repair of damaged gum tissue (40). Turmeric, rich in curcumin, exerts anti-inflammatory and antiseptic effects, accelerating wound healing in the gums (41). Borage, containing linolenic acid and flavonoids, strengthens gum tissue and reduces inflammation (42).

Rose, with tannins and flavonoids, soothes inflamed gums and improves blood flow to the tissue (43). Chamomile,

containing azulene and bisabolol, reduces inflammation and gum bleeding while promoting faster tissue repair (44). Coconut, rich in lauric acid and triglycerides, provides antibacterial and antiseptic benefits, supporting gum health (45). Cranberry, with anthocyanins and flavonoids, reduces infection and inflammation in the gums (46).

Russian olive, containing flavonoids and alkaloids, alleviates inflammation and strengthens gums (47). Echinacea, rich in alkamides and polyphenols, enhances immunity and reduces gum inflammation (48). Licorice, with glycyrrhizin and flavonoids, is traditionally used to relieve gum inflammation and bleeding (49). Nettle, containing flavonoids and tannins, supports tissue repair and prevents gum bleeding (50). Purslane, rich in omega-3 fatty acids and flavonoids, reduces inflammation and strengthens gum tissue (51). Sage, with thymol and carnosol, alleviates gum bleeding and inflammation while supporting tissue regeneration (52).

Overall, medicinal plants not only improve human health but also contribute significantly to environmental preservation. Their increased use in disease management, when combined with sustainable resource management and biodiversity conservation, can simultaneously enhance human well-being and protect the natural environment.

Conclusion

The use of medicinal plants in the treatment of gum infections and inflammation is deeply rooted in traditional medicine and increasingly supported by scientific evidence elucidating their mechanisms of action. Bioactive compounds such as flavonoids, tannins, polyphenols, and vitamins play crucial roles in reducing inflammation, strengthening gum tissue, and improving blood flow. These properties not only promote oral health but also carry substantial environmental significance. The utilization of local plant resources helps conserve biodiversity and reduces reliance on synthetic chemicals, which often have adverse ecological impacts. In countries like Iran, with rich botanical diversity, the thoughtful and sustainable use of medicinal plants can play a vital role in promoting sustainable development and environmental protection. By reducing dependence on synthetic pharmaceuticals, medicinal plants contribute to the preservation of soil, water, and air quality and help prevent ecosystem degradation.

Author Contributions:

All study activities, including study design, data collection, analysis, interpretation, manuscript preparation, and final revision, were carried out exclusively by Mirmehdi Seyed Ashrafi. The author approved the final version of the manuscript.

Conflict of interests

The authors declare there are no conflicts of interest.

Ethical considerations

Authors have carefully monitored ethical issues such as text plagiarism, duplicated publication, misconduct, data fabrication, and falsification.

Funding/Support

None.

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