



MEDICINAL PLANTS HAVING ANTIANEMIC PROPERTIES

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Abstract: - Anaemia is a prevalent malnutrition-related illness that is a global health concern impacting both developed and developing nations. There are various medicinal plants, which enrich hemoglobin content and on the other hand it also it help cure multiple health conditions such as cancer, diabetes, ulcer, lipid control, cure pain, fever, common cold and so on. Nutritional deficiency, inadequate amounts of some of the vitamins and minerals that are needed for hemoglobin production, may likewise cause iron deficiency. Because hemoglobin is the pigment that makes blood cells red, a lack of hemoglobin will cause the cells to be a paler color, leading to the term hypochromic, lacking in color. Medicinal plants comprising munga (*Moringa oleifera*), amla (*Phyllanthus emblica*), chukander (*Beta Bulgaria*), and mango (*Mangifera indica*), can also be used to cure anaemia. The purpose of this review is to discuss these herbal plants and their influence on iron deficiency anaemia.

Keywords: Medicinal plants, anemia, hemoglobin, iron deficiency, antianemic properties.

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I. Introduction

For millennia, people have utilized plants as a source of medical ingredients, and this practice is becoming more widespread. It is estimated that 80% of people on the planet rely on herbal remedies to suit their health needs.(1) Medicinal plants have been used to treat a variety of illnesses, and anemia is no exception.(2) Because they generate a wide range of bioactive compounds that most likely serve as a chemical defense against pathogens or predators, plants are a rich source of pharmaceuticals.(3) Anaemia is a condition in which the quantity of red blood cells or their oxygen-conveying limit is deficient to meet physiologic requirements, which change by age, sex, height, smoking, and pregnancy status. (4) Anemia is characterized by low hemoglobin concentration.(5) It is most predominant blood cell deficiency disorder, is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development.(6) Hemoglobin is one of the most vital proteins that are predominant in red blood cells.(7) The incidence of anemia is higher in the world than in developed countries.(8) There are multiple factors that may cause anemia, however, deficiency of iron is the most common one.(9)

Anemia affects 273 million people worldwide, or 43% of them.(5) The World Health Organization (WHO) reports that the number of people suffering from anemia is rising (to over 2 billion), with iron deficiency being the cause of 50% of cases (WHO, 2001).(11) Phytotherapy has been investigated in recent years as a potential treatment for tropical diseases.(12) Researchers are currently

working to create several medications using plant extracts for therapeutic purposes.(13) Anemia can hinder a person's ability to work, either individually or as a population. This can have detrimental effects on the economy and impede a country's progress.(14) Medicinal plants categorized as Rasayana in Ayurveda have long been thought to be beneficial for boosting a person's immunological and hematological systems.(15) Among the many illnesses that traditional healers claim to have effectively treated with plant materials is anemia.(16)

Anemia is a dangerous public health disorder that can afflict people of any age. It is characterized by a drop in the blood's ability to carry oxygen and a fall in hemoglobin levels. It lowers the tissue's oxygenation and has the potential to quicken the progression of several related illnesses.(17) One of the most important proteins found mostly in red blood cells is hemoglobin. It facilitates the movement of oxygen throughout the body. Hemoglobin can be found in two types deoxyhemoglobin and oxygenated form. Deoxyhemoglobin is often purple-blue in hue, whereas oxyhemoglobin is typically brilliant red.(18) Anemia occurs when the hemoglobin content and volume packed red blood cell count (hematocrit) per 100 milliliters of blood fall below normal limits.(19) The most prevalent illness in worldwide is anemia.(20) Anemia comes in more than 400 varieties, the most common of which being hemolytic anemia.(21)

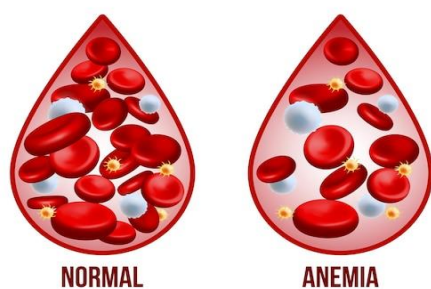


Figure 1: Overview of Anemia

Most often, anemia is more common in developed and developing nations where hunger is a serious issue. Because they require less work and are readily available, herbal preparations are used in modern medicine instead of synthetic ones. (4) The use of therapeutic plants in traditional medicine dates back to the dawn of humankind. This method of health care was classified as Herbalism or Botanical medicine.(22) A number of writers have claimed that eating fruits and vegetables improves health. Since they have been linked to improved health in the majority of developed nations, they have received extensive media coverage and are highly recommended for consumption.(23) In underdeveloped nations, medicinal plants have been utilized to treat a variety of illnesses, including anemia.(24) Ayurvedic physicians suggested an as a source of iron and other minerals.

Hemoglobin levels below 130 g/L for men and below 120 g/L for women are considered anemia according to WHO criteria .Paleness is one of the most often recognized symptoms of anemia. (25) Anemia has many different causes and forms. These include anemia caused by sickle cell disease, anemia caused by iron deficiency, anemia caused by a vitamin B12 deficiency, anemia caused by drugs as a side effect of pharmacological therapy, anemia caused by disease, etc.(26) Two criteria can be used to categorize anemia. The first is based on red blood cell morphological characteristics and associated indices, while the second is based on etiology. Three types of anemia are distinguished by the morphological approach: macrocytic normochromic anemia, macrocytic hypochromic anemia, and normochromic normoxic anemia.(27) One of the ailments for which herbal extracts were purportedly effective is anemia.

II. Epidemiology

The main cause of anemia is the discrepancy between the body's ability to store iron and its requirement for it in tissues due to diseases linked to blood loss. The primary reasons are:

1. Insufficient intake of iron.
2. Good for Increased Iron Requirement.
3. Reduced ability to absorb iron.
4. Abnormal iron deficiency (repeated hemorrhage)(17)

Infections, hemoglobinopathies, long-term renal problems, gastrointestinal issues, and other ailments are additional significant causes of anemia.(28)

The most common type of hemoglobinopathy in the world is caused by faulty hemoglobin genes found in the global population. The top 10 most affected countries, according to a research study

conducted between 2008 and 2017, are the United States (46.89%), the United Kingdom (9.58%), France (7.23%), Brazil (5.95%), and the remaining 6 countries (Nigeria, Germany, the Netherlands, Canada, India, and Italy) (2.12%–3.80%).(29) Hemolytic anemia is a worldwide public health issue that affects individuals of all ages.(30) It is believed that iron deficiency causes 50% of anemia cases worldwide.(31) The kind of anemia determines the course of treatment. Oral iron, vitamin B12 or B9, corticosteroid or immunosuppressive medication, erythropoietin injections, blood transfusions, or even bone marrow transplants are possible forms of treatment.(32)

III. Pathophysiology

Anemia occurs when the body's iron stores become depleted and a restricted supply of iron to various tissues becomes apparent.(33) It is a genetic condition brought on by the inheritance of two aberrant allelomorphous genes that regulate the production of the hemoglobin beta-chain.(34)

- Blood loss-related anemia can result from either acute or persistent blood loss.
- Anaemia brought on by decreased red cell production: aplastic anemia, bone marrow failure.
- Hemolytic anemias: acquired (autoimmune, mechanical destruction, toxic-metabolite, etc.) and genetic (Sickle cell anemia, thalassemias, etc.) (28)

IV. Risk Factors

It includes bacterial infections, inadequate iron consumption, poor absorption, and varying degrees of chronic blood loss.

Low birth weight and early birth are common outcomes for women who suffer from anemia or iron insufficiency.

V. Symptoms

A hereditary condition known as anemia is typically accompanied with chronic ulcers, an enlarged spleen, excruciating joint and finger swellings, dyspnea, palpitations, abdominal pain, and occasionally even death.

As 44% anemia worsens, symptoms include extreme thirst, disorientation, and fainting.(35) Symptoms include weakness, tinnitus, anxiety, dyspnea, pale or yellowish complexion, exhaustion, intolerance to exercise, and chest discomfort. fatigue, headaches, cramping in the legs, nail problems, and commissural cheilitis (oral cracking).(36)

VI. Plants with Antianemic Properties

1. *Phyllanthus emblica*

Commonly referred to as Indian gooseberry or Amla, *Phyllanthus emblica*, a member of the **phyllanthaceae** and genus *Phyllanthus*, has been found to have anti-anemic qualities when used as a medicinal herb. Anemia is typically caused by low hemoglobin levels in the blood.(18) It has a high content of minerals, amino acids, and vitamin C, all of which support the development of vigor and vitality. Different portions are used to cure different conditions, such as diabetes, diarrhea, and anemia. Amla juice contains several organic acids, including citric acid, gallic acid, malic acid, tartaric acid, and others, which are known to enhance

the bioavailability of iron.(37) Amla fruits have laxative, diuretic, astringent, cooling, and refrigerant properties.(38)



Figure 2: Phyllanthus Emblica (Amla) fruit

2. Trigonella foenum-graecum

Fenugreek, or *Trigonella foenum-graecum*, is a member of the **Fabaceae** family and genus of plants that have been used medicinally to cure a variety of illnesses.(18) The main component used to cure anemia is *Trigonella foenum-graecum* seeds. Seed extract's phytonutritional constituents, such as flavonoids, sterols, carbohydrates, and saponins, are on exhibit.(17) The iron content of one tablespoon of fenugreek is 3.72 milligrams.(4) Fenugreek seeds have been suggested to contain sources of essential amino acids (lysine and threonine), minerals (iron and copper), and vitamins (folate and ascorbate) that are important components of hemoglobin. They may also have a significant role in increasing hemoglobin biosynthesis and elevating hemoglobin levels in subjects who received supplements of the same medicinal plant.(18)

Fenugreek (*Trigonella foenum-graecum* Linn.) is an annual herb which has widely been consumed throughout the world as a food, a food additive and in the traditional remedies science civilizations.(39)



Figure 3: *Trigonella foenum graecum*(Fenugreek)

3. Moringa oleifera

One of the monogeneric family's most widely distributed varieties is *Moringa oleifera* (4). It belongs to the **Moringaceae** family and is referred to as drum stick in English and munga in Hindi. According to reports, the leaves of the moringa plant contain a substantial amount of iron, which helps children under the age of two who suffer from anemia.(40) The effects of ethanolic extract from moringa leaves were evaluated on the parameters of haematology (hemoglobin, red blood cell count, and hematocrit) (4). The antianemic, anti-inflammatory, hypertensive,

antimicrobial, antioxidant, and cardioprotective properties of *moringa oleifera* make it useful (37). Following treatment with *moringa oleifera*, the control group's levels of hemoglobin, erythrocyte, hematocrit, mean corpuscle volume, mean corpuscle HB, and red cell distribution had all increased.(37) Moringa oil is used on the body and has great aesthetic value.



Figure 4: *Moringa oleifera* (Drumsticks)

4. Beta vulgaris

The **Amaranthaceae** family includes the plant known as *beta vulgaris*, or beetroot, one of the most widely consumed vegetables worldwide. The evaluation of beetroot extracted with ethanol's anti-anaemic potential.(4) It's also referred to as beetroot in English and chukandar in Hindi. It contains a significant amount of iron, minerals, and vitamins that raise blood hemoglobin levels, particularly in pregnant women.(40) 0.8 g of iron are present in 100 g of beet plant. The consumption of beetroot juice raises hemoglobin levels. (37) It affects iron metabolism, liver detoxification, blood pressure management, the gastrointestinal tract, the cardiovascular system, and eye health. It also has anti-inflammatory and antioxidant properties. It also has anti-carcinogenic and anti-diabetic properties.(37) Beetroot's vitamins and minerals are probably the active ingredients that have hematinic effects.(4) beetroot is claimed to be useful in haematological disorders, its juice has obvious nutritional, medicinal and health benefits. Its also considered as rich supply of vitamins and minerals such as iron, magnesium and excellent source of folate.(41)



Figure 5: *Beta Vulgaris* (Beetroot)

5. Carica papaya

The *Carica papaya*, sometimes known as the papaya, is a tropical evergreen tree in the **Caricaceae** family that bears delicious fruit. The plant is also referred to by the names tapuya, pawpaw, kapaya, and kepay. This study evaluated the nutritional composition of

raw pawpaw (*Carica candamarcensis*) in relation to anemia in infants and pregnant women (ages 1-3).(4) It is thought that papaya leaves may have antioxidant and anti-inflammatory qualities. Papaya leaf extract is used in some traditional therapies to reduce inflammation and pain related to sickle cell crises. Numerous in vivo study investigations have documented the application of *C. papaya* in the treatment of sickle cell patients. Furthermore, *C. papaya* seed oil has anti-sickling qualities and may help sickle cell patients feel less pain.(42). The outcomes showed that the juice has therapeutic medication potential to hinder and manage anaemia.(4)



Figure 6: *carica papaya*

6. *Mangifera Indica*

Mangifera indica is a member of the *Mangifera* genus and the **Anacardiaceae** family. One of the most widely used plants with numerous therapeutic benefits is this one. *Mangifera indica*, a plant widely grown worldwide, is also referred to as the mango. (18) *Mangifera indica* contains various parts that have been shown to have beneficial effects on health. These include parts that are anti-oxidant, anti-diabetic, antiviral, anthelmintic, anti-allergic, anti-parasitic, anti-bone absorption, anti-tumor-anti-HIV, antispasmodic, antipyretic, immunomodulatory, anti-inflammatory, antibacterial, antifungal, anti-microbial, hepatoprotective, and gastroprotective.(65) Additionally, it was demonstrated that the ability to raise hemoglobin and red blood cell production as well as the ability to treat hyperlipidemia and cardiovascular problems.(18)



Figure 7: *Mangifera Indica* (Mango)

7. *Asparagus racemosus*

Asparagus racemosus, also known as Satawar, Satamuli, or Satavari, is a member of the **Liliaceous** family and is native to low elevations in India. Possible effects on anemia of *Asparagus racemosus* extract.(4) Research indicates that *asparagus racemosus* extract, at 750 mg/kg, increases the number of red blood cells, Hb,

and significantly decreases MCH and leukocytes when compared to anemia group, implying that *asparagus racemosus* may be used as an anti-anemia substitute. In addition, it caused a considerable increase in weight when compared to the control and iron-deficient groups. Anti-anemia qualities have been demonstrated by *Asparagus racemosus*.(4)



Figure 8: *Asparagus racemosus* (satavari)

8. *Justicia carnea*

It is a member of the family **Acanthaceae**. The medicinal herb *Justicia carnea* has demonstrated a wide range of uses and is noted for having numerous therapeutic benefits. This plant is indigenous to Pakistan, Srilanka, and India. In the modern day, it has been accepted as a treatment for numerous illnesses via a variety of medical systems.(18) The medicinal herb *justicia carnea* is said to have several pharmacological properties, including the ability to increase blood flow. According to these research, *justicia carnea* leaves not only possess antianemic qualities, but they also do not produce toxicity when applied in high quantities to important organs like the liver and kidneys.(19)



Figure 9: *Justicia carnea*

9. *Curcuma longa* linn

As a member of the **Zingiberaceae** family of plants, *Curcuma longa* yields turmeric through its rhizome. study on plants effective against anemia, it was shown that in an antianemia test, the levels of hemoglobin and erythrocytes were elevated when 200 mg/kg BB of turmeric squeeze and 200 mg/kg BB of turmeric ethanol extract were administered.(19) It raises the levels of oxyhaemoglobin and red blood corpuscle in rats when NaNO₂ is used as an inducer and studies *Curcuma longa* Linn's antianaemic properties. (17) The polar group in turmeric juice provides an additional advantage.(17)



Figure 10: *curcuma longa linn* (Turmeric)

10. *Glycyrrhiza glabra*

Glycyrrhiza glabra Other names for this are sweet licorice and real licorice. *Glycyrrhiza glabra* is a member of the **Fabaceae/Leguminosae** family. It has been demonstrated that *Glycyrrhiza glabra* protects against anemia. (17) With all dosages of *Glycyrrhiza glabra*, the levels of red blood corpuscle, oxyhemoglobin, PVC, and MCV in untreated controls can increase. (17) Research on *Glycyrrhiza glabra* revealed hepatoprotective benefits against anemia. In this study, using mice that had been given phenylhydrazine-induced anemia, researchers assessed the anti-anemia properties of *Glycyrrhiza glabra* water extract. The leaf is the plant portion that is utilized. The herb has long been used as a preventative measure against duodenal and stomach ulcers as well as an anti-inflammatory during allergic reactions in cases of dyspepsia. It was utilized in folk medicine as an emmenagogue, galactagogue, contraceptive, laxative, and anti-asthmatic medication. *Glycyrrhiza* roots were used for demulcent and expectorant property.(43)



Figure 11: *Glycyrrhiza glabra* (liquorice)

11. *Hibiscus cannabinus*

Another medicinal plant in the **Malvaceae** family is *Hibiscus cannabinus*. The genus *Hibiscus*, sometimes referred to as Kenaf, has demonstrated the capacity to raise iron levels, which in turn lowers the incidence of anemia. After one week of treatment, the red blood cell count, hemoglobin concentration, and pack cell volume (which had been initially decreased by phenylhydrazine administration) all significantly increased ($P < 0.05$) when *Hibiscus*

cannabinus leaf extract was administered. The animals' macrocytosis began to return to normal as they recovered from their anemia. Because the animals recovered from their anemia, the pathology shifted from traditional to traditional. The results collected steered that *Hibiscus cannabinus* leaves might have therapeutic medication characteristics.(44) It has been demonstrated to reverse anemia and to enhance packed cell volume, hemoglobin, and red blood cells.(18) The presence of phytosterols, flavonoids, polyphenols, tannins, steroids, alkaloids, saponins, lignans, essential oils, and glucosides such anthocyanin glycoside, cannabiscitrin, and cannabiscetin was revealed by the phytochemical study of *H. cannabis*.(44)



Figure 12: *Hibiscus cannabinus*

12. *Allium sativum linn*

The mature bulb of *Allium sativum* Linn., a member of the **Liliaceae** family, is known as garlic. Many societies have prized garlic (*Allium sativum*) for its health benefits as well as its use as a popular flavoring in food. The complex and diverse properties of garlic are widely believed to be the source of its many health benefits, including but not limited to its anti-platelet, pro-circulatory, anti-inflammatory, antiapoptotic, neuroprotective, and anti-cancer effects.(4) Aged Garlic Extracts, a formulation of garlic (*Allium sativum*), have been shown to have antioxidant effects in vitro. Therefore, because aged garlic has been shown to inhibit hemolysis and prevent decreased membrane deformability, it may be helpful in the management of sickle cell disease. Aged garlic extracts' antioxidant impact on sickle red blood cells (RBCs) was assessed.(42)

Garlic may increase iron absorption by expanding iron transport into the circulation system. Garlic secures against iron overload in rats given overabundance iron were ensured by supplementation with fresh garlic.(4)



Figure 13: *Allium Sativum linn* (Garlic)

VII. Conclusion

A reduction in the quantity of red blood cells in circulation is the hallmark of anemia. The most prevalent nutritional condition in the world, iron deficiency anemia mostly affects women and children. In this analysis *Phyllanthus Emblica*, *Trigonella foenum graecum*, *Moringa oleifera*, *Beta Vulgaris*, *Carica papaya*, *magnifera Indica*, *Asparagus racemosus*, *Justicia Carnea*, *curcuma longa* linn, *Glycyrrhiza glabra*, *Hibiscus cannabinus*, and *Allium Sativum* linn are just a few of the plants that have anti-anemic activities. These plants can raise hemoglobin levels and erythrocyte counts. It can be inferred from a variety of plants that are effective against anemia that *Moringa Oleifera* raises hemoglobin levels, erythrocyte counts, and a higher proportion of hematocrit compared to other plants.

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