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Medicinal Plants Used in Traditional Iranian Medicine for the Treatment of Gastric Ulcers: A Review of Animal and Clinical Studies

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Abstract: Gastric ulcers are among the most prevalent gastrointestinal disorders, significantly affecting patients' quality of life. Traditional Iranian Medicine (TIM), with its extensive use of medicinal plants, has historically played a vital role in the management of this condition. This review aims to examine the medicinal plants traditionally employed in Iran for the treatment of gastric ulcers. A comprehensive review of traditional Iranian medical texts and contemporary references was conducted. Sources included classical textbooks on traditional medicine and herbal therapy, as well as modern online databases. Reported traditional effects were subsequently compared with findings from preclinical and clinical studies. Numerous medicinal plants have been documented for their gastroprotective properties in TIM. Notable examples include *Brassica oleracea* L., *Glycyrrhiza glabra* L., *Allium sativum* L., *Curcuma longa* L., *Pistacia lentiscus* L. (resin), *Capsicum annuum* L., *Aloe barbadensis* Mill., *Glycine max* (L.) Merr., *Vitis vinifera* L., *Camellia sinensis* (L.) Kuntze, *Mentha piperita* L., *Matricaria chamomilla* L., *Cicer arietinum* L., *Phaseolus vulgaris* L., *Lens culinaris* Medik., *Olea europaea* L., *Juglans regia* L., *Zingiber officinale* Roscoe, *Rosa damascena* Mill., *Rosmarinus officinalis* L., *Cuminum cyminum* L., *Cichorium intybus* L., *Cinnamomum verum* J. Presl, *Hypericum perforatum* L., *Ziziphora clinopodioides*, *Boswellia serrata* Roxb., *Morus alba* L., *Morus nigra* L., *Musa paradisiaca*, *Trigonella foenum-graecum* L., *Lactuca sativa* L., *Cocos nucifera* L., *Nigella sativa* L., *Chrysanthemum morifolium* Ramat., *Foeniculum vulgare* Mill., *Lavandula angustifolia* Mill., *Taraxacum officinale* Weber, *Salvia officinalis* L., *Scrophularia scorodonia*, *Plantago major* L., *Melissa officinalis*, *Citrus reticulata* Blanco, and *Achillea millefolium* L. Medicinal plants used in traditional Iranian medicine demonstrate considerable potential in the prevention and treatment of gastric ulcers and may serve as valuable adjuncts in their clinical management.

Keywords: Stomach; Gastric ulcer; Traditional Iranian Medicine; Medicinal plants; Natural therapy

Plantas Medicinais Usadas na Medicina Tradicional Iraniana para o Tratamento de Úlceras Gástricas: Uma Revisão de Estudos Pré-Clínicos e Clínicos

Resumo: As úlceras gástricas estão entre os distúrbios gastrointestinais mais prevalentes, afetando significativamente a qualidade de vida dos pacientes. A Medicina Tradicional Iraniana (MTI), com seu extenso uso de plantas medicinais, desempenhou historicamente um papel vital no manejo dessa condição. Esta revisão tem como objetivo examinar as plantas medicinais tradicionalmente empregadas no Irã para o tratamento de úlceras gástricas. Foi realizada uma revisão abrangente de textos médicos tradicionais iranianos e de referências contemporâneas. As fontes incluíram livros clássicos de medicina tradicional e fitoterapia, bem como bases de dados online modernas. Os efeitos tradicionais relatados foram posteriormente comparados com achados de estudos pré-clínicos e clínicos. Numerosas plantas medicinais foram documentadas por suas propriedades gastroprotetoras na MTI. Exemplos notáveis incluem *Brassica oleracea* L., *Glycyrrhiza glabra* L., *Allium sativum* L., *Curcuma longa* L., *Pistacia lentiscus* L. (resina), *Capsicum annuum* L., *Aloe barbadensis* Mill., *Glycine max* (L.) Merr., *Vitis vinifera* L., *Camellia sinensis* (L.) Kuntze, *Mentha piperita* L., *Matricaria chamomilla* L., *Cicer arietinum* L., *Phaseolus vulgaris* L., *Lens culinaris* Medik., *Olea europaea* L., *Juglans regia* L., *Zingiber officinale* Roscoe, *Rosa damascena* Mill., *Rosmarinus officinalis* L., *Cuminum cyminum* L., *Cichorium intybus* L., *Cinnamomum verum* J. Presl, *Hypericum perforatum* L., *Ziziphora clinopodioides*, *Boswellia serrata* Roxb., *Morus alba* L., *Morus nigra* L., *Musa paradisiaca*, *Trigonella foenum-graecum* L., *Lactuca sativa* L., *Cocos nucifera* L., *Nigella sativa* L., *Chrysanthemum morifolium* Ramat., *Foeniculum vulgare* Mill., *Lavandula angustifolia* Mill., *Taraxacum officinale* Weber, *Salvia officinalis* L., *Scrophularia scorodonia*, *Plantago major* L., *Melissa officinalis*, *Citrus reticulata* Blanco e *Achillea millefolium* L. As plantas medicinais utilizadas na Medicina Tradicional Iraniana demonstram considerável potencial na prevenção e no tratamento de úlceras gástricas, podendo servir como adjuvantes valiosos no manejo clínico dessa condição.

Palavras-chave: Estômago; Úlcera gástrica; Medicina Tradicional Iraniana; Plantas medicinais; Terapia natural

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Introduction

Chronic diseases pose a long-term threat to individual health, diminishing both quality of life and organ function. Preventive strategies, including proper nutrition and a healthy lifestyle, play a pivotal role in mitigating complications and reducing healthcare costs (Ghasemi, 2020; SHOJASAADAT et al., 2019; AZARY et al., 2011; MEHRYAR et al., 2024; ALIZADEH et al., 2024; AZAR et al., 2021). Among these, gastrointestinal disorders particularly gastric ulcers represent a significant chronic health concern. Gastric ulcers are characterized by lesions in the stomach's mucosal lining, leading to the formation of sores that can profoundly impair patients' quality of life (MALFERTHEINER et al., 2009). Without appropriate treatment, these ulcers may result in serious complications, including bleeding, perforation, and peritonitis (LANAS & CHAN, 2017).

Clinically, gastric ulcers often present with severe abdominal pain, nausea, dyspepsia, and, in some cases, hematemesis (Ramakrishnan & Salinas, 2007). Major contributing factors include *Helicobacter pylori* infection, excessive use of nonsteroidal anti-inflammatory drugs (NSAIDs), alcohol overconsumption, and psychological stress. Poor dietary habits may

also contribute to disease development (YEOMANS, 2011).

Standard treatment typically involves pharmaceutical interventions such as proton pump inhibitors (PPIs), antacids, and antibiotics, which aim to reduce gastric acid secretion and eradicate *H. pylori* (KAVITT et al., 2019). However, these medications can be associated with side effects, including nausea, headaches, diarrhea, and hepatic dysfunction (VAKIL, 2024). Consequently, there has been growing interest in alternative strategies that offer fewer adverse effects and more sustainable outcomes, notably the use of natural medicinal plants (VAKIL, 2024).

Traditional Iranian Medicine (TIM), with its millennia-long history, provides a rich repository of medicinal plants with documented efficacy in the management of gastric ulcers (BEHZADI & ROOSTA, 2025; DAWOUD, 2025; ABBASI et al., 2024; TAYEBI et al., 2024).

Historically, medicinal plants have served as essential resources for health maintenance and disease management (OLIINYK, 2024; ALTEMEMY, 2024; JAFARI, 2025; CHANGAEE, 2025). Plants such as *Malva sylvestris* (mallow), *Zingiber officinale* (ginger), *Borago officinalis* (borage), and *Aloe barbadensis* (aloe vera) are particularly recognized for their wound-

healing properties, anti-inflammatory effects on the gastric mucosa, and relief of gastrointestinal discomfort (TODD & WALL, 2024). Beyond improving digestive health, these plants may also help reduce *H. pylori*-related infections (KUMAR et al., 2022).

This article aims to provide a scientific review of native Iranian medicinal plants and their effects on gastric ulcer management according to the principles of traditional Iranian medicine. By highlighting these natural, low-side-effect therapeutic options, this review seeks to complement existing pharmacological treatments and expand the repertoire of effective interventions for this prevalent condition.

Methods

This study was conducted as a comprehensive review of traditional Iranian medical sources and contemporary scientific literature regarding medicinal plants with potential efficacy in the treatment of gastric ulcers. Data collection began with an examination of classical and contemporary reference books on traditional medicine and herbal therapy. Subsequently, systematic searches were performed in online databases, including PubMed, Scopus, Web of Science, and Google Scholar, to identify relevant preclinical and clinical studies.

Inclusion Criteria:

- Sources documenting native Iranian medicinal plants cited in traditional texts for the treatment of gastric ulcers or other gastrointestinal disorders.
- Preclinical and clinical studies reporting the effects of these plants on gastric ulcers or gastric tissue.
- Articles and sources published in Persian or English.

Exclusion Criteria:

- Sources addressing non-native plants or applications unrelated to gastrointestinal health.
- Studies without full-text access or extractable data.
- Sources with low scientific quality or insufficient evidence.

Following the collection of relevant sources, the reported traditional effects of the identified plants were compared with findings from preclinical and clinical studies.

This approach enabled the identification of medicinal plants with the highest potential for the prevention and treatment of gastric ulcers.

Results

In traditional Iranian medicine, numerous medicinal plants have been used

for the treatment of gastric ulcers, including *Brassica oleracea* (cabbage), *Glycyrrhiza glabra* (licorice), *Allium sativum* (garlic), *Curcuma longa* (turmeric), *Pistacia lentiscus* (mastic), *Capsicum annuum* (red pepper), *Aloe barbadensis* (aloe vera), *Glycine max* (soy), *Vitis vinifera* (red grape), *Camellia sinensis* (green tea), *Mentha piperita* (peppermint), *Matricaria chamomilla* (chamomile), *Cicer arietinum* (chickpea), *Phaseolus vulgaris* (bean), *Lens culinaris* (lentil), *Olea europaea* (olive), *Juglans regia* (walnut), *Zingiber officinale* (ginger), *Rosa damascena* (rose), *Rosmarinus officinalis* (rosemary), *Cuminum cyminum* (cumin), *Cichorium intybus* (chicory), *Cinnamomum verum* (cinnamon), *Hypericum perforatum*

(St. John's wort), *Ziziphora clinopodioides*, *Boswellia serrata* (frankincense), *Morus alba* (white mulberry), *Morus nigra* (black mulberry), *Musa paradisiaca* (banana), *Trigonella foenum-graecum* (fenugreek), *Lactuca sativa* (lettuce), *Cocos nucifera* (coconut), *Nigella sativa* (black seed), *Chrysanthemum morifolium* (chrysanthemum), *Foeniculum vulgare* (fennel), *Lavandula angustifolia* (lavender), *Taraxacum officinale* (dandelion), *Salvia officinalis* (sage), *Scrophularia scorodonia*, *Plantago major* (plantain), *Melissa officinalis* (lemon balm), *Citrus limon* (lemon), *Citrus reticulata* (mandarin), and *Achillea millefolium* (yarrow).

Table 1 presents the botanical characteristics of these medicinal plants that are effective in the management of gastric ulcers.

Common Name	Scientific Name	Family	Plant Part Used
Cabbage	<i>Brassica Oleracea</i> L.	Brassicaceae	Leaf
Licorice	<i>Glycyrrhiza glabra</i> L.	Fabaceae	Root
Garlic	<i>Allium sativum</i> L.	Amaryllidaceae	Bulb, Seeds
Turmeric	<i>Curcuma longa</i> L.	Zingiberaceae	Rhizome
Mastic	<i>Pistacia lentiscus</i> L. (resin)	Anacardiaceae	Resin
Red chili	<i>Capsicum annuum</i> L.	Solanaceae	Fruit
Aloe vera	<i>Aloe barbadensis</i> Mill.	Asphodelaceae	Leaf
Soybean	<i>Glycine max</i> (L.) Merr.	Fabaceae	Seed
Red grape	<i>Vitis vinifera</i> L.	Vitaceae	Fruit
Green tea	<i>Camellia sinensis</i> (L.) Kuntze	Theaceae	Leaf
Peppermint	<i>Mentha piperita</i> L.	Lamiaceae	Leaf
Chamomile	<i>Matricaria chamomilla</i> L.	Asteraceae	Flower
Chickpea	<i>Cicer arietinum</i> L.	Fabaceae	Seed
Bean	<i>Phaseolus vulgaris</i> L.	Fabaceae	Seed
Lentil	<i>Lens culinaris</i> Medik.	Fabaceae	Seed
Olive	<i>Olea europaea</i> L.	Oleaceae	Fruit
Walnut	<i>Juglans regia</i> L.	Juglandaceae	Seed

Ginger	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Rhizome
Damask rose	<i>Rosa damascena</i> Mill.	Rosaceae	Flower
Rosemary	<i>Rosmarinus officinalis</i> L.	Lamiaceae	Leaf
Cumin	<i>Cuminum cyminum</i> L.	Apiaceae	Seed
Chicory	<i>Cichorium intybus</i> L.	Asteraceae	Leaf, Root
Cinnamon	<i>Cinnamomum verum</i> J. Presl	Lauraceae	Bark
St. John's wort	<i>Hypericum perforatum</i> L.	Hypericaceae	Leaf, Flower
Ziziphora	<i>Ziziphora clinopodioides</i>	Lamiaceae	Leaf, Stem
Frankincense	<i>Boswellia serrata</i> Roxb.	Burseraceae	Resin
White mulberry	<i>Morus alba</i> L.	Moraceae	Leaf, Fruit
Black mulberry	<i>Morus nigra</i> L.	Moraceae	Leaf, Fruit
Banana	<i>Musa paradisiaca</i>	Musaceae	Fruit
Fenugreek	<i>Trigonella foenum-graecum</i> L.	Fabaceae	Seed, Leaf
Lettuce	<i>Lactuca sativa</i> L.	Asteraceae	Leaf
Coconut	<i>Cocos nucifera</i> L.	Arecaceae	Fruit, Juice
Black seed	<i>Nigella sativa</i> L.	Ranunculaceae	Seed
Chrysanthemum	<i>Chrysanthemum morifolium</i> Ramat.	Asteraceae	Flower
Fennel	<i>Foeniculum vulgare</i> Mill.	Apiaceae	Seed, Leaf
Lavender	<i>Lavandula angustifolia</i> Mill.	Lamiaceae	Flower, Leaf
Dandelion	<i>Taraxacum officinale</i> Weber	Asteraceae	Leaf, Root
Sage	<i>Salvia officinalis</i> L.	Lamiaceae	Leaf
Coral tree / Scrophularia	<i>Scrophularia scorodonia</i>	Scrophulariaceae	Leaf, Root
Plantain	<i>Plantago major</i> L.	Plantaginaceae	Leaf, Seed
Lemon balm	<i>Melissa officinalis</i>	Lamiaceae	Leaf
Mandarin / Tangerine	<i>Citrus reticulata</i> Blanco	Rutaceae	Fruit
Yarrow	<i>Achillea millefolium</i> L.	Asteraceae	Leaf, Flower

Table 2 summarizes recent preclinical and clinical studies that validate the traditional

gastroprotective and ulcer-healing properties of these medicinal plants.

Table 2: Animal and clinical studies confirming the gastroprotective and ulcer-healing effects of traditional medicinal plants in recent research

Plant / Compound	Study Model	Key Findings
BRFE	Animal	Antibacterial, anti-inflammatory, gastric mucosal protection
<i>Glycyrrhiza glabra</i>	Animal	Reduced ulcer index, enhanced mucosal defense
Black seed (<i>Nigella sativa</i>)	Animal	Ulcer protection, strong effect even after cooking
Fresh garlic and onion	Animal	Reduced ulcer index, inhibited acid secretion
<i>Curcuma longa</i> (Turmeric)	Human / Clinical	Ulcer healing, pain reduction, no side effects
<i>Pistacia lentiscus</i>	Animal	Reduced inflammation and tissue damage, preventive and therapeutic effects
<i>Aloe barbadensis</i>	Animal	Reduced ulcer index, acidity, and lipid peroxidation; mucosal protection

<i>Camellia sinensis</i>	Animal	Reduced ulcer area, increased mucus, anti-inflammatory and antioxidant effects
<i>Matricaria chamomilla</i>	Animal	Prevented ulcer formation, non-toxic
<i>Juglans regia</i>	Animal	Reduced IL-6, TNF- α , CRP, COX-2; ulcer protection
Traditional VARD formula	Animal	Reduced ulcer index, increased tissue antioxidant activity
<i>Cuminum cyminum</i> , <i>Carum carvi</i> , <i>Thymus vulgaris</i>	Animal	Anti-gastric ulcer and anti-colitis effects; improved oxidative markers
<i>Cinnamomum tamala</i>	Animal	Reduced ulcer index, decreased acid, increased mucus and pH
<i>Hypericum perforatum</i>	Animal	Ulcer protection; more effective than omeprazole in prevention
<i>Ziziphora clinopodioides</i>	Animal	Inhibited acid secretion, effect mediated via vagus nerve
<i>Morus nigra</i>	Animal	Ulcer protection, maintained mucosal defense, effective in pudding model
Fenugreek seeds (FSAE)	Animal	Reduced oxidative stress, preserved antioxidant enzyme activity
<i>Nigella sativa</i>	Animal	Increased mucus, reduced oxidative stress, mucosal protection
<i>Foeniculum vulgare</i>	Animal	Ulcer protection, analgesic and antioxidant effects
Lavender silver nanoparticles	Animal	Reduced ulcer index and acidity, increased antioxidants and NO
<i>Plantago major</i>	Animal	Ulcer protection, highest effect at 200 mg/kg
<i>Moringa oleifera</i>	Animal	Reduced lipid peroxidation, increased SOD and GPx
JY formula	Animal	Improved mucosal structure, increased mucus, reduced edema and inflammation
<i>Achillea millefolium</i>	Animal	Reduced inflammation and apoptosis, increased antioxidant activity and PGE2/NO

Discussion

Recent studies have demonstrated that BRFE extract, analyzed for the first time using LC-ESI-MS/MS, contains 57 bioactive compounds. These compounds play a crucial role in increasing bacterial membrane permeability, exerting antibacterial effects, modulating immune responses, and reducing inflammation. Findings by Alotaibi et al. (2021) indicate that BRFE provides

significant gastro-duodenal protection by reducing inflammation, enhancing antioxidant activity, and preserving gastric mucosal tissue.

These results suggest a multifaceted mechanism of action for BRFE, involving direct antibacterial effects, immune modulation, and mucosal protection, three key factors in the prevention and treatment of gastric ulcers.

Toxicity studies of *Glycyrrhiza glabra* have shown that oral administration up to 1600 mg/kg in mice is non-toxic, with an LD50 of 2950 mg/kg. This extract reduced ulcer indices in various gastric ulcer models, with a dose of 200 mg/kg outperforming omeprazole, likely via enhancement of gastric mucosal defense mechanisms (JALILZADEH-AMIN et al., 2015). These findings underscore the importance of natural compounds that combine low toxicity with high therapeutic efficacy in gastric ulcer management.

Other studies have demonstrated that certain foods and medicinal plants, such as black seed, fresh garlic, and onion, provide notable gastroprotective effects by inhibiting histamine-stimulated acid secretion and reducing ulcer indices. While the protective effects of garlic and onion diminish after cooking, black seed retains its efficacy even after thermal processing, highlighting the stability of some bioactive compounds and emphasizing the importance of species selection and preparation methods in clinical applications (AMIR et al., 2011).

Clinical studies have further confirmed the beneficial effects of herbal supplements on gastric ulcers. For example, turmeric capsules administered to patients with peptic ulcers resulted in gradual ulcer

healing, with over 75% of patient's ulcer-free after 12 weeks, and without any hematologic, hepatic, or renal side effects (PRUCKSUNAND et al., 2001). These findings highlight the clinical relevance of safe and effective medicinal plants in ulcer management.

Animal studies have also demonstrated the gastroprotective effects of *Pistacia lentiscus* oil, *Aloe barbadensis* extract, green tea extract, *Matricaria chamomilla*, *Juglans regia*, and the traditional Iranian VARD formula. These effects are primarily mediated through reductions in inflammation, enhancement of antioxidant responses, increased gastric mucus secretion, and preservation of mucosal integrity (BOUTEMINE et al., 2018; ZHU et al., 2020; BORATO et al., 2016; KARBALAEI et al., 2009; USLU & HAMIT, 2022; MEMARIANI et al., 2017).

These studies emphasize that the protective mechanisms of medicinal plants are often multifactorial, encompassing anti-inflammatory, antioxidant, and tissue-supportive activities.

Additionally, essential oils from plants such as *Cuminum cyminum*, *Carum carvi*, and *Thymus vulgaris*, as well as aqueous and hydroalcoholic extracts of various herbs, demonstrated protective

effects by modulating oxidative and inflammatory markers and improving gastric and intestinal enzyme function (HAMED et al., 2022).

These findings suggest their potential use as dietary supplements or alternative therapies for managing gastric ulcers and colitis.

Furthermore, silver nanoparticles synthesized using *Lavandula angustifolia* exhibited significant gastroprotective activity, reducing ulcer indices and enhancing tissue antioxidant and nitric oxide levels. This highlights the potential of nanotechnology to improve the bioavailability and efficacy of natural compounds in ulcer treatment (MORADI et al., 2025).

Overall, the reviewed studies indicate that plant-derived compounds and natural extracts exert strong gastroprotective effects through multiple pathways, including inhibition of inflammation, reduction of oxidative stress, promotion of mucosal repair, and modulation of enzymatic activity.

The integration of preclinical and clinical evidence suggests that many of these compounds can be safely used as complementary or alternative therapies in gastric ulcer management.

These findings provide a foundation for the development of novel herbal formulations, combination extracts, and optimized dosing strategies.

Conclusion

Medicinal plants used in traditional Iranian medicine exhibit significant potential in the prevention and treatment of gastric ulcers through diverse mechanisms, including antioxidant, anti-inflammatory, antibacterial, and mucosal repair activities.

Preclinical and clinical evidence demonstrates that herbal extracts and essential oils can reduce ulcer indices, inhibit inflammation and oxidative stress, and provide effective mucosal protection. Certain plants, including turmeric, licorice, *Aloe vera*, green tea, and black seed, have shown strong gastroprotective effects with high safety profiles in both animal models and humans.

Traditional combination formulas further enhance tissue antioxidant activity and reduce mucosal damage, providing additional supportive evidence. The use of these medicinal plants can serve as an effective complement to conventional pharmacological therapies, potentially reducing side effects and improving ulcer management.

Further research, particularly large-scale clinical trials, is required to determine optimal dosages, treatment durations, and precise mechanisms of action.

This review underscores the importance of integrating traditional knowledge with modern scientific evidence to develop safe and effective natural therapies for gastric ulcers.

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