



Advancements in Ethnobotanical Sciences

Bridging Traditional Knowledge and Modern Science

Online ISSN: 0000-0000
Journal homepage: <https://www.jaebs.com>



Native Medicinal Plant Flora of Iran Used for Infected Wounds: An Ethnobotanical Review

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Article Info

Article type

Review

Article history

Received: 25 Jun. 2026

Accepted: 30 Aug. 2026

Published: 30 Sep. 2026

DOI [10.34172/jaebs.2026.17](https://doi.org/10.34172/jaebs.2026.17)

Keywords

Ethnobotany

Herbal medicine

Infected wounds

Medicinal plants

Skin infections

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ABSTRACT

Infected wounds remain a major health concern amid antimicrobial resistance and treatment-related adverse effects. This review synthesized ethnobotanical evidence on medicinal plants traditionally used in Iran to manage infected wounds and related skin conditions, highlighting their potential as sources of antimicrobial and wound-healing agents. A systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Comprehensive searches were performed in major electronic databases, including Scopus, Web of Science, Google Scholar, the Scientific Information Database (SID), and Magiran, covering publications from 1990 to 2025. After initial screening and eligibility assessment, 27 studies meeting the predefined inclusion criteria were included in the data extraction and analysis. Overall, the dataset comprised 42 species records, representing 38 unique species from 22 families were identified in Iranian ethnobotanical literature for traditional use in the management of infected wounds and other skin lesions. Among the documented preparations, decoctions were the most frequently reported method of use. Leaves and aerial parts were the most commonly used plant parts, while decoction was the predominant traditional preparation method. The findings reveal considerable ethnobotanical diversity in the traditional use of Iran's native medicinal plants for wound-related conditions. These records may help prioritize promising species and bioactive compounds for further research. However, traditional use does not establish efficacy or safety; rigorous phytochemical, pharmacological, toxicological, and clinical studies are needed to determine their therapeutic potential.



Introduction

The skin, the largest organ of the human body, serves as a critical barrier that protects underlying tissues and internal structures from environmental hazards, microbial invasion, and physical injury (Venus et al., 2010). Maintaining skin integrity is important not only for physical appearance but also for immune defense and preventing various diseases and complications (Venus et al., 2010). Wounds become particularly problematic when microorganisms colonize or invade damaged tissue and disrupt the normal healing process, potentially leading to persistent infection and other clinical complications (McKnight et al., 2022). Appropriate management of infected wounds is therefore essential to control infection, promote tissue repair, prevent complications, and preserve quality of life (Li et al., 2021).

Skin wounds, particularly those complicated by infection, constitute a substantial global health burden and may result in delayed tissue repair, prolonged treatment, increased healthcare costs, and reduced quality of life (Malone & Schultz, 2022). This challenge is further complicated by the increasing prevalence of antimicrobial resistance, which has increased the need to explore therapeutic alternatives that are effective, safe, accessible, and capable of complementing existing approaches to infection management. Consequently, increasing attention has been directed toward natural products, including medicinal plants, as potential sources of antimicrobial and wound-supporting compounds.

The use of medicinal plants in wound management has deep historical and cultural roots in the traditional medical systems of many societies (Cedillo-Cortezano et al., 2024). Numerous medicinal plants contain biologically active constituents, including flavonoids, tannins, terpenoids, and alkaloids, that have been investigated for antimicrobial, anti-inflammatory, antioxidant, and wound-healing activities (Bittner Fialová et al., 2021). Iran, owing to its considerable climatic, ecological, and floristic diversity, possesses a rich medicinal flora and a long history of traditional plant use (Derakhshanfar et al., 2019). Numerous native plant species have been incorporated into traditional medical practices and local knowledge systems, including for the

management of skin disorders and wounds (Solati et al., 2021a).

Ethnobotanical research provides an important means of documenting traditional knowledge and identifying medicinal plants that may merit further pharmacological investigation (Abbasi et al., 2024, Alkhatib & Abdi, 2026). Such investigations can provide valuable leads for subsequent studies of bioactive constituents, biological activities, and the mechanisms that may underlie the reported effects of medicinal plants (Nyagumbo et al., 2024). In the context of increasing antimicrobial resistance and the limitations of some conventional therapeutic approaches, systematic documentation and evaluation of plants traditionally used for wound-related conditions in Iran are therefore of considerable research interest (Nyagumbo et al., 2024, Paphitou, 2013).

A previous review of native Iranian medicinal plants used in the management of incision-related wounds reported that several species had been investigated for anti-inflammatory, antioxidant, antimicrobial, and collagen-related effects, suggesting that some may influence different stages of the wound-healing process (Afsha et al., 2015). Among the plants discussed, henna, green tea, and *Eryngium caucasicum* were reported to exhibit activities relevant to the three principal phases of wound healing: inflammation, proliferation, and remodeling. However, the authors emphasized the need for further research to establish the efficacy and safety of plant-derived preparations before their broader application in wound management (Afsha et al., 2015).

Similarly, a review integrating scientific and ethnopharmacological evidence identified 139 native medicinal plants of Iran with reported wound-healing applications (Solati et al., 2021a). Several species, including sage, aloe vera, St. John's wort, wild pistachio, and mesquite, were highlighted because of their reported antioxidant constituents and other bioactive compounds. The authors suggested that these plants may represent promising candidates for further investigation and the development of plant-based preparations for wound management (Solati et al., 2021a). Nevertheless, such findings should be interpreted in light of the distinction between traditional use, experimental evidence, and clinically established therapeutic efficacy.

Evidence from the broader literature also indicates that several plant families, particularly Asteraceae, Lamiaceae, and Fabaceae, include species that have been investigated for antimicrobial, anti-inflammatory, antioxidant, and wound-healing activities (Suntar, 2014, Vitale et al., 2022). Despite the growing body of research on medicinal plants in Iran, however, the ethnobotanical evidence concerning native plants traditionally used specifically for infected wounds remains fragmented across individual regional studies. Existing reviews have generally emphasized pharmacological activities, phytochemical constituents, or experimental evidence, whereas traditional patterns of plant selection, plant parts used, preparation methods, and reported applications have received comparatively less focused synthesis.

Accordingly, a systematic synthesis of the available ethnobotanical evidence is warranted. The present study was therefore undertaken to systematically review reports of native Iranian medicinal plants traditionally used for infected wounds and related skin conditions. Specifically, the study aimed to identify the documented plant species and their botanical families, characterize the plant parts used and methods of preparation, and summarize their reported traditional applications. By bringing together geographically dispersed ethnobotanical information, this review seeks to preserve and organize traditional knowledge while providing a basis for prioritizing plant species for future phytochemical, pharmacological, toxicological, and clinical investigations.

Methods

Study Design

This study was conducted as a systematic review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The review aimed to identify, compile, and synthesize available evidence concerning native medicinal plants of Iran that have been traditionally reported or otherwise investigated for their potential use in the management of infected wounds and related skin conditions.

Inclusion Criteria

Studies published between 1990 and 2025 were considered eligible if they investigated native

medicinal plants of Iran and reported their traditional or documented use in relation to infected wounds, skin infections, antimicrobial activity, or wound healing. Eligible sources included original research articles, review articles, ethnobotanical books, and academic theses. To be included, a source was required to provide sufficient information to identify the plant, including its scientific name and botanical family, together with relevant information on the plant part used and its reported traditional or contemporary application.

Exclusion Criteria

Studies were excluded if they lacked a direct relationship to infected wounds, skin infections, or native medicinal plants of Iran; did not provide sufficient full-text information; or contained insufficient information for reliable scientific interpretation. Sources addressing the use of plants exclusively for non-dermatological conditions were also excluded to maintain the focus of the review on wound- and skin-related applications.

Data Sources and Search Strategy

A systematic literature search was conducted in five electronic databases: Google Scholar, Scopus, Web of Science, the Scientific Information Database (SID), and Magiran. Searches covered publications from January 1990 through December 2025.

The search strategy incorporated combinations of terms related to medicinal plants, Iran, ethnobotany, and infected wounds, together with their corresponding Persian equivalents. Boolean operators AND and OR were used to combine search terms and broaden or refine the retrieval of potentially relevant records. The search strategy was adapted as necessary to accommodate differences in the indexing and search functionality of the individual databases.

Study Screening and Selection

During the identification phase, 56 records were retrieved from the selected databases. After removal of duplicate records, 45 unique records remained for screening. Titles and abstracts were subsequently reviewed, and 13 records were excluded because they did not meet the predefined relevance criteria. The full texts of the remaining 32 records were then assessed for eligibility. Five

records were excluded because they did not provide sufficient or complete ethnobotanical information. Ultimately, 27 studies met the predefined eligibility criteria and were included in the final synthesis.

The screening and selection process was independently performed by two reviewers. Any disagreements between the reviewers were discussed and resolved through consensus.

Data Extraction and Management

Data were extracted using a standardized approach to promote consistency and facilitate comparison across the included studies. The extracted variables included the scientific and local names of the plants, botanical families, plant parts used (e.g., leaves, roots, flowers, stems, seeds, or whole plants), reported traditional applications and documented biological activities, methods of preparation and administration, and the corresponding references.

Particular attention was given to information relevant to antimicrobial and wound-related applications, including reported use for infected wounds, skin infections, wound healing, and related dermatological conditions. Where available, information concerning reported anti-inflammatory or other potentially relevant biological activities was also recorded.

The extracted information was organized into structured tables to facilitate systematic comparison and narrative synthesis across the included studies. Plant names and botanical classifications were reported according to the nomenclature provided in the source studies, with taxonomic information standardized where necessary for consistency.

Data Analysis

The extracted data were analyzed using a descriptive approach. The frequency and distribution of the reported plant families, plant species, plant parts used, preparation methods, and traditional applications were summarized. The documented species were also compared according to their reported uses and the types of biological activities described in the included sources, with particular attention to antimicrobial, antifungal, and wound-healing activities.

The findings were synthesized using descriptive tables and figures to provide a structured overview of the diversity of medicinal plants reported in Iran and their documented traditional applications in the management of infected wounds and related skin conditions. Because the included sources varied in study design, reporting methods, and the nature of the available evidence, no quantitative meta-analysis was performed.

Results

The dataset comprised 42 species records, representing 38 unique species from 22 families were identified from the included sources. Among the reported families, Asteraceae was the most frequently represented, with six species, followed by Scrophulariaceae, with four species. Analysis of the plant parts used in the traditional management of infected wounds showed that leaves were the most frequently reported plant part, accounting for 22 records. Stems and seeds were the next most commonly reported parts, with six and five records, respectively.

Overall, the findings demonstrate considerable taxonomic diversity among the medicinal plants documented in the ethnobotanical literature of Iran in relation to infected wounds. Leaves were the predominant plant part reported across the included sources, followed by stems and seeds. Detailed information on the identified plant species, botanical families, plant parts used, and related traditional applications is presented in Table 1.

Leaves and aerial parts were the most frequently used plant parts in the traditional management of wounds and skin infections. Decoction was by far the most commonly reported method of preparation and use, followed by poultice and topical application.

Figure 1 shows the distribution of plant families represented in Iranian ethnobotanical reports related to the management of skin infections. Lamiaceae, Scrophulariaceae, and Asteraceae were the most frequently represented families, with the highest numbers of reported species.

Figure 2 shows the number of Traditional methods of plant use in each botanical family across the different provinces of Iran.

Table 1. Native Iranian medicinal plants reported for infected wounds, skin infections, and wound management.

Scientific name	Persian/common name	Family	Plant part used	Local name	Reported traditional application	Method of use	Collection area	Reference
<i>Scrophularia striata</i> Boiss.	Gol-e-Mimouni	Scrophulariaceae	Stems, leaves	Teshneh-dari	Wound and burn healing; reported antimicrobial use	Decoction	Fereydonshahr	(Sajjadi et al., 2016)
<i>Scrophularia deserti</i> Del.	Gol-e-Mimouni	Scrophulariaceae	Stems, leaves	Banjak Mashin	Wound and burn healing	Decoction	Fereydonshahr	(Sajjadi et al., 2016)
<i>Salvia compressa</i>	Tropical sage	Lamiaceae	Leaves, flowering shoots	Morpozou	Traditional use for disinfecting infected wounds	Decoction	Ardestan (Isfahan)	(Haerinasab & Abbasi, 2019)
<i>Citrullus colocynthis</i>	Bitter apple	Cucurbitaceae	Fruit	Hanzal	Traditional management of chronic infected wounds	Decoction	Ardestan (Isfahan)	(Haerinasab & Abbasi, 2019)
<i>Malva microcarpa</i>	Small-fruited mallow	Malvaceae	Seeds, leaves	Khatmi	Traditional treatment of infected skin wounds	Decoction	Ardestan (Isfahan)	(Haerinasab & Abbasi, 2019)
<i>Cercis siliquastrum</i>	Judas tree	Fabaceae	Leaves, stem bark	Arghavan	Traditional treatment of deep wounds	Decoction	Ardestan (Isfahan)	(Haerinasab & Abbasi, 2019)
<i>Calotropis procera</i>	Sodom apple	Asclepiadaceae	Latex, leaves	Kharagh	Traditional treatment of infected wounds	Poultice	Bushehr	(Dolatkahi & Ghorbani Nohooji, 2014)
<i>Ricinus communis</i>	Castor bean	Euphorbiaceae	Seed latex	Karchak	Traditional disinfection of wounds and burns	Poultice	Bushehr	(Dolatkahi & Ghorbani Nohooji, 2014)
<i>Ferula ovina</i>	Koma	Apiaceae	Gum/resin	Ashtarak	Traditional treatment of infected wounds	Decoction	Fars	(Kiasi & Forouzeh, 2019)
<i>Fumaria officinalis</i>	Fumitory	Papaveraceae	Leaves	Shatreh	Traditional treatment of skin infections	Decoction	Fars	(Kiasi & Forouzeh, 2019)
<i>Artemisia aucheri</i>	Artemisia	Asteraceae	Aerial parts	Jaj	Traditional treatment of fungal skin infections	Decoction	Semnan	(Jalali et al., 2024)
<i>Phragmites australis</i>	Common reed	Poaceae	Leaves, stems	Qamish	Traditional use for wound disinfection	Decoction, Ash	Marivan (Kurdistan)	(Tabad & Jalilian, 2015)
<i>Teucrium polium</i>	Cat thyme	Lamiaceae	Aerial parts	Noukhod-e-Maryami	Traditional use for wound disinfection	Decoction, poultice	Marivan (Kurdistan)	(Tabad & Jalilian, 2015)
<i>Lonicera nummulariifolia</i>	Honeysuckle	Caprifoliaceae	Leaves	Shen	Traditional use for wound disinfection	Infusion	Fars	(Dolatkahi et al., 2014)
<i>Ruta graveolens</i>	Rue	Rutaceae	Aerial parts	Sodab	Traditional treatment of skin infections	Decoction	Khuzestan	(Fooladi et al., 2024)

Scientific name	Persian/common name	Family	Plant part used	Local name	Reported traditional application	Method of use	Collection area	Reference
<i>Astragalus gossypinus</i>	Cottony milkvetch	Fabaceae	Root	Katira	Traditional treatment of boils and promotion of drainage	Decoction	Khuzestan	(Fooladi et al., 2024)
<i>Curcuma longa</i>	Turmeric	Zingiberaceae	Rhizome	Sari-kuk	Traditional treatment of purulent wounds	Poultice	Khuzestan	(Fooladi et al., 2024)
<i>Falcaria vulgaris</i>	Falcaria	Apiaceae	Aerial parts	Ghazayaghi	Traditional treatment of skin wounds	Poultice	Zanjan	(Moghanloo & Ghahremaninejad, 2019)
<i>Salvia macrosiphon</i>	Long-tubed sage	Lamiaceae	Whole plant	Qarāqolākh	Traditional use for wound disinfection	Infusion	Zanjan	(Moghanloo & Ghahremaninejad, 2019)
<i>Veronica anagallis-aquatica</i>	Water speedwell	Plantaginaceae	Whole plant	-	Traditional burn treatment	Poultice	Lorestan	(Delfan et al., 2015, Mehrnia & Hosseini, 2024)
<i>Eucalyptus camaldulensis</i>	River red gum	Myrtaceae	Leaves	Eucalyptus	Traditional treatment of purulent wounds	Decoction	Lorestan	(Delfan et al., 2015)
<i>Achillea wilhelmsii</i>	Yarrow	Asteraceae	Aerial parts	Gol-sarzard	Traditional treatment of purulent wounds	Decoction	Lorestan	(Delfan et al., 2015)
<i>Malva parviflora</i>	Little mallow	Malvaceae	Whole plant	Maleki	Traditional prevention of wound infection	Decoction	Golestan	(samiei & Forouzeh, 2023)
<i>Anthemis cotula</i>	Stinking chamomile	Asteraceae	Flowering shoots	Boveyneh	Traditional wound washing	Decoction	Khuzestan	(Khodayari et al., 2015)
<i>Artemisia maritima</i>	Sea wormwood	Asteraceae	Flowering shoots	Dermeh	Traditional treatment of skin infections	Decoction	Khuzestan	(Khodayari et al., 2015)
<i>Plantago major</i>	Greater plantain	Plantaginaceae	Leaves, seeds	Barhang	Traditional treatment of purulent wounds	Decoction	Khuzestan	(Khodayari et al., 2015)
<i>Eucalyptus globulus</i>	Blue gum	Myrtaceae	Leaves	Eucalyptus	Traditional use for wound disinfection	Fumigation	Bushehr	(Dolatkhahi & Ghorbani Nohooji, 2014)
<i>Calotropis procera</i>	Sodom apple	Asclepiadaceae	Leaves, latex	Kharagh	Traditional wound healing	Topical application	Bushehr	(Dolatkhahi & Ghorbani Nohooji, 2014)
<i>Erodium cicutarium</i>	Redstem filaree	Geraniaceae	Whole plant	Qeytaran	Traditional treatment of purulent boils	Decoction	Lorestan	(Mehrnia & Hosseini, 2024)
<i>Verbascum songaricum</i>	Mullein	Scrophulariaceae	Stems, leaves	Goudmeh	Traditional treatment of purulent boils	Medicinal preparation	Lorestan	(Mehrnia & Hosseini, 2024)

Scientific name	Persian/common name	Family	Plant part used	Local name	Reported traditional application	Method of use	Collection area	Reference
<i>Anthemis austro-iranica</i>	Southern chamomile	Asteraceae	Whole plant	-	Wound disinfection	Decoction	Isfahan	(Sajjadi et al., 2016)
<i>Ziziphus jujuba</i>	Jujube	Rhamnaceae	Leaves, fruit, wood	Konar	Traditional treatment of infected wounds	Decoction	Isfahan	(Haerinasab & Abbasi, 2019)
<i>Equisetum arvense</i>	Field horsetail	Equisetaceae	Stem	Dom Asbi	Traditional wound washing	Decoction	Fars	(Dolatkahi et al., 2014)
<i>Onosma dichroanthum</i>	Not reported	Boraginaceae	Aerial parts	-	Traditional use for wound disinfection	Herbal infusion	Golestan	(Kiasi et al., 2023)
<i>Onosma longiloba</i>	Hound's tongue	Boraginaceae	Fresh leaves	Zangoulei	Traditional use for wound disinfection	Cooked preparation	Razavi Khorasan	(Hosseini et al., 2019)
<i>Juglans regia</i>	Persian walnut	Juglandaceae	Leaves, fruit, bark	Goz	Traditional wound healing	Decoction	Kurdistan	(Tabad & Jalilian, 2015)
<i>Plantago major</i>	Greater plantain	Plantaginaceae	Whole plant	-	Traditional wound healing	Decoction	West Azerbaijan	(Keshavarzi & Azizi, 2015)
<i>Ferula ovina</i>	Koma	Apiaceae	Gum/resin	Ashtarak	Traditional wound healing	Decoction	Fars (Qashqai)	Fooladi et al., 2024
<i>Ricinus communis</i>	Castor bean	Euphorbiaceae	Seed latex	Karchak	Traditional use for wound disinfection	Poultice	Fars (Kazeroon)	(Dolatkahi et al., 2012)
<i>Achillea tenuifolia</i>	Yarrow	Asteraceae	Aerial parts	Bimadrour	Traditional treatment of purulent wounds	Decoction	Lorestan	(Mehrnia & Hosseini, 2024)
<i>Capparis spinosa</i>	Caper bush	Capparaceae	Aerial parts	Alaf-e-Mar	Traditional use for wound disinfection	Decoction	Lorestan	(Delfan et al., 2015)
<i>Biebersteinia multifida</i>	Adamak	Geraniaceae	Aerial parts	Genu	Traditional treatment of purulent boils	Decoction	Lorestan	(Delfan et al., 2015)

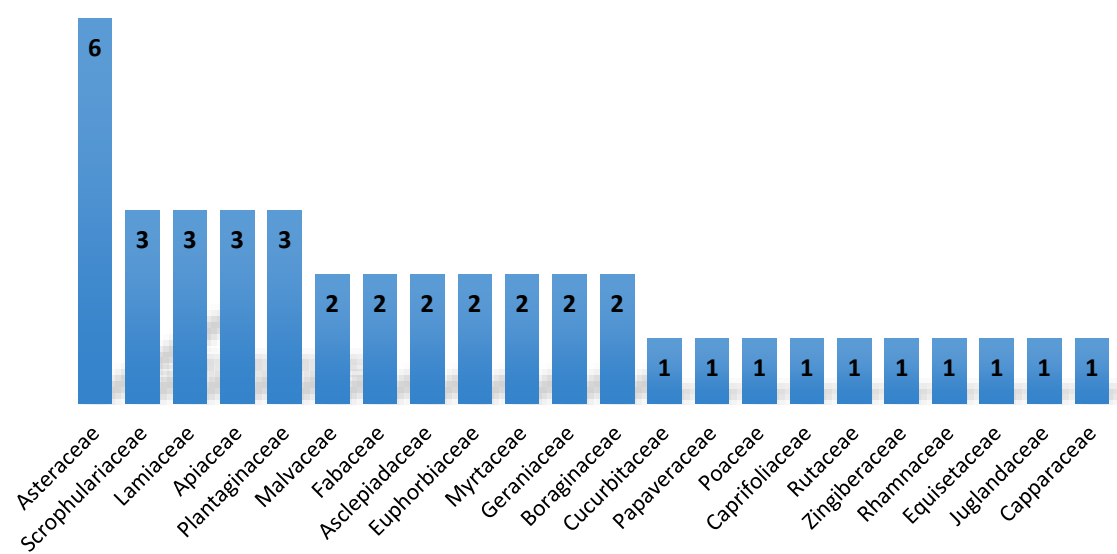


Figure 1. Distribution of plant families represented in Iranian ethnobotanical reports on skin infections

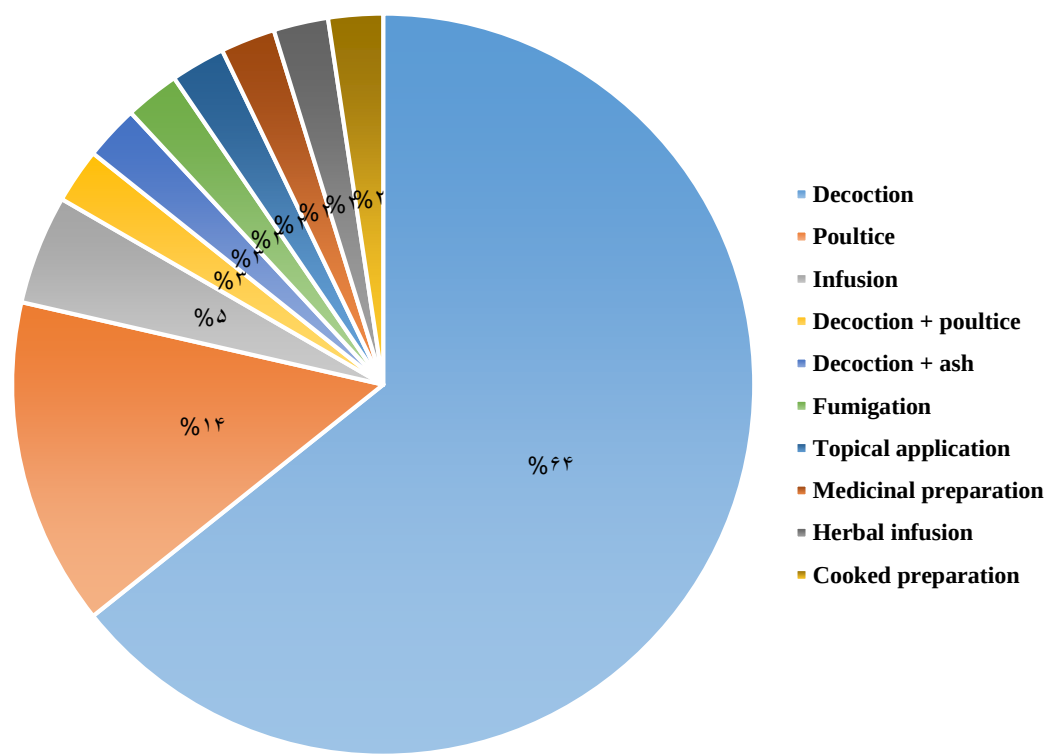


Figure 2. Traditional methods of plant use

Discussion

The findings of this study demonstrate considerable diversity in the traditional use of Iran's native flora for the management of infected wounds. The relatively high representation of the families Asteraceae and Scrophulariaceae indicates that these botanical groups have a prominent presence in ethnobotanical reports concerning wound management. This pattern may be related, at least in part, to the diversity of secondary metabolites found in these families, including flavonoids, phenolic compounds, and terpenoids, several of which have been investigated experimentally for potential antimicrobial, anti-inflammatory, antioxidant, and tissue-repair-related activities. The predominance of leaves as the most frequently used plant part may likewise reflect their relatively easy accessibility and renewable nature, as well as the presence of diverse secondary metabolites in leaf tissues.

An examination of the phytochemical constituents reported in the selected literature showed that many of the plants included in this review contain compounds such as flavonoids, phenolic compounds, tannins, and terpenoids. These constituents have attracted considerable attention in experimental and preclinical research because of their potential effects on microbial growth, inflammation, oxidative stress, and tissue repair. Pharmacological studies have further suggested that some of these compounds may contribute to wound repair through antioxidant activity, inhibition of bacterial growth, and modulation of processes involved in cellular proliferation and tissue regeneration (Bittner Fialová et al., 2021, Cedillo-Cortezano et al., 2024, Derakhshanfar et al., 2019, Vitale et al., 2022). However, the presence of such constituents should not, by itself, be interpreted as evidence of clinical efficacy in infected wound management.

The use of medicinal plants for wound treatment has a long history in human medicine (Naseem et al., 2023). Ethnobotanical studies from Iran indicate that the diversity of medicinal plants traditionally used for wounds and skin infections occurs within a broader context of the country's considerable geographic, ecological, and floristic diversity. Iran's historical position along routes of cultural exchange, including the Silk Road, may also

have contributed to the transmission and diversification of traditional knowledge and therapeutic practices (Amiri et al., 2021). Nevertheless, historical or geographical associations alone cannot establish the origin or direction of transmission of specific medicinal practices, and such interpretations require dedicated historical and anthropological investigation.

Among the species reported in the literature, plants such as sage, borage, valerian, fennel, licorice, mint, Datura, yarrow, Aloe vera, calendula, wild pistachio, and colocynth have received attention in ethnobotanical reports and studies related to wound repair. Some of these plants contain antioxidant and other biologically active constituents and therefore may represent candidates for further investigation in the development of wound-healing preparations (Solati et al., 2021b). However, their inclusion in traditional medical practices should be distinguished from evidence demonstrating therapeutic effectiveness.

The present findings are partly consistent with observations reported from Nigeria and Pakistan (Oyeniyi et al., 2025, Rehman et al., 2025). Among the plant families, Asteraceae has been frequently represented in ethnobotanical studies concerning wounds and dermatological conditions. Species belonging to this family, including *Achillea millefolium*, *Calendula officinalis*, and *Vernonia amygdalina*, have been traditionally used for wound management and certain skin conditions. Constituents identified in some of these plants have been associated with anti-inflammatory, antimicrobial, antioxidant, and other biological activities. Experimental studies have also suggested that some of these activities may be related to processes such as keratinocyte proliferation, modulation of inflammation, and extracellular matrix remodeling (Carvalho et al., 2018).

Studies conducted in Pakistan, Cameroon, and other African countries have likewise documented the use of certain medicinal plants for respiratory infections in addition to their applications in wounds and dermatological conditions. Such overlap may indicate convergent patterns in traditional plant-based knowledge across different communities; however, the underlying reasons for

these similarities remain uncertain and require further historical, ethnographic, and comparative investigation (Makgobole et al., 2023, Molonge et al., 2025, Rehman et al., 2025).

Regarding the plant parts used, leaves, flowers, fruits, and seeds have been among the most frequently reported materials in ethnobotanical practices (Hosseini et al., 2021). Leaves, in particular, may account for a substantial proportion of traditional preparations because of their accessibility and their content of compounds such as flavonoids and phenolic constituents (Komakech et al., 2019, Suja et al., 2024). Similar observations have been reported from Nigeria and other African countries, where aerial plant parts, particularly leaves, are widely used in traditional medicine (Makgobole et al., 2023, Oyeniyi et al., 2025). Experimental studies have also suggested that plant polysaccharides and heteroglycans occurring in different plant tissues may participate in certain processes associated with wound repair (Ayyanar & Ignacimuthu, 2009). These findings provide a rationale for further investigation but do not establish that the traditionally used plant parts are clinically effective.

Among the 42 ethnobotanical records, decoction was the most frequently reported method of use (27 records, 64.3%), followed by poultice (6 records, 14.3%) and infusion (2 records, 4.8%). Other methods included decoction plus poultice, decoction plus ash, fumigation, topical application, medicinal preparation, herbal infusion, and cooked preparation, each reported in one record (2.4%). (Khajoei Nasab et al., 2022, Rehman et al., 2025). Other studies have also reported direct topical application and preparation methods such as boiling and soaking as common practices (Molonge et al., 2025, Oyeniyi et al., 2025). This diversity in preparation methods probably reflects differences in cultural practices, plant species, plant parts, local availability, and intended therapeutic applications. Importantly, differences in preparation methods may substantially influence the chemical composition and biological activity of the resulting preparations, highlighting the need for standardization in future pharmacological investigations.

Overall, the use of medicinal plants for wounds and skin infections has been documented across diverse communities worldwide, with certain

similarities observed in plant selection and preparation practices. Such overlap may partly reflect the presence of secondary metabolites, including tannins, anthocyanins, flavonoids, and other phenolic compounds. Nevertheless, the detection of these constituents alone is insufficient to establish therapeutic efficacy, and ethnobotanical evidence should be clearly distinguished from pharmacological and clinical evidence. Existing experimental studies provide a basis for further investigation of the potential of selected medicinal plants for the development of wound-healing preparations, but additional evidence is required before any clinical conclusions can be drawn (Ranjbari & Nazer, 2024).

Iran possesses substantial scientific infrastructure, a pharmaceutical sector, and expertise in medicinal plant research, providing a potentially favorable setting for advanced investigation and development of plant-based preparations (Safa et al., 2013). The use of multi-component herbal preparations and the potential interactions among their constituents are important areas of interest in medicinal plant pharmacology. However, direct comparisons between such approaches and single-molecule pharmaceutical agents, or their characterization as alternatives to established therapies, require adequate experimental and clinical evidence (Tsioutsiou et al., 2017).

The relatively high representation of Asteraceae and Scrophulariaceae may partly reflect the considerable floristic diversity of Iran and the distribution of these families across several major ecological regions, including the Irano-Turanian, Zagros, and Alborz regions. Species belonging to these families contain diverse phytochemical constituents, including flavonoids, phenolic compounds, and terpenoids, have been traditionally used in Iran for a range of health conditions, including wounds and skin infections (Derakhshanfar et al., 2019, Solati et al., 2021b). The prominence of Asteraceae in the present review is also broadly consistent with findings from ethnobotanical studies conducted in Iran and other countries and may indicate the importance of this family within traditional knowledge related to wounds and dermatological conditions (Oyeniyi et al., 2025, Rehman et al., 2025, Solati et al., 2021b, Suntar, 2014). However, the frequency with which a botanical family is reported in ethnobotanical

literature may also be influenced by its geographic distribution, cultural familiarity, accessibility, and research intensity, rather than solely by pharmacological properties.

Despite the considerable value of ethnobotanical data, this field remains subject to several limitations, including methodological heterogeneity among studies, differences in plant preparation methods, insufficient standardization of active constituents, and limited clinical evidence. Future research should therefore focus on the phytochemical characterization and standardization of selected species using advanced analytical approaches, followed by targeted evaluation of antimicrobial and antifungal activities against standardized microbial strains. Appropriate animal models should also be employed to investigate wound-healing effects under controlled conditions. At subsequent stages, the feasibility of developing standardized pharmaceutical formulations, together with their safety, pharmacokinetic characteristics, and efficacy, should be systematically evaluated. Integrating ethnobotanical knowledge with pharmaceutical sciences, phytochemistry, microbiology, and biotechnology may facilitate the systematic translation of traditional knowledge into preclinical research and, where supported by adequate evidence, subsequent clinical investigation.

Conclusion

This systematic review highlights the considerable diversity of Iran's native medicinal flora in terms of plant species, botanical families, and traditional applications related to the management of infected wounds. Asteraceae and Scrophulariaceae were the most frequently represented families among the plants identified, while leaves were the most commonly reported plant part used in traditional practices. The presence of diverse bioactive constituents in these plants, including flavonoids, phenolic compounds, tannins, and terpenoids, provides a scientific basis for further investigation of their potential antimicrobial, anti-inflammatory, antioxidant, and wound-healing-related activities. However, ethnobotanical use and the presence of bioactive compounds should not be interpreted as evidence of established therapeutic efficacy. The findings therefore support the potential of selected

native Iranian medicinal plants as candidates for further research and possible development of standardized natural products for wound management. Rigorous phytochemical, pharmacological, toxicological, and clinical studies are required to determine their efficacy, safety, mechanisms of action, and clinical applicability.

Declarations Conflict of Interest

The authors declare no conflicts of interest.

Acknowledgments

The authors thank the Student Research Committee of Ilam University of Medical Sciences for logistical support.

Consent for Publications

The authors certify that that this work in its final form has been thoroughly reviewed and approved for publication.

Funding Support

The authors did not receive support from any organization for the submitted work.

Authors' Contributions

Conceptualization: Mahsa Keshvari and Masoumeh Tahmasebi

Data curation: Mahsa Keshvari

Formal analysis: Mahsa Keshvari

Funding acquisition: Mahsa Keshvari

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Ethical Considerations

Not applicable. This letter does not report new studies involving human participants, animal subjects, or patient data.

AI Use Disclosure

AI was used only for language editing and improving clarity. The authors take full responsibility for the scientific content.

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