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# Exploring Herbal Remedies for Migraine: Insights from the Medicinal Plants of Northern Iran

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**A B S T R A C T**

**Objective**: Migraine is a prevalent neurological condition characterized by severe, one-sided headaches often accompanied by nausea, vomiting, and dizziness. This ethnobotanical study aims to identify the medicinal plants used by the people of northern Iran that may be effective against migraines.

**Methodology**: This review article was conducted by searching the keywords of medicinal plants, traditional medicine, and migraine, from databases such as Web of Science, PubMed, Scopus, and Google Scholar. Unrelated related articles were removed and finally, related articles were used to review the texts.

**Results**: In the ethnobotany of the northern boundary of Iran (West Azarbaijan, East Azarbaijan, Ardabil, Gilan, Mazandaran, Golestan, and Khorasan provinces) of Iran, medicinal plants such as *Origanum vulgare*, *Rosa canina, Asperula odorata L., Zingiber officinale, Valeriana officinalis are traditionally used. , Echinum ammonium, Ocimum basilicum, Melissa officinalis, Tragopogon pratensis, Salvia officinalis, Rheum ribes, Viola suavis, Ferulago angulate*, and *Juniperus polycarpos* are used for migraine therapy.

**Conclusion:** Medicinal plants containing analgesic, antispasmodic, and sedative compounds can effectively treat migraines, providing therapeutic relief and relaxing effects.

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## Introduction

Migraine is a primary headache disorder characterized by recurrent episodes of severe, throbbing head pain, often unilateral, and frequently accompanied by nausea, vomiting, and sensitivity to light and sound [1,2]. Migraine headaches initially start with vague pains around the head and gradually turn into concentrated and throbbing pains [3]. While typically lasting several hours, migraine attacks can persist for up to three days [4]. The exact etiology remains elusive, although genetic predisposition, hormonal fluctuations, environmental triggers, and dietary factors have been implicated [5]. Diagnosis is primarily clinical, based on headache characteristics and associated symptoms and for the prevention of migraine, self-regulation, stress control, diet plan, regular exercise, yoga, and meditation are used [6].

Pharmacological interventions, including nortriptyline, topiramate, indomethacin, and various commercial migraine preparations, constitute the mainstay of acute migraine management [7]. Despite the effects on migraine, these drugs have side effects and are harmful to the patient's body, so it seems necessary and necessary to use a natural and safe source of medicine [7]. Some foods can aggravate migraine headaches, and on the other hand, taking some supplements and foods can reduce and control it. While dietary modifications and lifestyle interventions can mitigate migraine frequency and severity, herbal remedies have emerged as promising options [8]. However, many turn to natural treatments such as relaxation techniques and herbal medicines [9]. Herbal treatments can be useful options to reduce the intensity and recurrence of migraine

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attacks, also have fewer side effects, and can be useful for people who are allergic to chemical drugs [10]. This study aims to identify and document ethnobotanically relevant plants used for migraine treatment in northern Iran.

## Method

This study employed a systematic review approach to identify medicinal plants used in the treatment of migraine headaches in the northern regions of Iran. A comprehensive literature search was conducted across four databases: Web of Science, PubMed, Scopus, and Google Scholar. The search was performed using keywords such as "medicinal plants," "traditional medicine," and "migraine." The search strategy was designed to include articles published up until August 2024, without language restrictions to maximize the breadth of the search results.

## Inclusion and Exclusion Criteria

To ensure the relevance and quality of the selected studies, the following criteria were applied:

## Inclusion Criteria

Articles that focused on the use of medicinal plants for the treatment of migraines. Studies conducted in the geographical region of northern Iran (West Azarbaijan, East Azarbaijan, Ardabil, Gilan, Mazandaran, Golestan, and Khorasan provinces). Ethnobotanical studies or clinical studies that provided detailed descriptions of plant species, preparation methods, and therapeutic uses.

## Exclusion Criteria

Articles that did not specifically address the treatment of migraines. Studies that focused on other regions outside the northern boundary of Iran. Reviews or meta-analyses that did not provide original data on medicinal plant use.

## Search Results and Study Selection

The initial search yielded a total of 23 articles. After removing duplicates and screening titles and abstracts, 8 articles were selected for full-text review. Following the application of inclusion and exclusion criteria, 35 articles were deemed eligible and were included in the final review. The selected studies were carefully reviewed to extract data on medicinal plant species, their preparation methods, and their reported effects on migraine relief. The extracted data were then analyzed to identify commonly used medicinal plants in the treatment of migraines, their ethnobotanical relevance, and their potential mechanisms of action.

## Results

Ethnobotany is a valuable native knowledge that originates from ancient villages. This knowledge includes beliefs, concepts, attitudes, and processes of transmission, acquisition, and storage of human-plant interaction information, and in addition to its inherent nature, it originates from a specific geographical area and is culturally produced. The northern region of Iran, which includes provinces such as West Azarbaijan, East Azarbaijan, Ardabil, Gilan, Mazandaran, Golestan, and Khorasan, has its own herbal healing culture, which is especially rich for migraine treatment. Ethnobotanical knowledge of this rationale for migraine treatment is given in Table 1. Based on the obtained results, it was determined that medicinal plants such as *Origanum vulgare, Rosa canina, Asperula odorata L., Zingiber officinale, Valeriana officinalis, Echinum ammonium, Ocimum basilicum, Melissa officinalis, Tragopogon pratensis, Salvia officinalis, Rheum ribes, Viola suavis, Ferulago angulate* and *Juniperus polycarpos* have therapeutic uses for migraine. Additional information in this regard is given in Table 1. Also, the anti-migraine mechanism of the medicinal plants of this study is specified in Table 2.

**Table 1.** Knowledge of herbal therapy for migraine in northern Iran

| Scientific name | Common Plant Name | Family | Organ | Region |
|---|---|---|---|---|
| *Origanum vulgare* | Oregano | Labiatae | The aerial part of the plant | Arasbaran [11] |

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| | | | | |
|---|---|---|---|---|
| *Rosa canina L* | Dog rose, or common briar | Rosaceae | Leaf, flower | Arasbaran [11] |
| *Asperula odorata L.* | Sweet woodruff | Rubiaceae | The aerial part of the plant | Arasbaran [11] |
| *Zingiber officinale* | Ginger | Zingiberaceae | Root | Neka, Mazandaran [12] |
| *Valeriana officinalis* | Valerian | Caprifoliaceae | The aerial part of the plant | Neka, Mazandaran [12] |
| *Echinum ammonium* | Iranian Borage or Gol-e-Gavzaban | Boraginaceae | Flower | Neka, Mazandaran [13] |
| *Ocimum basilicum* | Basil | Lamiaceae | Leaf | Sari, Mazandaran [14] |
| *Melissa officinalis L.* | Lemon balm or bee balm | Lamiaceae | Leaf | Amol, Mazandaran [15] |
| *Tragopogon pratensis L.* | Meadow Goat's Beard | Asteraceae | Root | Meshginshahr, Ardabil [16] |
| *Salvia officinalis L.* | Sage | Lamiaceae | The aerial part of the plant and Root | Meshginshahr, Ardabil [16] |
| *Rheum ribes L.* | Syrian rhubarb | Polygonaceae | Root | Meshginshahr, Ardabil [16] |
| *Echium amoenum* | Persian borage | Boraginaceae | Flower | Sareyn, Ardabil [17] |
| *Viola suavis* | Wood violet or Banafshe | Violaceae | Flower, Rhizome, Root | Sareyn, Ardabil [17] |
| *Ferulago angulate (Schltdl.) Boiss.* | Chavir | Apiaceae | Root | Raz and Jargalan, North Khorasan [18] |
| *Juniperus polycarpos* | Persian juniper | Cupressaceae | Seed | Raz and Jargalan, North Khorasan [18] |
| *Melilotus officinalis (L.) Pall.* | Sweet yellow clover | Fabaceae | The aerial part of the plant | Raz and Jargalan, North Khorasan [18] |

**Table 2.** Anti-migraine mechanism of medicinal plants of this study

| **Scientific name** | **Common Plant Name** | **Mechanism** |
|---|---|---|
| *Origanum vulgare* | Oregano | Possesses anti-inflammatory and antispasmodic properties that help reduce muscle tension and pain. |
| *Rosa canina L* | Dog rose, or common briar | Rich in Vitamin C and antioxidants, aiding in reducing inflammation and protecting blood vessels. |
| *Asperula odorata L.* | Sweet woodruff | Has calming and antispasmodic effects that help relieve tension headaches and migraines. |
| *Zingiber officinale* | Ginger | Contains anti-inflammatory, antioxidant, and anti-nausea properties that help lessen the severity and duration of migraines. |

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| | | |
|---|---|---|
| *Valeriana officinalis* | Valerian | Provides calming and anti-anxiety effects, which may help reduce pain and stress associated with migraines. |
| *Echinum ammonium* | Iranian Borage or Gol-e-Gavzaban | Has anti-inflammatory and antioxidant effects that help relieve pain and vascular inflammation related to migraines. |
| *Ocimum basilicum* | Basil | Exhibits calming and antispasmodic effects, which help reduce muscle tension and promote relaxation. |
| *Melissa officinalis L.* | Lemon balm or bee balm | Has calming and antispasmodic properties, aiding in reducing headaches and stress. |
| *Tragopogon pratensis L.* | Meadow Goat's Beard | Possesses anti-inflammatory effects that may help reduce vascular inflammation and pain. |
| *Salvia officinalis L.* | Sage | Contains anti-inflammatory and antioxidant compounds that help reduce inflammation and pain. |
| *Rheum ribes L.* | Syrian rhubarb | Offers anti-inflammatory and antioxidant properties that help alleviate pain and inflammation. |
| *Echium amoenum* | Persian borage | Has calming and anti-inflammatory effects that help relieve pain and promote relaxation. |
| *Viola suavis* | Wood violet or Banafshe | Shows antispasmodic and calming properties that help reduce muscle tension and pain. |
| *Ferulago angulate (Schltdl.) Boiss.* | Chavir | Shows antispasmodic and calming properties that help reduce muscle tension and pain. |
| *Juniperus polycarpos* | Persian juniper | Exhibits anti-inflammatory and analgesic effects that help reduce inflammation and pain. |
| *Melilotus officinalis (L.) Pall.* | Sweet yellow clover | Contains coumarin, which has anti-inflammatory and blood-thinning properties that help improve blood flow and relieve migraine pain. |

The analysis revealed that the Lamiaceae family, with four instances, shows the highest diversity among the data. This indicates the significant role of this family in medicinal uses across various regions. Roots and aerial parts are the most frequently utilized plant organs, underscoring their importance in both pharmaceutical and traditional medicine practices. Furthermore, the regions of Raz and Jargalan in

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North Khorasan and Arasbaran, with the highest number of plant species, highlight the substantial diversity of medicinal plants in these areas.

## Discussion

Migraine is a primary headache disorder characterized by severe, recurrent pain. A range of environmental and physiological factors, including sensory stimuli, dehydration, stress, sleep disturbances, and dietary triggers, can precipitate or exacerbate migraine attacks [8]. While conventional treatments, such as pharmacotherapy and physical interventions, are available, their efficacy is often limited [9]. Consequently, there is a growing interest in exploring alternative approaches, including dietary modifications and herbal interventions, to mitigate migraine symptoms [19]. Traditional medicine has long espoused the use of herbal remedies for the management of migraine headaches. While modern pharmaceuticals often incorporate plant-derived compounds (e.g., aspirin from willow bark), herbal therapies typically involve the unrefined plant material, potentially reducing the risk of adverse effects associated with synthetic drug formulations [19]. In the Aras region of Iran, chicory (*Cichorium intybus*) is used as a nerve tonic, chamomile (*Anthemis nobilis*) as an anti-inflammatory and anticonvulsant, and *Papaver orientale* is used as a pain reliever [20]. Chamomile (*Anthemis austro-iranica*) is used in Kazerun to relieve coldness and strengthen the heart [21]. Alborazi poppy (*Papaver tennifolium* Boiss & Hohen ex Boiss.) is used as a sedative in Cheshme Anjir region of Shiraz [22]. In Kerman, Alcea (*Alcea aucheri*) is used for migraine and headaches, and *Echium amoenum* (*Echium amoenum*) is used as a sedative and hypnotic [23].

## Conclusion

Comparative analysis of our ethnobotanical findings with data from other Iranian regions underscores the diverse and culturally embedded nature of Iranian traditional medicine. Each region exhibits a unique phytotherapeutic repertoire for migraine management, collectively contributing to a rich tapestry of botanical knowledge within the country. This diversity highlights the need for comprehensive ethnobotanical investigations to fully elucidate the therapeutic potential of Iran's medicinal plant resources.

## Statements and Declarations

## Funding support

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

## Competing interests

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

## Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Urmia University of Medical Sciences and pasture.

## Consent to participate

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

## Author contributions

SN: Conceptualization, the original draft writing, investigation, writing including reviewing and editing and investigation and formal analysis; ZE: Conceptualization, supervision, and project administration; ZE and SN: Conceptualization, the original draft writing, investigation, writing including reviewing and editing

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