

Medicinal Plants Traditionally Used for Abdominal Pain in Ilam City, Western Iran: An Ethnobotanical Perspective

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ABSTRACT

Iran's diverse geography supports a wide array of ethnic groups, each possessing unique cultural traditions and practices in the medicinal use of plants for disease prevention, management, and treatment. This rich ethnobotanical heritage underscores the urgency of systematic documentation, particularly as traditional knowledge risks being lost with the passing of experienced healers. In this systematic ethnobotanical study conducted in Ilam City, located in western Iran, medicinal plants traditionally used for the treatment of abdominal pain were identified and recorded. Data were collected through structured ethnobotanical questionnaires administered to local herbal medicine practitioners. In addition, a comprehensive list of medicinal plants available in Ilam was obtained from the Deputy of Food and Drug Administration, and direct visits to local herbalists ensured the reliability and accuracy of the data collected. The questionnaire gathered information on participants' demographics, plant species names, specific parts used, preparation methods, and perceived therapeutic effects in treating abdominal pain. A total of 25 medicinal plant species were identified, including *Oliveria decumbens* Vent., *Avena sativa*, *Ziziphora capitata*, *Rosa damascena*, *Thymbra spicata* L., *Rosa canina*, *Verbascum alceoides*, *Foeniculum vulgare*, *Carum carvi*, *Satureja khuzistanica* Jamzad, *Origanum vulgare*, *Achillea biebersteinii*, *Artemisia sieberi*, *Mentha spicata*, *Glycyrrhiza glabra*, *Citrus aurantium*, *Hibiscus trionum*, *Alhagi persarum*, *Centaurea virgata*, *Cerasus microcarpa*, *Quercus brantii*, and *Alyssum homolocarpum*. Among these, the most frequently used species for treating stomach pain were *Ziziphora capitata*, *Thymbra spicata* L., *Foeniculum vulgare*, *Satureja khuzistanica* Jamzad, *Origanum vulgare*, and *Achillea biebersteinii*. These species demonstrated a Usage Report Index (UR) of 9, a Relative Frequency of Citation (RFC) of 0.35, and a Percentage Frequency of Use (PFU) of 34.6%. The Lamiaceae family was the most commonly cited for its therapeutic effects on abdominal pain. Aerial parts were the most frequently used plant parts (48%), while infusion (57%) emerged as the predominant preparation method. The abundance of medicinal plants in Ilam City represents a valuable resource for future pharmaceutical and phytochemical research aimed at developing herbal treatments for digestive ailments. Given the strong local reliance on traditional medicine, scientific validation of these plants' therapeutic efficacy is essential. Future research should prioritize pharmacological investigations, formulation standardization, and the integration of validated remedies into evidence-based medical practice. Preserving and scientifically verifying this ethnobotanical knowledge could pave the way for safer, more accessible, and naturally derived treatments for gastrointestinal disorders.

Keywords: Ethnobotany, Medicinal plants, Traditional medicine, Stomachache, Ilam, Treatment

Mathematics Subject Classification: 62J12, 62G99

Journal of Economic Literature (JEL) Classification : Q12, D24

1. INTRODUCTION

The gastrointestinal (GI) tract is a complex system that functions as a continuous tube extending from the mouth to the anus ¹. A key component of this system is the intestinal microbiota, comprising a diverse array of microorganisms, including bacteria, archaea, microbial eukaryotes (such as fungi and protozoa), and viruses. Among these, bacteria represent the most abundant and diverse group, playing essential roles in metabolic regulation and immune function ².

Disorders affecting the GI tract—particularly abdominal pain—are highly prevalent and affect individuals across all age groups ³. Abdominal pain can arise from various etiologies and is generally classified into two major types: acute and chronic. Acute abdominal pain typically presents suddenly and with severity, often resulting from infections, obstructions, or inflammation. In contrast, chronic abdominal pain develops gradually and is commonly associated with long-term conditions such as inflammatory bowel disease (IBD) or irritable bowel syndrome (IBS) ^{4,5}.

Certain populations, including children, adolescents, and adults with a family history of digestive disorders or prior exposure to bacterial or viral infections, are at greater risk of experiencing abdominal pain. In particular, gastroenteritis frequently caused by *Shigella* spp.—along with other pathogens such as *Salmonella* spp., certain strains of *Escherichia coli*, *Campylobacter*, and *Vibrio* spp., significantly contributes to the prevalence of diarrhea in many regions ⁶⁻⁸. The primary causes of abdominal pain include gastrointestinal infections, digestive disturbances (e.g., constipation and diarrhea), chronic inflammatory conditions such as Crohn's disease and ulcerative colitis, as well as non-gastrointestinal pathologies like appendicitis and renal disorders ⁹.

The duration of recovery from abdominal pain largely depends on its underlying cause. Patients with IBD, for example, frequently report persistent abdominal pain, which can substantially impair their quality of life. Common treatment strategies include the use of anti-inflammatory agents, antibiotics, and dietary modifications. However, the prolonged use of analgesics—particularly nonsteroidal anti-inflammatory drugs (NSAIDs) and opioids—has been associated with adverse effects, including hepatotoxicity, nephrotoxicity, decreased gastrointestinal motility, and exacerbation of IBD symptoms.

Historically, humans have relied on medicinal plants for the treatment of a wide range of ailments, and this practice continues to be integral in many parts of the world, especially in developing countries ¹⁰. It is estimated that 66–85% of the global population depends on plant-based therapies to meet their healthcare needs. Medicinal plants serve not only as a foundation for the development of new pharmaceutical agents but also as an important resource for enhancing public health across diverse cultures. With the rising threat of antibiotic resistance, the exploration of plant-derived antimicrobial compounds is increasingly viewed as a practical and cost-effective alternative. Herbal medicines are generally more accessible and sustainable, especially considering that an estimated 75–80% of the world's population relies on traditional medical systems ^{11,12}.

Ethnobotany—the study of the interactions between people and plants within cultural, social, and economic frameworks—focuses on how various communities utilize plants for medicinal purposes and preserves indigenous knowledge regarding their use ¹³. The global significance of medicinal plants lies in their applications across both traditional and modern healthcare systems. Ethnobotanical research is

thus a critical tool for documenting traditional knowledge, promoting biodiversity conservation, and identifying plant species with therapeutic potential ¹⁴.

In Iran, ethnobotanical studies have played a pivotal role in preserving and disseminating knowledge about both medicinal and edible plants. Due to its vast climatic and biological diversity, Iran represents a unique and valuable setting for ethnobotanical research. The use of medicinal plants in Iran dates back approximately 6,000 years, with traditional knowledge being passed down orally through generations. Recognizing the long-standing therapeutic potential of local flora, modern pharmaceutical industries have increasingly integrated various plant species into the development of medicinal formulations and dietary supplements ^{15,16}.

Traditional medicine serves as an indispensable reservoir of knowledge concerning the medicinal properties of plants and offers complementary insights for advancing modern therapeutic approaches. Exploring the potential of medicinal plants in treating gastrointestinal disorders may lead to the development of more effective, accessible, and culturally appropriate treatments, ultimately improving patient outcomes and quality of life.

2. MATERIALS AND METHODS

Material and method: sectional ethnobotanical study in 2024 in Ilam city. Ilam city is the most populous and one of the cities in Ilam province in Iran. According to the 2015 census, the population of Ilam city was 222,770 people. The main language of these people is Kurdish. Ilam city borders Sirvan city to the north, Chavar city to the northwest, Mehran city to the southwest, Malekshahi city to the south, and Badre city. The city borders Kermanshah, Lorestan, and Khuzestan provinces and Iraq.



Figure 1: Map of Ilam city

Selection of villages and experts for the collection of traditional medicine information:

on plants effective in stomach pain was done by ethnobotanical questionnaire. The interviewer personally conducted an interview by visiting each herbal pharmacy in Ilam city. The complete list of medicinal drugs in Ilam city was prepared by the Deputy of Food and Drug Administration of Ilam. The questionnaire included personal information and the names of native plants, the organs used, the method of use and the effect of commercial treatment. Plant identification First, herbarium specimens were taken for the important plants introduced in the questionnaires. Then they were collected based on traditional information. A standardized questionnaire was designed and used to collect data on traditional herbal remedies for the treatment of stomach ache. Data collection included face-to-face visits to local herbal shops in Abdanan, where the researcher interviewed knowledgeable herbalists and physicians in the field to collect ethnobotanical information. The questionnaire included personal details, names of indigenous plants, plant parts used, methods of use, and effects of traditional remedies on stomach ache. To identify and confirm the medicinal plants, the primary traditional data were checked against the confirmed plant names from the ILAM Flora and Plant List database by Dr. Valiollah Mozaffarian.

Plant species identification

was carried out at the Center for Biological and Medicinal Plants Research, ILAM University of Medical Sciences, Iran. The confirmed plant names were corrected using an online database. And were identified and confirmed according to the morphological keys of the plant flora of Dr. Valiollah Mozaffarian.

Data processing and statistical analysis

Quantitative methods used in ethnobotanical research aid in identifying essential medicinal plant species for pharmacological investigations during clinical trials. The Utilization Report (UR) index was employed to analyze the gathered data, in accordance with the study's aims. Plant identification took place at the Center for Biological and Medicinal Plants Research at ILAM University of Medical Sciences in Iran. The confirmed botanical names were validated through an online database and cross-referenced with the morphological keys presented in Dr. Valiollah Mozaffarian's plant flora reference. For data analysis and statistical assessment, the Relative Frequency of Citation (RFC) index was computed to evaluate the importance of different species in local medicinal practices. The RFC was calculated using the following formula: $RFC = FC/N$

In this equation, FC signifies the number of informants who recognized the use of a particular plant, while N represents the total number of participants surveyed. The Relative Frequency of Citation (RFC) can vary from zero, which indicates that no local informants mentioned the plant, to one, which signifies that all knowledgeable individuals acknowledged its medicinal use. After data collection, several qualitative metrics were employed for analysis. Metrics such as the Informant Consensus Factor (ICF), Relative Frequency of Citation (RFC), and Utilization Report (UR) were derived from the questionnaires to facilitate statistical evaluations. The analysis was conducted using SPSS software. In this study, key

indicators including UR, RFC, and ICF were employed to assess the relevance of plant species in local medicinal practices. The UR represents the total number of usage reports for each plant as provided by informants. The RFC is calculated to determine the relative significance of plant species in traditional medicine (Razmjoue et al., 2024) using the specified formula: $RFC = FC/N$

where FC denotes the number of individuals who reported using a specific plant, and N is the overall number of respondents. The RFC can vary from 0 (when a plant is unfamiliar) to 1 (when every informant recognizes it as a remedy). Additionally, the ICF serves to quantify the degree of consensus among informants regarding the use of a particular medicinal plant, calculated as follows: $ICF = (n - n') / (n - 1)$

In this context, n represents the total number of herbal references, while n' indicates the number of herbs that have been mentioned at least once. These quantitative approaches enable researchers to identify key plant species that warrant further investigation in clinical studies. Information regarding traditional medicinal plants used for prostate health was collected using structured questionnaires that comply with the guidelines established by the Journal of Ethnopharmacology. In addition to interviewing herbalists, data was also gathered from other local specialists involved in herbal medicine practices.

Ethical considerations

The present study was approved by Ilam University of Medical Sciences under the Ethics Code No. Ir.medilam.rec. 1401.069, which seems to indicate that these anonymous surveys, with a question that does not contain the identity of the respondent, do not affect traditional healers. Approvals were also obtained from the heads of the relevant departments of the CACH healthcare structure after reviewing the question and being aware of the study objectives. Written consent was obtained from the interviewees participating in the study and their personal information was kept confidential.

Limitations and Mitigation

Strategies One of the potential challenges in conducting this study was the lack of cooperation from some herbalists. To address this issue, at least 25 standardized questionnaires were distributed, ensuring that reliable and valid data could be collected and analyzed. This helped to reduce potential biases and increase the robustness of the study findings.

3. Result

Demographic characteristics including gender, education level, age group, age, and language are recorded in Table 1.

After analyzing the data obtained from the questionnaires, the botanical information of medicinal plantseffective for Abdominal pain in Ilam is specified in Table 2.

Table 1: Demographic Characteristics of Participants

Characteristics	Gender		Abundance	Relative abundance
		Male	13	52%
		female	12	48%
	Education	Diploma	5	20%
		Associate Degree	2	8%
		Bachelor's degree	15	60%
		Master's degree	3	12%
	Age group	20-40	17	68%
		41-60	8	32%
	Age	The least	26	
		The most	55	
	Language	Kurdish	15	60%
		Lor	5	20%
		Persian	5	20%

Table 2: Medicinal Plants Traditionally Used for Abdominal Pain

Local Name	Scientific Name	Plant Family	Plant Part Used	Traditional Usage Method	Traditional Therapeutic Effect
Lalleh Kohestan	<i>Oliveria decumbens</i> Vent.	Apiaceae	Flowering tops	Decoction	Abdominal pain
Oats	<i>Avena sativa</i>	Graminaceae	Aerial parts	Decoction	Abdominal pain
Kakooti-e-Sarsan	<i>Ziziphora capitata</i>	Lamiaceae	Aerial parts	Decoction	Abdominal pain
Damask Rose	<i>Rosa damascena</i>	Rosaceae	Flowers	Infusion	Abdominal pain
Avishanak	<i>Thymbra spicata</i> L.	Lamiaceae	Aerial parts	Infusion	Abdominal pain
Wild Rose	<i>Rosa canina</i> L.	Rosaceae	Flowers	Infusion	Abdominal pain
Mullein-like Flower	<i>Verbascum alceoides</i>	Scrophulariaceae	Flowers	Infusion	Abdominal pain
Fennel	<i>Foeniculum vulgare</i>	Apiaceae	Seeds	Infusion	Abdominal pain
Caraway	<i>Carum carvi</i>	Apiaceae	Seeds	Infusion	Abdominal pain
Khuzestani Savory	<i>Satureja khuzistanica</i> Jamzad	Lamiaceae	Aerial parts	Infusion	Abdominal pain
Wild Marjoram	<i>Origanum vulgare</i>	Lamiaceae	Aerial parts	Infusion	Abdominal pain
Yarrow	<i>Achillea biebersteinii</i>	Asteraceae	Aerial parts	Decoction	Abdominal pain
Artemisia	<i>Artemisia sieberi</i> Besser	Asteraceae	Aerial parts	Decoction	Abdominal pain

Field Mint	<i>Mentha spicata</i>	Lamiaceae	Leaves	Infusion	Abdominal pain
Licorice	<i>Glycyrrhiza glabra</i>	Fabaceae	Aerial parts	Decoction	Abdominal pain
Bitter Orange Blossom	<i>Citrus aurantium</i>	Rutaceae	Flowers	Infusion	Abdominal pain
Three-colored Mallow	<i>Hibiscus trionum</i>	Malvaceae	Flowers	Decoction	Abdominal pain
Persian Camelthorn	<i>Alhagi persarum</i>	Fabaceae	Aerial parts	Infusion	Abdominal pain
Bushy Cornflower	<i>Centaurea virgata</i>	Asteraceae	Aerial parts	Infusion	Abdominal pain
Small-fruited Sour Cherry	<i>Cerasus microcarpa</i>	Rosaceae	Fruit	Fresh consumption	Abdominal pain
Oak	<i>Quercus brantii</i>	Fagaceae	Fruit	Fresh consumption / Decoction	Abdominal pain
Qodoumeh	<i>Alyssum homolocarpum</i>	Brassicaceae	Aerial parts	Infusion	Abdominal pain

The abundance of plant families, percentage of organs used, and traditional method of use are given in Figure 2-4.

Based on the results obtained, it is clear that the lamiaceae family are the most widely used plant family (Figure 2).

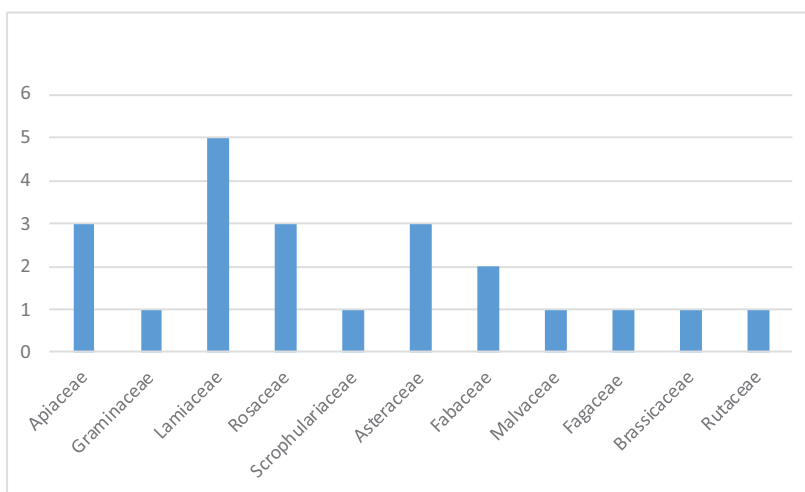


Figure 2: Distribution of plant families affecting abdominal pain in Ilam.

The aerial parts of the plants were the most frequently utilized, accounting for 48% of all reported uses (Figure 3). Infusion was identified as the most common traditional preparation method, used in 57% of

cases (Figure 4). Quantitative indices applied in this ethnobotanical study helped determine the most significant medicinal plant species employed for gastrointestinal relief. Table 3 presents the Percentage Frequency of Use (PFU), Use Report (UR), and Relative Frequency of Citation (RFC) for the identified plants. According to the data in Table 3, *Ziziphora capitata*, *Thymbra spicata* L., *Foeniculum vulgare*, *Satureja khuzistanica* Jamzad, *Origanum vulgare*, and *Achillea biebersteinii* emerged as the most commonly used species for treating stomach pain, with a UR of 9, an RFC of 0.35, and a PFU of 34.6%.

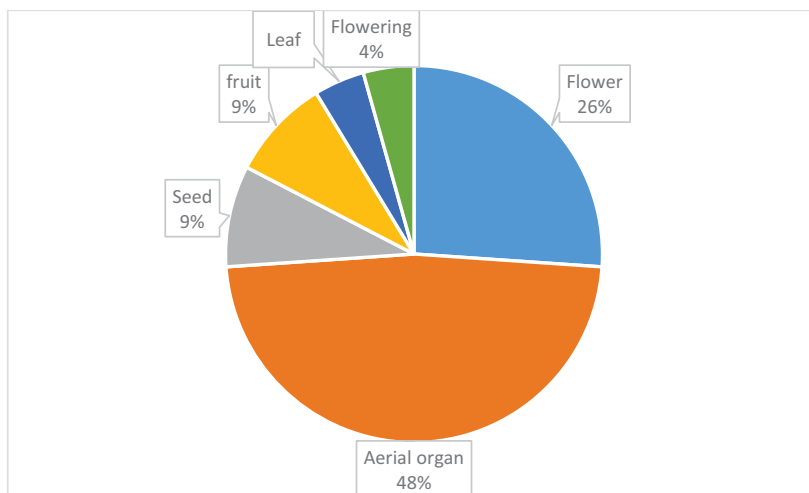


Figure 3: Percentage of use of plant organs effective on abdominal pain in Ilam

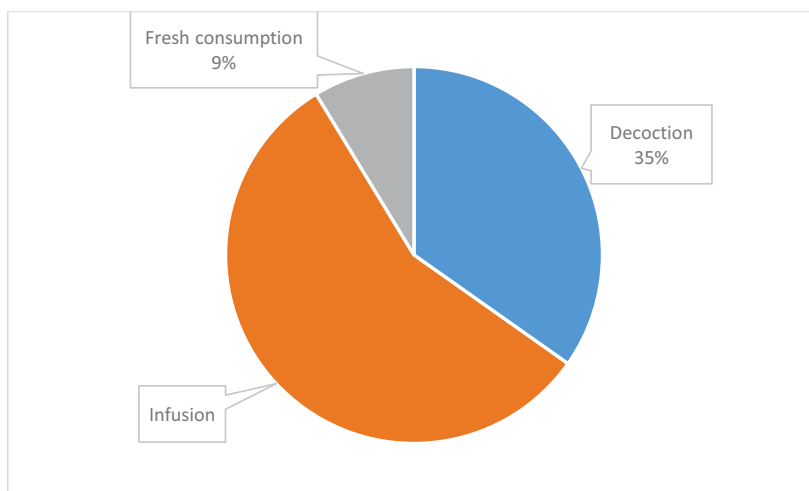


Figure 4: The percentage of the method of use of plant parts effective on abdominal pain in Ilam

4. Discussion

Ilam Province, located on the western slopes of the Zagros Mountains, is characterized by a diverse climate and a wealth of natural and historical attractions, earning it the title “Bride of the Zagros.” Historical evidence indicates that the region was part of the ancient Elamite civilization, with numerous archaeological remains and inscriptions bearing witness to its rich cultural heritage. The province comprises ten cities: Ilam, Dehloran, Abdanan, Ivan, Badreh, Dareh Shahr, Chardavel, Malekshahi, Mehran, and Sirvan. The city of Ilam, in particular, stands out for its forested, mountainous terrain and is home to over 400 species of medicinal plants. The present study aims to conduct a descriptive-analytical and ethnobotanical investigation of medicinal plants traditionally used in Ilam City for the treatment of heart-related and gastrointestinal conditions. *Oliveria decumbens* Vent. is a highly regarded herb in traditional Iranian medicine, used for treating a variety of gastrointestinal issues, including abdominal discomfort, indigestion, and diarrhea ¹⁷. *Avena sativa* L. (oats), a member of the Poaceae family, is known for its cardiovascular benefits and has shown promise in alleviating diarrhea and dysentery ¹⁸. Species of the genus *Ziziphora*, within the Lamiaceae family, are aromatic and traditionally employed as sedatives, stomach tonics, aphrodisiacs, and carminatives ¹⁹. Recent studies have demonstrated the therapeutic potential of *Rosa damascena* in managing primary dysmenorrhea (PD) and premenstrual syndrome (PMS), targeting both menstrual pain and secondary symptoms such as headache, fatigue, anxiety, and bloating ²⁰. The Lamiaceae family, known for its diverse medicinal species, is widely used for its antimicrobial and antiseptic properties. In this regard, *Thymbra spicata* L. has shown potential as a nutraceutical, likely due to its effects on digestive enzymes, biological transport mechanisms, and gut microbiota ²¹. *Rosa canina* is utilized globally for culinary, beverage, and medicinal applications. It is rich in bioactive compounds such as flavonols, carotenoids, tannins, and organic acids, making it effective in addressing a range of conditions, including kidney disorders, viral infections, anxiety, osteoarthritis, hypertension, and diabetes ²². Neuroblastoma (NB), the most common extracranial solid tumor in children, is often metastatic and difficult to treat. Studies on the methanolic extract of *Verbascum gypsicola* (VGME), rich in flavonoids, indicate that it can induce apoptosis in NB cells (SH-SY5Y), suggesting its potential as a future anticancer agent ²³. *Foeniculum vulgare* Mill. (fennel), a hardy perennial from the Apiaceae family, has demonstrated various therapeutic properties: antibacterial, antifungal, antiviral, antioxidant, anti-inflammatory, antimicrobial, hepatoprotective, bronchodilatory, and cognitive-enhancing. Fennel is used to treat infantile colic, dysmenorrhea, polycystic ovary syndrome, and to promote lactation ²⁴. *Carum carvi* and *Bunium persicum*, also from the Apiaceae family, possess antimicrobial, antioxidant, anti-inflammatory, and antidiabetic activities, and are applied in managing cardiovascular diseases, in addition to being used as spices and natural breath fresheners ²⁵. Osteoarthritis (OA), a common degenerative condition, has no definitive cure. Although pharmaceutical, physical, and surgical treatments exist, herbal therapies are gaining popularity for their minimal side effects, affordability, and ease of topical use. Notably, *Satureja khuzistanica* Jamzad, native to Lorestan and Khuzestan, exhibits strong analgesic effects ²⁶. *Origanum vulgare*, a Lamiaceae species found across Africa, Asia, and Europe, is valued for its antiseptic, analgesic, sedative, and tonic effects, particularly on the cardiovascular and respiratory systems. It is also used as an antidote, stomach tonic, antitussive, and in managing sinusitis and sexual

dysfunction ²⁷. Historically, seeds of various plant species have been recognized for their medicinal benefits, including anticonvulsant, aphrodisiac, analgesic, antitussive, anti-inflammatory, menstrual-regulating, and diuretic effects, as well as for treating urinary tract infections ²⁷. *Achillea biebersteinii*, commonly known as yarrow in Iran, has a long tradition of use for relieving abdominal pain, digestive disturbances, menstrual cramps, and for enhancing wound healing. Its extracts are rich in flavonoids, phenolic acids, glucosides, sesquiterpene lactones, and terpenoids, which contribute to its antioxidant, antimicrobial, analgesic, antidiabetic, antiplatelet, insecticidal, antifungal, and anticancer properties ²⁸. In traditional Iranian medicine, abdominal bloating referred to as bloot is considered a result of imbalances in stomach temperature, food moisture, and digestive humidity. *Mentha spicata*, with its cooling and spicy profile, is traditionally used to treat flatulence. Its essential oil, predominantly composed of carvone, has shown effectiveness in relieving bloating associated with indigestion, cesarean delivery, and menstrual discomfort ²⁹. *Glycyrrhiza glabra* (licorice), a perennial herb with a significant role in traditional Chinese medicine, is now being explored for its potential in oncology. When used in conjunction with chemotherapy, it may reduce treatment-related side effects. However, data on its efficacy in mitigating the adverse effects of chemo and radiotherapy remain limited ³⁰. The immature dried fruits of *Citrus aurantium* L. and *Citrus sinensis* Osbeck are widely used in flavoring, beverages, and pharmaceuticals due to their notable therapeutic effects, particularly in supporting digestion and managing diarrhea. Additionally, their flavonoids and alkaloids are effective in weight control and cosmetic applications ³¹. *Hibiscus trionum* has been investigated for its antidiabetic properties, particularly its ability to modulate glucose and insulin levels in diabetic rat models. These effects are associated with enhanced antioxidant enzyme activities (SOD, GSH-PX) in tissues such as the liver, kidney, and heart, alongside reductions in lipid peroxidation (MDA) ³². The Asteraceae family comprises a wide array of medicinal and dietary plants known for their antioxidant, antidepressant, antibacterial, antiseptic, appetite-stimulating, and hepatoprotective effects ³³.

Oaks from the genus *Quercus* (Fagaceae) are deciduous trees and shrubs widely distributed in the Zagros, Arasbaran, and Hyrcanian forests. These species are traditionally employed for their hepatoprotective, antibacterial, antidiabetic, anti-inflammatory, and anticancer effects ³⁴. *Alhagi persica* is traditionally used for relieving gastrointestinal discomfort, largely attributed to its capsaicin-related inhibitory effects ³⁵. A recent innovation involves the use of probiotic-based microspheres developed from plant waste such as carrot pomace extract. These have been incorporated into functional symbiotic yogurt formulations using *Lactobacillus plantarum* and microspheres derived from *Alyssum homolocarpum* seed gum (AHSG) in combination with sodium alginate (SA), produced via an extrusion technique. This approach enhances the delivery of probiotics and bioactives in dairy matrices ³⁶. Ethnobotanical knowledge and studies play a crucial role in inspiring innovative research ideas and advancing drug development by bridging traditional wisdom with modern biomedical science ³⁷⁻⁴⁵.

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