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Medicinal Plants Effective Against Anemia in Northwest Iran: A Review of Hematopoietic Medicinal Plants

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A B S T R A C T

Objective: Anemia, characterized by an insufficient number of healthy red blood cells, can be caused by blood loss, hemolysis, or impaired erythropoiesis. Types of anemia include iron-deficiency anemia and vitamin-deficiency anemia. Given their high iron and nutrient content, certain medicinal plants offer potential therapeutic benefits for anemia. This review aims to identify medicinal plants from Northwest Iran traditionally used for treating this condition.

Methodology: To identify relevant literature, a comprehensive database search was conducted using keywords such as 'medicinal plants,' 'Iran,' 'anemia,' 'hematopoietic,' 'Urmia,' 'Tabriz,' 'Ardabil,' 'West Azerbaijan,' 'East Azerbaijan,' and 'ethnobotany. Databases such as Google Scholar, SID, Magiran, PubMed, and Scopus were used to search for relevant articles, particularly ethnobotanical studies related to the subject.

Results: The review identified that medicinal plants such as *Nasturtium sp.*, *Salvia officinalis*, *Centaurea depressa*, *Centaurea virgate*, *Achillea biebersteinii*, *Cichorium intybus*, *Urtica dioica*, *Prunus cerasifera*, *Cichorium intybus*, *Saponaria officinalis*, *Foeniculum vulgare*, *Achillea millefolium*, *Berberis vulgaris*, *Capsella bursa-pastoris*, *Crataegus aronia*, *Adiantum capillus-Veneris*, *Anthemis cotula*, *Gandelia tourenfortii*, *Rheus ribes*, *Lactuca virosa*, *Hyssopus officinale*, and *Salix alba* are used in traditional and ethnobotanical practices to treat anemia.

Conclusion: Further research is recommended to conduct phytochemical analysis of these medicinal plants, identifying the active compounds that influence anemia and hematopoiesis. Additionally, clinical trials involving animal and human models could explore the potential of these plants as a basis for developing effective and affordable herbal combination drugs for the treatment of anemia.

Keywords: Blood, Anemia, Hematopoietic, Medicinal Plants, Treatment

➢ **How to cite this paper**

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Introduction

Anemia, characterized by a reduction in red blood cell count and oxygen-carrying capacity, can be classified into various types, including aplastic anemia, iron-deficiency anemia (IDA), sickle cell anemia, thalassemia, and vitamin-deficiency anemia [1, 2]. Anemia, also known as low hemoglobin, can manifest with symptoms such as fatigue, weakness, pale or yellowish skin, irregular heartbeat, shortness of breath, dizziness, lightheadedness, chest pain, cold extremities, and headaches [3, 4]. Several factors can increase the risk of anemia, including a diet low in vitamins, intestinal disorders, pregnancy, chronic diseases, family history, and age [5].

Chemical medications, which provide essential vitamins and minerals to stimulate hematopoiesis, are commonly used to treat anemia [6]. Rapid-acting treatments for anemia include folic acid, ferrous

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sulfate, and iron supplements like Fefol. Foods rich in iron are crucial for increasing iron levels in the body [7]. Medicinal plants, known for their iron content, have a long history of use in treating anemia and can serve as valuable complementary options [8]. Herbal remedies are traditional home treatments for this condition. Consuming iron-rich foods alongside substances that enhance iron absorption, such as vitamin C sources like oranges, tomatoes, and raspberries, can further improve iron levels [9]. This study aims to report on hematopoietic medicinal plants effective in alleviating anemia, based on the ethnobotanical knowledge of the region.

Methodology

To identify relevant literature, a comprehensive database search was conducted using keywords such as 'medicinal plants,' 'Iran,' 'anemia,' 'hematopoietic,' 'Urmia,' 'Tabriz,' 'Ardabil,' 'West Azerbaijan,' 'East Azerbaijan,' and 'ethnobotany.' Reputable databases like Google Scholar, SID, MagIran, PubMed, and Scopus were consulted. Relevant ethnobotanical articles were reviewed to gather information. Each identified article was carefully screened for its relevance to the topic, emphasizing those that offered insights into the traditional medicinal practices, specific plant species used, and their reported effects on anemia or hematopoietic function. Additionally, reference lists of the selected articles were scrutinized to identify further studies that might not have appeared in the initial search results but were crucial for understanding the broader ethnobotanical context. The selected studies were evaluated for their methodological rigor, relevance, and contribution to the field. The inclusion criteria ensured that only studies explicitly focused on the use of medicinal plants in the aforementioned regions of Iran for treating anemia were considered, while studies lacking specific data on the medicinal plants or focusing on unrelated health conditions were excluded.

Results

The review of ethnobotanical articles revealed that several medicinal plants used for the treatment of anemia are found along the western border of Iran. Complete information regarding these plants is provided in Table 1.

Table 1. Medicinal Plants Effective Against Anemia Based on Ethnobotanical Records in Iran

Scientific Name	Plant Family	Common Name	Part Used	Region Studied
Leguminosea	Lamiaceae	Ajibiyan	Aerial parts	Urmia, West Azerbaijan [11]
Nasturtium sp.	Cruciferae	Alaf Jashemeh	Aerial parts	Urmia, West Azerbaijan [11]
Salvia officinalis	Lamiaceae	Sage	Aerial parts	Urmia, West Azerbaijan [11]
Centaurea depressa	Asteraceae	Gol Gandom	Flower	Urmia, West Azerbaijan [11]
Centaurea virgate	Asteraceae	Gol Gandom	Flower	Sareyn, Ardabil [12]
Achillea biebersteinii	Asteraceae	Yarrow	Flower, leaves	Sareyn, Ardabil [12]
Cichorium intybus	Asteraceae	Chicory	Leaves	Sareyn, Ardabil [12]
Urtica dioica	Lamiaceae	Nettle	Leaves	Sareyn, Ardabil [12]
Prunus cerasifera	Rosaceae	Plum	Fruit, leaves	Sareyn, Ardabil [12]
Cichorium intybus	Asteraceae	Chicory	Leaves	Ajab Shir [13]
Medicago falcata L.	Fabaceae	Yellow Alfalfa	Leaves	Ajab Shir [13]
Saponaria officinalis	Caryophyllaceae	Soapwort	Rhizome, roots	Ajab Shir [13]

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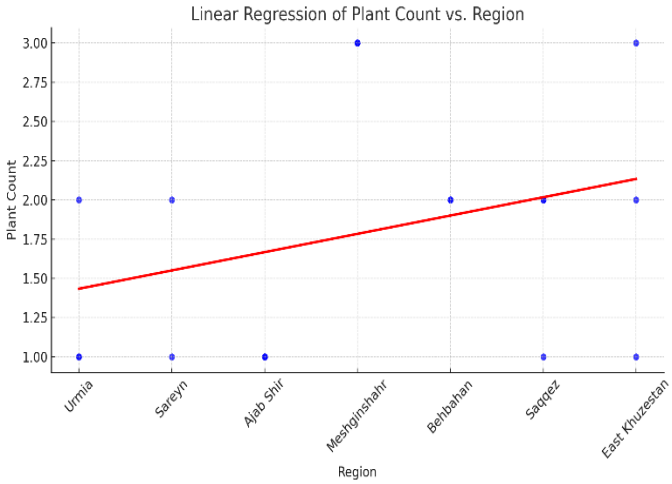
Foeniculum vulgare Mill.	Apiaceae	Fennel	Roots, seeds	Meshginshahr [14]
Achillea millefolium L.	Asteraceae	Yarrow	Aerial parts	Meshginshahr [14]
Berberis vulgaris L.	Berberidaceae	Barberry	Fruit	Meshginshahr [14]
Capsella bursa-pastoris L.	Brassicaceae	Shepherd's Purse	Aerial parts	Meshginshahr [14]
Crataegus aronia L.	Rosaceae	Hawthorn	Fruit, flower	Meshginshahr [14]
Urtica dioica L.	Urticaceae	Nettle	Leaves, roots, seeds	Meshginshahr [14]
Adiantum capillus-Veneris L.	Adiantaceae	Maidenhair Fern	Aerial parts	Behbahan, Khuzestan [15]
Anthemis cotula L.	Apiaceae	Mayweed	Flower	Behbahan, Khuzestan [15]
Gandelia tourenfortii	Asteraceae	Kangar	Stem	Saqqez, Kurdistan [16]
Rheus ribes	Polygonaceae	Rhubarb	Stem	Saqqez, Kurdistan [16]
Lactuca virosa Habl	Asteraceae	Wild Lettuce	Aerial parts	East Khuzestan [17]
Hyssopus officinale L.	Lamiaceae	Hyssop	Flowering shoots	East Khuzestan [17]
Salix alba L.	Salicaceae	White Willow	Bark, leaves	East Khuzestan [17]

The analysis results of the table showed that the Asteraceae family had the highest number of plant samples with 7 specimens, while other families, such as Berberidaceae and Salicaceae, had only one specimen each. Examining the frequency of different plant parts (such as leaves, flowers, fruits, etc.) can help identify the most commonly used parts. In this table, the "leaves" are the most frequently utilized. Most of the plants have been studied in the "Meshginshahr" region. A comparison between "Urmia, West Azerbaijan," and "Meshginshahr" shows that some plants, such as Cichorium intybus, are found in both regions.

The chart below (Figure 1) displays a linear regression between the number of plants (Y-axis) and different regions (X-axis). The red line represents the linear regression line, indicating the relationship between these two variables.

Figure 1. Linear Regression Analysis of Plant Distribution Across Different Regions



Discussion

Anemia, characterized by a reduction in hemoglobin levels and compromised oxygen delivery to the body's organs, is a significant public health issue. As a key component of hemoglobin, iron plays a vital role in oxygen transport. Exploring natural treatments for anemia offers potential solutions to address this condition.

Traditional Iranian medicine utilizes medicinal plants such as sorrel, nettle, dandelion, alfalfa, parsley, burdock, red raspberry, and rosehip for the treatment of anemia [18]. Foods like lentils, chickpeas, spinach,

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soybeans, chia seeds, cocoa powder, potatoes with skin, cashews, beans, mushrooms, plums, dried fruits, barley, and whole grains are rich in iron and can be beneficial in managing anemia [19]. Nettle leaves are particularly nutrient-dense, containing iron, vitamin A, vitamin C, magnesium, calcium, potassium, and antioxidants [20]. Alfalfa, another nutrient-rich plant, is high in protein, iron, calcium, magnesium, phosphorus, vitamin A, vitamin K, chlorophyll, and antioxidants [21]. The Greengage fruit is also a source of minerals and iron [22]. Sage has been shown to increase red blood cell production, making it effective in treating anemia [23]. Watercress, with its high iron absorption rate, can alleviate anemia [24]. Chicory, rich in iron, is also beneficial for treating this condition [25]. Fennel, containing iron and histidine, can combat anemia [26]. Barberry juice enhances the absorption of dietary iron [27]. In traditional medicine, chamomile, kangar, and hyssop are used to treat anemia [28]. Vitamin C can enhance iron absorption [29].

Conclusion

The medicinal plants investigated in this study either contain iron and hematopoietic compounds or enhance iron absorption through their vitamin C content, thereby promoting hematopoiesis and alleviating anemia.

Statements and Declarations

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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.

Consent to participate

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

Author contributions

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

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