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Hematopoietic medicinal plants based on ethnobotanical documents of Iran: A strategy to develop nature-based drugs effective on anemia

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ABSTRACT

Anemia is a very common public health problem which has recently been spread in both developed and developing countries. Anemia causes wanness, tachycardia, tinnitus, headache, irritability, weakness, and a number of non-specific complaints. Many of the plants can be used as hematopoietic. This article is to report the medicinal plants that are used as hematopoietic according to the main references of the Iranian traditional medicine. For this purpose, the related articles were retrieved from the Web of Science, PubMed, Scopus, Islamic World Science Citation Center, and Magiran by the search terms consisting of anemia, hematopoietic, ethnobotany, medicinal plants, Iran, and traditional medicine. According to the findings of this study, *Raphanus sativus*, *Oryganum vulgare*, *Thymus vulgaris*, *Rosmarinus officinalis*, *Petroselinum crispum*, *Allium sativum*, *Foeniculum vulgare*, *Spinacia oleracea* L., *Phaseolus vulgaris*, *Prunus armeniaca*, *Matricaria chamomilla*, *Cucumis melo var.inodorus*, *Rheum officinale*, *Cucumis melo*, *Ficus carica*, *Citrus latifolia*, *Solanum tuberosum* L., *Ananas comosus*, *Solanum lycopersicum*, *Brassica rapa*, *Daucus carota*, *Urtica dioica*, and *Centaurea cyanus* were found to be hematopoietic plants. These plants contain bioactive and antioxidant components that either have iron or affect the body's mechanisms and cause hematopoiesis.

Key words: Anemia, Hematopoiesis, Medicinal plants, Traditional medicine

INTRODUCTION

Heart diseases are the leading cause of mortality of both men and women. In Iran, as with many other countries, the frequency of risk factors and incidence of non-communicable diseases, the most frequent of which are cardiovascular diseases, is increasing and the age at acquiring these diseases is decreasing [1,2]. Anemia is a very common public health problem which has recently been spread in developed and developing countries [3]. Iron deficiency and iron deficiency anemia (IDA) are prevalent hematological and eating disorders across the world [4]. IDA is a prevalent eating disorder in developing countries and the most important cause of nutritional anemia in children and women of reproductive age [5,6]. Anemia is a clinical disorder which is characterized by decreased accumulation of blood hemoglobin, the age, gender, and physiological status of people, and the altitude of living place [7]. Worldwide, over 500 million people have recently been projected to acquire anemia [8]. Anemia causes tachycardia, wanness, headache, irritability, tinnitus, weakness, and certain non-specific complaints [9]. Worldwide, the most prevalent anemia is IDA which is characterized by decreased hemoglobin and plasma ferritin [10]. IDA is associated with adverse effects on muscular strength, physical output, and cognitive, behavioral, and learning development, and may cause impairment of immune system and the body temperature regulation [11]. Currently, iron supplementation for pregnant women and newborns is the only national strategy to resolve this problem, while there is no plan for preventing and controlling iron deficiency of other populations such as children, adolescents, and especially girls and women of reproductive age [12]. The common causes of IDA are inadequate intake of iron, iron malabsorption, bleeding, gastrointestinal diseases, and fungal infections. IDA leads to different complications

including growth restriction, exercise intolerance, behavioral changes, bad temper, attention deficit, irritability, and change in host immune response. Iron is an essential component of the body and the second leading frequent metal in the soil, and can be found in many plants. In certain cases, iron absorption is limited in the body [13]. Overall, there are three main categories of reasons for anemia consisting of inadequate production of red blood cells, ineffective production and hemolytic anemias. Besides these three main categories, IDA, categorized as ineffective production and diagnosed through description, detailed examination, and laboratory assessments, is considered a cause of anemia [14].

Currently, sciences are advancing very rapidly and the nations have to experience, acquire knowledge, and achieve advanced sciences to be able to live in the current world. In this regard, the use of the experiences of ancient Iranians to develop the science of medicinal plants and Iranian medicine is an approach to accelerate the development of this precious science [15-23]. Besides that, climatic diversity in certain countries, such as Iran, India, and China, has caused the occurrence of diverse, pharmaceutically valuable species, from flora perspective, in these countries, such that hundreds of plant species have been identified to date, with highly effective properties [24-38]. Iranian people from different cultures welcome the use of the medicinal plants greatly with still a growing use of these plants over the past two or three decades [39-50]. These natural sources are as old as human beings and have been a very important food and pharmaceutical source over the generations [51-56]. According to many natural therapists, physicians, and the experts of plant sciences, the medicinal plants can be used to treat diseases [57-68]. In fact, the medicinal plants, as a main source of drugs and therapies in the world, have played an effective role in medical, economic, and agricultural sciences worldwide [69-79]. Since the medicinal plants are considered vital to community development and large studies have been conducted to identify nature- and plant-based products and substances throughout history [80-99], then this article was to report the medicinal plants that are used as hematopoietic according to the Iranian traditional medicine to enable us to take an effective measure to develop pharmaceutical sciences and to produce the drugs with fewer side effects through identifying the experiences with the use of the medicinal plants to prevent and treat anemia in the traditional medicine.

For this review article, the articles were searched for in the databases Information Sciences Institute, PubMed, Islamic World Science Citation Center, Scopus, Magiran, and Google Scholar. The words of anemia, hematopoietic, ethnobotany, medicinal plants, Iran, and traditional medicine were used to search for the relevant articles.

The medicinal plants *Raphanus sativus*, *Oriyganum vulgare*, *Thymus vulgaris*, *Rosmarinus officinalis*, *Petroselinum crispum*, *Allium sativum*, *Foeniculum vulgare*, *Spinacia oleracea L.*, *Phaseolus vulgaris*, *Prunus armeniaca*, *Matricaria chamomilla*, *Cucumis melo var.inodorus*, *Rheum officinale*, *Cucumis melo*, *Ficus carica*, *Citrus latifolia*, *Solanum tuberosum L.*, *Ananas comosus*, *Solanum lycopersicum*, *Brassica rapa*, *Daucus carota*, *Urtica dioica*, and *Centaurea cyanus* were the most important medicinal plants native to Iran that are used to anemia. Other details of reported medicinal plants have been shown in Table 1.

Table. The most important medicinal plants native to Iran effective on anemia

No.	Scientific names	Family	Persian name
1	<i>Raphanus sativus</i>	Brassicaceae	Torb
2	<i>Oriyganum vulgare</i>	Lamiaceae	Marzanjoush
3	<i>Thymus vulgaris</i>	Lamiaceae	Avishan
4	<i>Rosmarinus officinalis</i>	Lamiaceae	Rozmari
5	<i>Petroselinum crispum</i>	Apiaceae	Jafari
6	<i>Allium sativum</i>	Alliaceae	Sir
7	<i>Foeniculum vulgare</i>	Apiaceae	Razianeh
8	<i>Spinacia oleracea L.</i>	Chenopdiaceae	Esfenaj
9	<i>Phaseolus vulgaris</i>	Fabaceae	Lobia
10	<i>Prunus armeniaca</i>	Rosaceae	Zardalou
11	<i>Matricaria chamomilla</i>	Asteraceae	Babouneh
12	<i>Cucumis melo var.inodorus</i>	Cucurbitaceae	Kharbozeh
13	<i>Rheum officinale</i>	Polygonaceae	Rivas
14	<i>Cucumis melo</i>	Cucurbitaceae	Talebi
15	<i>Ficus carica</i>	Moraceae	Anjir
16	<i>Citrus latifolia</i>	Rutaceae	Limotorsh
17	<i>Solanum tuberosum L.</i>	Solanaceae	Sibzamini
18	<i>Ananas comosus</i>	Bromeliaceae	Ananas
19	<i>Solanum lycopersicum</i>	Solanaceae	Goje farangi
20	<i>Brassica rapa</i>	Brassicaceae	Shalgham
21	<i>Daucus carota</i>	Apiaceae	Havich
22	<i>Urtica dioica</i>	Urticaceae	Gazaneh
23	<i>Centaurea cyanus</i>	Asteraceae	Gole gandom

DISCUSSION

The medicinal plants cause fewer side effects because of being nature-based and more adaptable to the body's organisms than chemical eating. In this review article, 23 medicinal plants were found to be hematopoietic agents. Plant antioxidants may inhibit the lysis of red blood cell membrane enhances and strengthens the blood and prevent the harmful effects of free radicals [100]. Some plants absorb iron from the earth and the plants are a rich source of iron. Some plants have healing properties of gastric ulcers and in this way to improve anemia or a number of plants with anti-blood-sucking parasites improve anemia status. These plants can have hematopoietic activity through different mechanisms such as iron absorption-increasing agents, such as citric acid and ascorbic acid. The medicinal plants that are rich in iron, malic acid, and tartaric acid are able to increase iron absorption and erythropoiesis.

Although the health benefits of phenolic compounds with antioxidant activity which are found in some fruits and vegetables are established, but some phenolic compounds decrease the absorption of iron, increasing the risk of iron deficiency. The most important benefits of phenolic compounds are their positive effects in prevention and treatment of various diseases [101-119], but they have negative effects on nutrient absorption. For example iron which is necessary for cellular functions and carrying the oxygen from the lungs in people with iron deficiency increase the risk if they consume the plants with high level of phenolic compounds such as using high amounts of grape seed extract or EGCG [120]. There are a lot of plants having high amounts of these agents [121-159]. Therefore, these subjects should avoid consumption of these plants.

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