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"Anemia: Understanding It's Impact and Treatment Through Modern And Herbal Medicine."

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Abstract:- One of the most common health issues is anemia, which can lead to major health issues such as delayed mental and psychomotor development, decreased productivity at work, heightened vulnerability to parasite infections, and stunted infant growth. Low socioeconomic position, nutritional inadequacies, helminthic infections and other infectious diseases, illiteracy, and blood disorders are the causes that cause anemia. Iron deficiency, foliate deficiency, hookworm infection, and malaria are the main causes of anemia. About half of the two billion people who suffer from anemia have an iron deficit. Treating the underlying causes, bringing the hemoglobin concentration back to normal, and preventing and treating consequences are the most economical ways to combat anemia.

Keywords: Iron deficiency, Anemia, Health surveys, Maternal, Child health

1. Introduction:-Anemia is one of the most widespread public health problems throughout the world. It is much more common in developing countries where people suffer from malnutrition and helminthic infections. However, iron deficiency in diet is the primary cause of anemia in wealthy nations. [1].

Blood is an essential fluid that your heart continuously pumps through your veins, arteries, and entire body. Anemia is a blood condition. Your health and quality of life may be impacted when something goes wrong with your blood.Anemia is a prevalent nutritional deficiency condition and worldwide public health issue that has a significant impact on people's health as well as the social and economic advancement of both developed and developing nations. [2]. According to WHO [2004], one third of the global population [over 2 billion] are anemia due to imbalance in their nutritious food intake [3]. According to WHO estimations, India has the greatest rate of anemia even among South Asian nations. An important fact is that about half of the global maternal death due to anemia occurs in South Asian countries. India contributes to about 80 percent of the maternal deaths due to anemia in South Asia [4].

Anemia is the condition resulted when the body has not enough red blood cells to transport oxygen from the lungs to each cell [5]. It occurs when there is reduction in hemoglobin concentration of the peripheral blood below the normal level in relation to age and sex [6]. Anemia can affects people of all ages, races and ethnicities. While certain forms of anemia are quite uncommon, others are extremely frequent. Some are mild, and other are severe or life-threatening if not treated aggressively. Anemia often can be successfully treated and even prevented.[7]

A decrease in the percentage of red blood cells is referred to as anemia. It is not a diagnosis, but a presentation of underlying condition. Whether or not a patient becomes symptomatic depends on the etiology of anemia, the acuity of onset, and the presence of other diseases such as presence of other diseases, especially presence of cardiovascular disease.Most patients experience some symptoms related to anemia when the hemoglobin drops below 7.0 g/dl.The World Health Organization [WHO] criteria for anemia In men are less than 13 gm. /dl And women is less than 12 gm. / dl. However, it differs by age, sex and pregnancy status [8]

2.ETIOLOGY OF ANEMIA

The causes of anemia can be classified based on red blood cell morphology. Several types of anemia according to morphology and their causes include Aplastic anemia caused by bone marrow damage [9], microcytic anemia due to Iron deficiency [10], normocytic anemia triggered by chronic diseases, Disruptions in red blood cell production in the bone marrow, kidney failure, or Bleeding [11], hemolytic anemia that occurs due to damage to red blood cells.Before they reach maturity [12], and macrocytic anemia (megaloblastic & Pernicious) resulting from deficiencies in vitamin B12, folic acid, and protein Synthesis disorders [13]. Hemoglobinopathies anemia, a genetic disorder, leads To abnormal red blood cell shapes as seen in sickle cell anemia and thalassemia [14]. Small size is referred to as microcytic, and hemoglobin content that is below normal (low MCV; low MCHC) is referred to as hypochromic. In iron deficiency anemia, sideroblastic disorders, or persistent blood loss, this often indicates a lack of heme (iron) production. In addition, this condition can also be associated with impaired globin synthesis, such as thalassemia [13]

3.EPIDEMIOLOGY OF ANEMIA

Anemia is a very common condition that affects up to one-third of the global Population.In many cases, it is mild and does not cause symptoms, so it may not require treatment.The prevalence of anemia increases with age and is more common in women of Reproductive age, pregnant women, and the elderly.The prevalence is more than 20% in individuals over the age of 85.The incidence of anemia is around 50%-60% in nursing home populations. In the Elderly, approximately onethird of patients have anemia caused by nutritional Deficiencies, such as iron, folate, and vitamin B12. In another third of patients, there is Evidence of renal failure or chronic inflammation [15]

Classically, mild iron deficiency anemia is seen in women of childbearing age, usually Due to poor dietary intake of iron.Anemia is also common in elderly patients, often due to poor nutrition, especially of Iron and folic acid. Other at-risk groups include alcoholics, the hy5.The study of epidemiology Numerous factors, including age, dietary habits, Socioeconomic situation, ethnic mix, and the criteria employed to establish the Diagnosis, influence the prevalence of iron deficiency anemia.Children between the ages of nine months and three years are generally the most Susceptible to iron deficiency anemia [16].

During adolescence, the frequency rises once more after declining among school-age Children
Maternal iron deficiency, preterm birth, low birth weight, small for gestational age, twin Pregnancy, twin-to-twine transfusion, intrauterine growth retardation, immediate Clamping of the umbilical cord at birth, perinatal bleeding, low-iron infant formula use, Prolonged breast feeding without iron supplementation, delayed introduction of solid Foods after six months.[17]

4.PATHOPHYSIOLOGY

Iron is a necessary element in the body and is mainly controlled by how much we eat, how well our body absorbs it from the intestines, and how much iron is recycled. Haem iron and non-haem iron are the two types of dietary iron. Haem iron is easier for the body to absorb and is found in foods like meat, poultry, and fish because it comes from haemoglobin and myoglobin. Non-haem iron is mostly found in plant-based foods but is not as easy to absorb. Certain compounds in plants, like phytate, oxalate, polyphenols, and tannin, can reduce the amount of non-haem iron the body takes in. Some medicines, like proton pump inhibitors, can also affect this. On the other hand, substances such as ascorbic acid, citrate, and stomach acid help the body absorb iron better. In a normal, balanced diet, a person usually takes in about 5 to 15 milligrams of elemental iron

and 1 to 5 milligrams of haem iron each day, but only around 1 to 2 milligrams is absorbed bloodstream, mostly in the duodenum and the beginning part of the jejunum.[18]

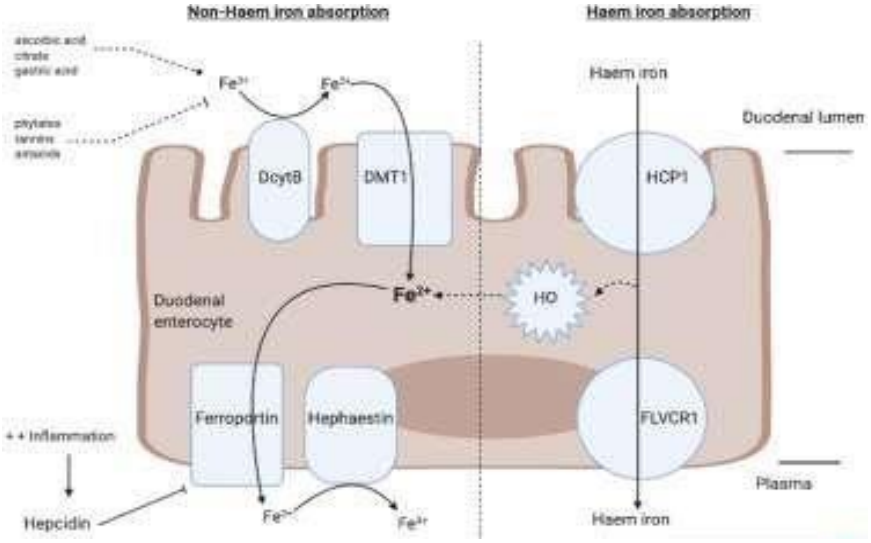

Fig 4.1: Mechanism of haem and non haem iron absorption in the intestine

5.TYPES OF ANEMIA

Anemia results from several RBC abnormalities, including decreased production, as seen Within. Aplastic anemia, impaired maturation deficit in megaloblastic anemia, errors in haemoglobin. Synthesis characterized by iron deficiency anemia, genetic defects of haemoglobin maturation Manifested in thalassemia, synthesis of abnormal haemoglobin detected in hemoglobinpathies, Sickle cell anemia and thalassemia and weight loss of RBC's are in hemolytic anemia.
The following are the different types of anemia

1) Iron- Deficiency Anemia. 2) Sickle cell Anemia 3) Thalassemia.
4) Pernicious Anemia. 5) Hemolytic Anemia. 6) Aplastic Anemia

1)Iron-Deficiency Anemia

Iron-Deficiency Anemia is one of the most common anemia in world as well as in India. It is a condition when the blood has insufficient amounts of iron. The protein found in red blood cells called hemoglobin is responsible for transporting oxygen throughout the body. Iron is essential for various Activities of the body especially in haemoglobin synthesis. Anemia results from insufficient iron because less hemoglobin and red blood cells are produced. This type of anemia are more Common in adolescents and in women [19].

This illness may be exacerbated by blood loss from internal gastrointestinal bleeding or excessive blood donation. Anemia can be caused by low iron levels for several reasons. The causes of iron deficiency anemia Are pregnancy or childhood spurts, poor absorption of iron, bleeding from The gut (intestines), Dietary factors (iron poor or restricted diet), medication (aspirin, Ibuprofen, naproxen and Diclofenac), lack of certain vitamins (folic acid and vitamin B12), Bleeding from the kidney , Hookworm infection, red blood cell problems, bone marrow
Problem[20]

2) Sickle cell anemia

This type of anemia is characterized by the production of sickle-shaped, or "C"-shaped, red blood cells by the body. Its aberrant hemoglobin gives it a sickle shape and makes it difficult for the blood to flow through the arteries. The sickle cell aggregates obstruct blood flow to the organs and limbs. Organ damage, severe infections, and discomfort are all brought on by blocked blood arteries. Because sickle cells only last 10 to 20 days, the body is unable to make enough red blood cells to replace those that die, which results in blood loss and anemia. Because sickle cell anemia is hereditary, it is an incurable condition that is passed down from one

generation to the next. It is a chronic illness that is most prevalent in South or Central America and Africa. Mediterranean countries, India and Saudi Arabia[21]

6.SIGNS AND SYMPTOMS OF ANEMIA

1) Pallor.
2) Epithelial Changes. 3) Nail Changes.
4) Pedal Edema
5) Plummer-Vision Syndrome[22]

7.KEY REASONS FOR ANEMIA

Low socioeconomic position, nutritional deficiencies, helminth infections and other infectious Diseases, illiteracy, and blood disorders including sickle cell anemia are some of the causes of Anemia [23,24]. Malaria, foliate deficiency, hookworm infection, and iron inadequacy are the Main reasons in these societies The two primary causes of anemia that are taken into Consideration in this analysis are parasite infections and dietary deficiencies.[25]

A)Iron deficiency

Iron deficiency, vitamin B12 deficiency, and foliate deficiency anemia are examples of anemia Brought on by nutritional deficiencies . Iron deficit: The most common ailment that Primarily causes anemia is iron deficiency. According to WHO estimates, iron deficiency Accounts for almost 50% of anemia [26]. It results in a decrease in red blood cells' hemoglobin Content, which is the iron-containing pigment that transports oxygen from the lungs to the cells. Lack of iron When the amount of iron absorbed from the meal is less than the average daily Intake needs, anemia results. Iron shortage may also result from the body's poor absorption of Iron. An individual's health, cognitive development, academic performance, and work Performance are all significantly impacted by iron deficiency [27]

B)Vitamin B deficiency

A lack of vitamin B-complex in the diet may cause anemia. Due to its importance in the Production of hemoglobin, which increases the delivery of oxygen, vitamin B6 deficiency has Been linked to anemia. Iron deficiency anemia is comparable to a type of anemia caused by a Vitamin B6 deficiency. A lack of riboflavin (vitamin B2) can also result in anemia. In developed Countries this problem has been reported from infants born to Vegetarian mothers as B12 is not Present in plant. Anemia can also be resulted from. Impaired absorption of Vitamin B12[28]

C)Pregnancy

Being pregnant For the mother's blood volume to rise by about 50%, her erythrocyte mass to Increase by about 35%, and for iron to be diverted to the fetus for erythropoiesis, she needs About 1,200 mg of iron during pregnancy from conception to delivery The third trimester is When iron is primarily diverted to the fetus for erythropoiesis In the third trimester of Pregnancy, iron use rises from about 2 mg/day in the first trimester to about 6 mg/day Iron[29]

8.DIAGNOSIS AND INVESTIGATION OF ANEMIA

A) Diagnosis

1)Medical and family histories

2)Physical exam.

3)Tests and procedures.

B) Investigation

1)Routine investigation.

2)Peripheral smear.[30]

9.TREATMENT OF ANEMIA

Anemia treatment depends on what's causing it.

A)Iron deficiency anemia

To treat this type, you usually take iron pills and make changes to your diet.If the lack of iron Is because of blood loss, it's important to find where the bleeding is coming from and stop It.This could require surgery

B)Vitamin deficiency anemia

For folic acid and vitamin B-12 deficiency, treatment includes taking supplements and eating More foods with these nutrients. If your body can't absorb vitamin B-12 properly, you may Need shots of vitamin B-12.At first, these shots might be given every other day. Over time, they May be given once a month, possibly for life.[31]

C)Anemia of chronic disease

For this type, the focus is to treat the underlying disease. If symptoms get worse, you Might need a blood transfusion, or shots of a hormone called erythropoietin.Anemias linked to Bone marrow disease.The treatment can involve medicine, chemotherapy, or a bone marrow Transplant from a donor.

D)Aplastic anemia

This type of anemia can be treated with blood transfusions to increase red blood cells. A bone Marrow transplant may be needed if the bone marrow isn't making healthy blood Cells.Hemolytic anemias.Managing this condition includes stopping any medicines that might Be causing it and treating infections. Medications that lower immune system activity may be used as treatment if the immune system is targeting red blood cells. [32]

E)Sickle cell anemia

Treatment may include oxygen, pain relief, and fluids given through a vein to reduce pain and Prevent problems. Blood transfusions, folic acid supplements, and antibiotics may also be Used.A cancer medicine called hydroxyurea (Droxia, Hydrea, Siklos) is also used for sickle cell Anemia.[33]

10.HERBS USED IN TREATMENT OF ANEMIA

1)Amla (Emblica, Indian gooseberry or amla) (Biological source/ family Emblica officinalis Gaerth (Phyllanthus emblica Linn.),Belonging to family Euphorbiaceae .[34]) :-

Fig no.10.1:- Amla

• Role of amla in the treatment of anemia

A)High Vitamin C Content

O Converts Ferric Iron (Fe^{3+}) → Ferrous Iron (Fe^{2+})

O Enhances intestinal iron absorption

B)Antioxidant Compounds (Emblicanin A & B, Flavonoids, Tannins)

O Reduce oxidative stress on red blood cells (RBCs)

O Prevent hemolysis (RBC destruction)

C)Stimulation of Hematopoiesis

O Activates bone marrow → Increases RBC production.

O Enhances Erythropoietin secretion.[35]

D)Hepatoprotective Action

O Improves liver function.

O Enhances iron storage & metabolism (ferritin, transferring regulation)

E)Nutritional Support

O Provides iron, amino acids, minerals.

O Supports hemoglobin synthesis [36]

• **Uses of Amla**

Amla is a very important fruit in Ayurveda and modern herbal medicine because it has a lot Of nutrients and helps build blood. It is useful for treating iron deficiency anemia and Improving blood health overall.

1)Source of Iron and Vitamin C

Amla contains natural iron that helps increase hemoglobin levels.It is very rich in Vitamin C, which is one of the highest among fruits. This helps the body absorb iron from plant Sources better. When amla is used with other iron-rich herbs or foods like sesame seeds, Moringa, spinach, the body can use the iron more effectively.

2)Improves Hemoglobin and Red Blood Cell Production

Drinking amla juice or taking amla powder regularly helps the body make new red blood Cells. The antioxidants in amla, such as ellagic acid and gallic acid, also protect red blood Cells from damage caused by harmful substances.[37]

3)Acts as an Immunity Booster

Anemia can make the body weaker and lower immunity, leading to fatigue and more Infections. Amla helps strengthen the immune system and reduces weakness and the risk of Repeated infections.

4)Enhances Iron Supplement Therapy

When used along with iron-rich herbs such as Punarnava, Sesame, or Moringa, amla can make iron therapy more effective and help reduce side effects like stomach upset.[38]

2)Sesame Seeds (Til) **(**Biological source/family**:-**Sesamum indicum Linn., belonging to the family Pedaliaceae.[39])

Fig no.10.2:- Seasem seed o

• **Role of sesame seeds in the treatment of anemia** A) Rich Source of Iron Black sesame seeds are particularly rich in nonheme iron. o Regular intake increases the body's iron pool. Helps in restoring iron stores and improving red blood cell production.[40] B) Presence of Copper and Zinc

o Sesame seeds contain copper and zinc, trace elements required for iron metabolism and RBC maturation.

o Copper aids in the creation of hemoglobin and the transformation of iron into ferrous iron, which is useful.

o Zinc supports enzyme systems involved in erythropoiesis (RBC formation). C) Folate and Vitamin B Complex Content

o Folate (Vitamin B9) and other B vitamins in sesame seeds support DNA synthesis in the bone marrow, necessary for new RBC formation Helps prevent megaloblastic anemia.[41]

D) Antioxidant Action

O Sesame contains lignans (sesamin, sesamolin) and vitamin E, which act as strong Antioxidants.

O These protect RBCs from oxidative stress and membrane damage.

O Increases RBC lifespan and prevents hemolysis.

E) Improves Iron Bioavailability

O Sesame seeds also contain phytic acid, which can reduce iron absorption, but Roasting or soaking decreases phytic acid levels.

O When properly processed, sesame becomes a bioavailable source of iron and Micronutrients.

F) Supports Erythropoiesis

O Nutrients in sesame seeds (iron, copper, folate, protein) promote hematopoiesis (blood cell formation) in bone marrow.

O Enhances overall red blood cell count and hemoglobin level.[42]•

Uses / Medicinal importance

Acts as a nutritive tonic and immunity booster.

Used in anemia due to rich iron and folate content.

Exhibits antioxidant, anti-inflammatory, and cholesterol-lowering properties.

Used in Ayurveda for hair growth, skin health, and general strength[43].

3) Punarnava (Sanskrit), Spreading Hogweed (English) **(**Biological source/family:- Boerhavia diffusa Linn., which is belonging to family Nyctaginaceae [44])

Fig no.10.3:- Punarnava

• **Role of punarnava in the treatment of anemia** A) Hematinic Effect (Increases Hemoglobin)

o Punarnava helps stimulate erythropoiesis (red blood cell production) in bone marrow.

o Its active compounds (punarnavine, boeravinones, alkaloids, and flavonoids) enhance hemoglobin synthesis by improving iron metabolism and utilization.[45] B) Iron Absorption and Metabolism

o Punarnava improves the function of the liver and spleen, which play vital roles in iron storage, conversion, and recycling. By promoting better hepatic function, it enhances iron absorption and ferritin formation. C) Antioxidant and Cytoprotective Action o The herb contains flavonoids, tannins, and phenolic compounds that act as antioxidants.

o They prevent oxidative damage to red blood cells.

o They reduce lipid peroxidation, maintaining RBC membrane stability.[46] D) Anti-inflammatory and Detoxifying Effects

o Punarnava's anti-inflammatory and diuretic properties help detoxify the body and reduce toxininduced suppression of hematopoiesis. o Cleanses the blood and supports healthy circulation. E) Hepatoprotective Action

o Punarnava acts as a liver tonic (hepatoprotective) by regenerating hepatocytes and improving bile secretion.[47]

• **Uses**

O It is used to treat anemia, swelling, jaundice, fluid buildup, and liver problems.

O It is also used as a rejuvenating and restorative tonic in Ayurvedic medicine.

O It helps with kidney and urinary issues because of its diuretic properties.[48]

11.DIFFERENCE BETWEEN ALLOPATHY AND HERBAL TREATMENT OF ANEMIA]

Aspect	Allopathic medicine	Ayurvedic medicine (herbs)
Approach	Focuses on replacing or supplementing iron and addressing the symptoms of anemia[49]	Aims to balance the body's systems, improve blood formation (Raktadhatu), and correct the root cause
		naturally[35]
Common treatment	Iron supplements (ferrous sulfate, ferrous fumarate), folic acid, vitamin B12 injections, erythropoietin, and blood transfusions.[49]	Use of herbal tonics and plants that enhance hemoglobin synthesis and improve digestion and absorption of nutrients.[36]
Example of medicine/herb	Ferrous sulfate tablets - Folic acid & B12 infection Erythropoietin (for chronic anemia)[49]	Amla (Emblica officinalis) - rich in vitamin C enhances iron absorption. [35] Punarnava (Boerhavia diffusa) improves kidney function and blood quality.[40] Sesamum indicum (Sesame seeds) - rich in iron and folate.[45]
Mechanisms of action	Provides direct supplementation of iron and vitamins to quickly raise hemoglobin levels[49]	Stimulates natural hemoglobin synthesis, enhances iron absorption, and reduces oxidative stress through antioxidants[35]

Side effects	May cause constipation, nausea, gastric irritation, or iron overload[49]	Generally safe and well tolerated, though some herbs may act slowly and need long-term use for effect[44]
Duration of effect	Faster improvement in hemoglobin levels[49]	Gradual and long-term improvement with added benefits for immunity and vitality[38]
Focus on causes vs Symptoms	Primarily targets symptoms (low iron, low Hb)[49]	Addresses both root cause and symptoms, such as poor digestion, malabsorption, or chronic illness[34,40]
Preventive aspect	Limited preventive role; Mainly curative[49]	Strong preventive approach – herbs like amla and sesame help maintain normal hemoglobin naturally.[42]

Table no.11. 1 :- Comparative Study of Allopathy And Herbal Treatment of Anemia

12.CONCLUSIONS

Anemia continues to be one of the most prevalent nutritional deficiency disorders worldwide, affecting populations in both developing and developed countries. Its consequences on human health, productivity, and socio-economic development are profound. The review highlights that while modern (allopathic) treatment primarily focuses on iron and vitamin supplementation, herbal remedies offer a holistic, safe, and sustainable alternative. Medicinal plants such as Emblica officinalis (Amla), Sesamum indicum (Sesame), and Boerhavia diffusa (Punarnava) possess rich phytochemical profiles including iron, vitamin C, tannins, flavonoids, and antioxidants that promote hemoglobin synthesis, enhance iron absorption, and improve overall blood quality. These herbs not only correct anemia but also strengthen immunity, improve metabolism, and maintain long-term wellness. Incorporating these traditional herbal medicines with modern scientific validation can provide a complementary and preventive strategy against anemia. Future research should focus on clinical trials, standardization of herbal formulations, and understanding synergistic effects among herbal combinations to ensure safety and efficacy.

13.REFERENCE

1)WHO,2005.Worldwide prevalence of anemia 1993 – 2005 : WHO global database onAnemia /Edited by Brunode Benoist, Erin Mc Lean, Ines Egli and Mary Cogs well.

2)WHO (2004) Micronutrient deficiency : Battling iron deficiency anemia: the challenge. Available from: http://www.who.int/nut/ida.htm, accessed on April 24, 2008.

3)Balham J, Zimmermann M B, Kraemer K (2007) the Guidebook Nutritional Anemia. Sight And life press, Basel, Switzerland. Pp. 11-42.

4)Ezzati, M, Lopus, A.D., Dogers, A., Vander, H.S., Murray C., 2002. Selected major risk Factors and global and regional burden of disease. Lancet 360: 1347-60.

5)Le Hesran JY, Akiana J, Ndiaye HM, Dia M, Senghor P (2004) Severe malaria attack is Associated with high prevalence of Ascaris lumbricoides infection among children in Rural Senegal. Trans R Soc Trop Med Hyg 98(7): 397-399.

6)King, TC. Hematopoietic pathology. In: Elsevier's integrated pathology. Philadelphia (PA): Mosby Elsevier; 2007. Pp. 263-289.

7)WHO. Prevalence and diagnosis of iron deficiency anemia: a guide for program Manager. Vol. 52. Geneva: WHO, UNICEF ; 2001. Pp. 447-501.

8)World Health Organization. Iron deficiency anemia: assessment, prevention and control :A Guide for programme managers. Vol. 36. Geneva: WHO, UNICEF, UNU; 2001. Pp314-362.

9) Harika R, Faber M, Samuel F, Kimiywe J, Mulugeta A, Eilander A. Micronutrient status And dietary intake of iron, vitamin A, iodine, folate and zinc in women of reproductive age and Pregnant women in Ethiopia, Kenya, Nigeria and South Africa: a systematic review of data From 2005 to 2015. Nutrients. 2017;9(10):1096. Doi:10.3390/nu9101096.

10)Zheng Y, Liu X, He Y, Zhang J, Zhang X, Chen J, et al. Prevalence and morphological Subtype distributions of anaemia in a Chinese rural population: the Henan Rural Cohort study. Public Health Nutr. 2023;26(6):1254–63. Doi:10.1017/S1368980023000112.

11)Sharief SA, Minhajat R, Riu DS, Langi YA, Asrifuddin A, Sumampouw OJ, et al. Normocytic anemia in pregnant women: a scoping review. Med J Malaysia. 2024;79(5):646–57.

12)Alotaibi NE, Mohsin B, Alharbi S, Alghamdi A, Aljasser A, Alanazi K, et al. Postrenal Transplant anemia and its effects on patients and graft outcomes: seven years follow-up. Saudi Pharm J. 2023;31(8):101696. Doi:10.1016/j.jsps.2023.101696.

13) Nickens C, Knollmann-Ritschel BE. Educational case: nutrient deprivation and anemia. Acad Pathol. 2019;6:2374289519888733. Doi:10.1177/2374289519888733.

14)Michalak SS, Olewicz-Gawlik A, Rupa-Matysek J, Wolny-Rokicka E, Nowakowska E, Gil L. Autoimmune hemolytic anemia: current knowledge and perspectives. Immun Ageing. 2020;17(1):38. Doi:10.1186/s12979-020-00200

15) Amin SK, Antunes C. Star Pearls [Internet]. Star Pearls Publishing; Treasure Island (FL): Jul 18, 2022. Lower Gastrointestinal Bleeding. [PubMed]

16) Prema R., 1992. Anemia I In Pregnancy. In: Ratnam Ss, Bhasker Rao K, Arul kumaran S, Editors. Obstetrics and Gynaecology for Postgraduates, Vol 1. Madras: Orient Longman. 42-53.

17)Kumar A, Sharma E, Marley A, et al. Iron deficiency anaemia: pathophysiology, Assessment, practical management. BMJ Open Gastroenterol. 2022;9(1):e000759

18) Prema R., 1992. Anemia I In Pregnancy. In: Ratnam Ss, Bhasker Rao K, Arul kumaran S, Editors. Obstetrics and Gynaecology for Postgraduates, Vol 1. Madras: Orient Longman. 42-53.

19) Harper, J.L., Marcel, E.C. and Emmanuel, C. B., 2015. Iron Deficiency Anemia: Practice Essentials, Pathophysiology and Etiology Medscape.

20) Turner MR, Talbot K; Functional Vitamin B12 deficiency. Pact Neurol. 2009 Feb; 9 (1): 37 - 41.

21)Sheth TN, Choudhry NK, Bowes M, Detsky AS. The relation of conjunctival pallor to the Presence of anemia. J Gen Intern Med. 1997;12(2):102–6.

22)Brodsky, R. A. and Jones, R.J., 2005. Aplastic anemia. Lancet. 365(9471):1647-56.

23)World Bank (1980) Poverty and development of human resources: regional perspectives. Washington, DC: World Bank staff working paper no. 406.

24)Menendez C, Fleming AF, Alonso PL (2000) Malaria-related anemia. Parasitol Today 16(11): 469-476.

25)Fleming AF, Weather all DJ, Ledingham JGG, Warrell DA (1987) An anemia is a world Health problem. Oxford textbook of medicine 2nd (end).Oxford: Oxford University Press. Pp. 72.

26)Hahn JS, Nam Dk, Lee EJ, Lee SJ, Koo YW, et al. (1988) A Case of VitaminB12 Deficiency Megaloblastic Anemia Following Total Gastrectomy. Yonsei Medical Journal 29(3): 270-277.

27)Bothell TH, Baines RD, Mac Far lane BJ, Mac Phial AP (1989) Nutritional iron Requirements and food iron absorption. J Inter Med226(5): 357-3652) .

28)Jain V (1999) Clinic hematological study of megaloblastic anemia. MDThesis, Delhi University. Pp. 50-52

29)Abbafati C, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1204–22. Doi:10.1016/S0140-6736(20)30925-9.

30)Munro MG, et al. The relationship between heavy menstrual bleeding, iron deficiency, and Iron deficiency anemia. Am J Obstet Gynecol. 2023 Jul 1. Doi:10.1016/j.ajog.2023.01.01.

31) de las Cuevas Allende R, Díaz de Entresotos L, Conde Díez S. Anaemia of chronic diseases: Pathophysiology, diagnosis and treatment. Med Clin (Engl Ed). 2021;156(5):235–42. Doi:10.1016/j.medcle.2020.07.022.

32)Rees DC, Robinson S, Howard J. How I manage red cell transfusions in patients with sickle Cell disease. Br J Haematol. 2018;180(4):607–17. Doi:10.1111/bjh.15115.

33)Wonkam A, Makani J. Sickle cell disease in Africa: an urgent need for longitudinal cohort Studies. Lancet Glob Health. 2019;7(10):e1310–1. Doi:10.1016/S2214-109X(19)30364-X.

34) Khan H. Role of Emblica officinalis in medicine. Bot Res Int. 2009;2(4) :218–228.Scartezzini P. Review on some plants of Indian traditional medicine with antioxidant activity. J Ethnopharmacol. 2000;71(1-2) :23–43.

35) Bhattacharya SK, Bhattacharya A, Sairam K, Ghosal S. Effect of bioactive tannoid Principles of Emblica officinalis on ischemia-reperfusion induced oxidative stress in rat heart Phytomedicine. 2002;9(2) :171–4.

36) Wang YF, Wang YF, Wang XY, Ren Z, Qiu CW, Li YC, Kitazato K, Qiu QD, Wang Y, Zhang LY, Zhang JH, Yu CR, Liu Q, Zhang YJ. Phyllaemblicin B inhibits Coxsackie virus B3 Induced apoptosis and myocarditis. Antiviral Res. 2009; 84:150–8.

37) Rehman H, Yasin KA, Choudhary MA, Khaliq N, Rahman A, Choudhary MI, Malik S. Studies on the chemical constituents of Phyllanthus emblica. Nat Prod Res. 2007;21(9) :775–8

38) Jain SK, Khurdiya DS. Vitamin C enrichment of fruit juice-based ready-to-serve beverages Through blending of Indian gooseberry (Emblica officinalis Gaertn.) juice. Plant Foods Hum Nutr. 2004;59(2) :63–6.

39) Scartezzini P, Antognoni F, Raggi MA, Poli F, Sabbioni C. Vitamin C content and Antioxidant activity of the fruit and of the Ayurvedic preparation of Emblica officinalis Gaertn. J Ethnopharmacol. 2006;104(1-2) :113–8.

40) Khan H. Role of Emblica officinalis in medicine. Bot Res Int. 2009;2(4) :218–28.

41) Joshi R, Kumar MS, Satyamoorthy K, Unnikrisnan MK, Mukherjee T. Free radical Reactions and antioxidant activities of sesamol: pulse radiolytic and biochemical studies. J Agric Food Chem. 2005;53(7) :2696–703.

42) Anonymous. Standardization of single drugs of Unani medicine. New Delhi: Central Council for Research in Unani Medicine (CCRUM); 1992. P. 206–11.

43) Nadkarni KM. Indian materia medica. 3rd ed. Bombay: Popular Book Depot; 1982. Vol. 1, p. 1126–9.

44) Nahar L, Rokonuzzaman. Investig ation of the analgesic and antioxidant activity From an ethanol extract of seeds of Sesamum indicum. Pak J Biol Sci. 2009;12(7) :595–8.

45) Patil KS, Bhalsing SR. Ethnomedicinal uses, phytochemistry and pharmacological Properties of the genus Boerhavia. J Ethnopharmacol. 2016 Apr 22; 182:200-220.

46) Bhowmik D, Sampath KK, Srivastava S, Paswan S, Sankar A. Traditional Indian herbs Punarnava and its medicinal importance. J Pharmacognosy Phytochem. 2012 May 1;1(1):52-8.

47) Joshi P, Sud S, Prajapati D, Ghetiya H, Nandakumar A. An Ethereal Study of

Drakshavaleha and Punarnavadi Mandura in Managing Pandu Roga with Special Reference to Iron Deficiency Anemia.

48) Nayak P, Thirunavoukkarasu M. A review of the plant Boerhaavia diffusa: its chemistry, Pharmacology and therapeutical potential. J Phytopharmacol. 2016;5(2) :83-92.

49)Geng C. What to know about the medications to treat anemia [Internet]. Medically reviewed by Ngo P, PharmD. Healthline; 2023 May 25 [cited 2025 Nov 9]. Available from: https://www.healthline.com/health/anemia/medications