02 - ANEMIA

GYAN VAHINI

FROM

FOGSI, FOOD DRUGS & MEDICOSURGICAL EQUIPMENT COMMITTEE

February - 2025

Message From Dr. Sunita Tandulwadkar

Dr. Sunita Tandulwadkar

President FOGSI-2025

Dear FOGSIans,

Anemia continues to be one of the most silent yet widespread challenges affecting women across all stages of life — from adolescence to reproductive years, through perimenopause and into postmenopausal age. The recent National Family Health Survey (NFHS-5) data shows a concerning prevalence:

- 59% of adolescent girls,
- 57% of women in the reproductive age group, and
- over 50% of perimenopausal women

suffer from some form of anemia.

These numbers are not just statistics — they are reflections of the urgent need for focused attention and unified action.
Our FOGSI Presidential Theme: **"Ek Rashtra, Ek Mission – Swasth Nari, Samruddha Vatan"** puts the spotlight firmly on the health of Indian women as the foundation of a prosperous nation.

In alignment with this vision, our flagship program **"Know Your Numbers"** encourages every woman to be aware of her Hemoglobin, Blood Sugar, Blood Pressure, and Weight — with hemoglobin being a key indicator of her vitality and strength.

This special issue of the News Bulletin beautifully brings together a comprehensive overview of anemia — including genetic disorders like Thalassemia and Sickle Cell Anemia, and anemia in chronic illnesses. It also explores the future of supplements, such as liposomal iron, nano iron particles, and iron-carrying probiotics, which promise better absorption with fewer side effects. Nutritional strategies, biofortified foods, and targeted public health campaigns are paving the way forward.

I congratulate Dr Asha Jain for the brilliant e-magazine on this theme.

Happy Reading!

Warm regards,
Dr. Sunita Tandulwadkar
President, FOGSI

Message from Dr Abha Singh

Dr. Abha Singh
Vice President FOGSI-2025

Dear Fogsians ,
Season's Greetings!

Gyan Vahini Focus for this month published by Food Drugs & Medico Surgical Equipment Committee has focused on "Anemia in Women, ranging from adolescence, reproductive age up to post-menopausal period.".
Anemia is a significant public health problem in India, particularly affecting women of reproductive age. The prevalence of anemia as per NFHS-5 (2019-21), is 25.0% and 57.0 % in men and women (15-49 years). 31.1 % and 59.1 % in adolescent boys and girls, 52.2 % in pregnant women and 67.1% in children (6-59 months).

Anemia may be due to nutritional deficiencies, inadequate diet or absorption, infections, worm infestation, inflammation, chronic diseases, gynecological diseases causing heavy menstrual bleeding and obstetric conditions like PPH, and inherited red blood cell disorders like thalassemia etc.
The consequences of anemia vary in different age groups from developmental delays, poor school performance and behavioral disturbances in children. During pregnancy it is associated with poor maternal and birth outcomes, including premature birth, low birth weight, post-partum hemorrhage and maternal mortality. It is a great economic burden on the individual and country.
However, after assessing the magnitude of the problem WHO has included reduction of anemia as one of the six World Health Assembly Global Nutrition Targets within the Comprehensive implementation plan on maternal, infant and young child nutrition. Additionally, anemia in women 15–49 years of age is one of the targets for the United Nations 2030 Agenda for Sustainable Development.
MOHFW has also launched AMB- Anemia Mukht Bharat Program to eradicate anemia by 2030. Multipronged approach is required by government, public and private partnership to eradicate anemia.
Fogsi has also launched KYN – **Know Your numbers** project that includes Hb estimation of women for detection and management of **anemia** and **Sampoorna** for preconceptional care to reduce the maternal, neonatal morbidity and mortality .
I request you to read and conserve the e-copy of Gyan Vahini which has been carefully produced by the contributors and that will also serve as a ready reckoner for you.

Happy reading!
Dr Abha Singh (VP Fogsi)

Message from Dr Suvarna Khadilkar

Dr. Suvarna Khadilkar
Secretary General FOGSI-2025

It gives me great pleasure to address you all through this February 2025 edition of the FDMSEC FOGSI e-magazine, which so aptly centers on the critical topic of anemia. This publication aligns perfectly with our key initiatives—**"Know Your Numbers"** and **"Sampoorna."** With this publication we create a resource that brings the latest evidence-based guidelines and expert perspectives to the forefront.

As Honorary Secretary General, I have witnessed first-hand the synergy and commitment of our authors, editorial team, and designers who worked tirelessly to ensure that this issue addresses anemia comprehensively. From adolescent care and nutrition to pregnancy management and post-reproductive health, every article in this e-magazine encapsulates the multidisciplinary approach we strive to foster at FOGSI. By uniting diverse voices from various fields, we can more effectively advocate for early diagnosis, individualized care, and robust preventive strategies to combat anemia across a woman's lifespan.

I trust that the insights offered in these pages will empower each of us—clinicians, researchers, educators, and community leaders—to champion proactive health measures in our respective spheres. By embracing regular screenings, encouraging lifestyle modifications, and enhancing our clinical practices, we can work together to reduce the burden of anemia and improve outcomes for women everywhere. I congratulate everyone involved in bringing this invaluable publication to life and hope it serves as a beacon of knowledge for all FOGSI members and beyond.

With best and warm wishes,

Dr. Suvarna Khadilkar
Secretary General, FOGSI

Dr. Asha Jain
Chairperson
FOGSI FDMSE Committee

FOREWORD

Feb Message from the Chairperson, FDMSE Committee – Dr. Asha Jain

It is with great pride and excitement that I present our February 2025 FDMSEC FOGSI **e-magazine focused on anemia**. First and foremost, I wish to extend my heartfelt gratitude to our visionary President, Dr. Sunita Tandulwadkar, our supportive Vice President in charge, Dr. Abha Singh, and our dedicated Secretary General, Dr. Suvarna Khadilkar, for their unwavering guidance and encouragement throughout the development of this publication.

A special note of thanks goes out to each of our esteemed authors, whose contributions have made this edition truly comprehensive and informative: Dr. Sarita Kumari, Dr. M Chandra Ponnusami, Dr. Sandhya Rani Panigrahi, Dr. Renu Jain, Dr. Prabhdeep Kaur, Dr. Priyanka Rai, Dr. Vishnu Priya, Dr. Sugandha Goel, Dr. Ruche Bhargava, Dr. Shikha Seth, Dr. Neetha George, and Dr. Okram Sarda Devi. Their dedication to patient care and academic excellence is evident in each article, ensuring our members stay informed about the latest advancements in diagnosing, managing, and preventing anemia in women.

I also want to appreciate the invaluable efforts of our Designer, Bhupendra, who has lent his creative touch to make this magazine visually appealing, and our Coordinator, Dr. Ruche Bhargava, whose meticulous oversight kept us on schedule and ensured a seamless editorial process.

I trust that this e-magazine will serve as a practical guide and an inspiration for all FOGSI members to continue championing women's health. Let us embrace the spirit of **"Know Your Numbers" and "Sampoorna"** by working together to promote regular screenings and holistic care, ultimately improving the quality of life for women across every stage of life.

Warm regards,

Dr. Asha Jain
Chairperson, FDMSE Committee
2025-2027

"Know Your Numbers" is an ambitious health initiative.

- This project seeks to gather vital health data- Weight, Blood pressure, Blood Sugar Level with HbA1C, and Hemoglobin level -from women across India.
- By focusing on these key health indicators, the project aims to foster a proactive health management culture among women.
- The data collected will be instrumental in identifying prevalent health issues early and promoting interventions that can significantly reduce the incidence of che diseases.
- This initiative not only emphasizes the importance of regular health monitoring but also strives to empower women with the knowledge and tools needed to take charge of their health, ensuring they lead longer, healthier lives.
- Collect key health data: weight, blood pressure, blood sugar, HbA1C, and hemoglobin from women across India.
- Encourage proactive health management for early identification of prevalent health issues.
- Promote timely interventions to reduce chronic disease incidence.
- Empower women with knowledge and tools for better health and longevity.
- Gather vital health data: weight, blood pressure, blood sugar (HbA1C), and haemoglobin levels from women across India.
- Foster proactive health management among women.
- Identify prevalent health issues early and promote timely interventions.
- Reduce the incidence of chronic diseases through regular monitoring.
- Empower women with knowledge and tools for healthier, longer lives.

SURVEY FOR KNOW YOUR NUMBER (KYN) PROJECT

Do Teeke Zindagi Ke

As part of my upcoming tenure as the President of FOGSI, I am pleased to submit a proposal for a comprehensive training program on HPV vaccination, targeting 50,000 members of the Indian Medical Association (IMA). This initiative aligns with our shared goal of enhancing public health through preventive care, and I am confident that, with your support, we can make a significant impact in addressing cervical cancer awareness and prevention across India. 9-14 age group we will conduct the drive for increasing awareness of cervical cancer vaccination

Study on Understanding the Acceptance and Usage Patterns of Various Contraceptive Methods Among Women in India

Aims & Objectives

- To determine the prevalence of usage and type of contraceptives in various age groups across different demographic regions in India

- To identify whether contraception is used or not
- To identify the most commonly used contraception in men and women across India

Contraception

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Preface

Dr. Asha Jain
Editor, FOGSI E-Magazine
Chairperson, Food, Drugs, and Medicosurgical Equipment Committee
Federation of Obstetric and Gynaecological Societies of India (FOGSI)
February -2025

As the editor of Gyan Vahini—our Food, Drugs & Medicosurgical Equipment Committee (FDMSEC) e-magazine—I am delighted to place before you this February 2025 number dedicated exclusively to anaemia. Few conditions cut across the lifespan of Indian girls and women with such quiet persistence and such profound consequences. Yet anaemia remains, in many homes and clinics, an under-recognised adversary. This issue aims to change that narrative by bringing together clear epidemiology, robust clinical guidance and practical public-health tools, so every reader—whether practising obstetrician, postgraduate trainee, nutritionist, public-health planner or civil-society volunteer—can act with renewed purpose.

Why anaemia, why now?

National Family Health Survey-5 figures tell their own stark story: 59 % of adolescent girls, 57 % of women of reproductive age and more than half of perimenopausal women in India are anaemic. Anaemia saps energy, blunts cognitive development, undermines pregnancy outcomes and diminishes economic productivity. Reducing its prevalence is therefore not merely a clinical aspiration; it is a national development imperative embedded in the WHO Global Nutrition Targets and the United Nations 2030 Sustainable Development Goals. India's flagship Anemia Mukt Bharat initiative and FOGSI's own "Know Your Numbers" campaign have created a fertile environment for concerted action . This magazine joins that movement, translating policy intent into bedside practice and community outreach.

A panorama of content

Our contributors have crafted twelve in-depth articles that move from foundations to frontiers:

1. **Overview of Anaemia** sets the stage with pathophysiology, classification and the multi-sectoral response envisaged under Anemia Mukt Bharat .
2. **Anaemia in Adolescence** explores growth-spurt physiology, behavioural risk factors and school-based intervention models.
3. **Managing Anaemia during Pregnancy** provides trimester-wise algorithms, bridging oral, parenteral and transfusion therapies.
4. **Post-partum Anaemia** reminds us that vigilance must continue beyond discharge to protect maternal well-being and infant growth.
5. **Anaemia in Perimenopausal & Menopausal Women** addresses heavy-bleeding sequelae, chronic disease intersections and nutrition for the empty-nest years.
6. **Iron-Deficiency Anaemia—A Focus on Treatment** demystifies modern oral and intravenous preparations, clarifying doses, side-effects and monitoring.
7. **Comprehensive Management of Sickle-cell Disease** and
8. **Thalassaemia Management Strategies** extend our lens to hereditary haemoglobinopathies, emphasising antenatal screening, chelation advances and gene therapy horizons.
9. **Anaemia of Chronic Diseases** tackles inflammation-driven iron restriction.

10. **Nutritional Interventions for Prevention** links agronomy, fortification and behaviour-change communication.
11. **Public-health Initiatives** maps national programmes—SUMAN, PMSMA, 12-ka-Naara, Na Na Anaemia Ride—that offer ready platforms for FOGSI partnership .
12. **Future Trends in Treatment** introduces ferric derisomaltose, liposomal iron and microbiome-friendly formulations, as well as CRISPR-based cures .

This carefully sequenced trajectory—from community prevention to precision therapeutics—ensures that no reader finishes the issue with a knowledge gap unaddressed.

Voices behind the pages

To synthesise such breadth, we needed a mosaic of experience. I extend my warmest gratitude to every author listed in our index . Their manuscripts reflect countless clinic hours, research diligence and a shared conviction that evidence must travel beyond journals into real-world practice. Their sharp eyes have made these articles both rigorous and readable.

We are indebted to our FOGSI leadership—President Dr Sunita Tandulwadkar, Vice-President Dr Abha Singh and Secretary-General Dr Suvarna Khadilkar—for championing an editorial environment that prizes clarity over jargon and patient benefit over academic display. Their own messages in this issue set the tone for collaborative, data-driven advocacy .

Creative credit goes to Mr Bhupendra, whose clean layouts, infographics and judicious use of colour transform dense haematology into an inviting visual journey. Dr Ruche Bhargava has anchored our production timeline with grace and meticulous attention to reference formatting.

How to use this issue

Gyan Vahini is designed for action. Here are five practical pathways to convert reading into impact:

1. **Update clinic protocols**: Use the trimester-wise tables for pregnancy management and the postpartum algorithms to standardise discharge counselling.
2. **Lead community sessions**: Adapt the adolescent and nutrition chapters into school talks or anganwadi demonstrations; the behaviour-change checklists are ready-made hand-outs.

3. **Audit and improve**: Employ the haemoglobin cut-off charts and ferritin interpretation guides to review laboratory ordering practices and reduce missed diagnoses.
4. **Advocate locally**: Align hospital anaemia initiatives with district-level AMB targets; the public-health article provides contact points and funding windows.
5. **Mentor trainees**: Assign individual articles as journal-club material, encouraging residents to critique methodology and translate guidelines into patient-specific plans.

Looking ahead

Although this edition closes with a forward-looking piece on nano-iron, the real future lies in the hands of our readers. Each obstetric ward that adopts delayed-cord-clamping, each primary-health centre that stocks point-of-care haemoglobinometers, each panchayat that hosts a deworming day, chips away at India's anaemia burden. Let this magazine not remain a PDF stored on a laptop, but a catalyst passed from phone to phone, from morning ward round to evening community meeting.
Our subsequent issues will explore allied challenges—beginning with micronutrient malnutrition and later the interface of mental health and reproductive endocrinology—but the fight against anaemia will remain a through-line. Data will evolve, therapies will modernise, yet the fundamental lesson endures: a woman's haemoglobin is a marker not only of her physiological reserve but of the equity of the system that surrounds her.

A note on style and responsibility

You will notice that the articles favour straightforward language, metric units and guideline citations in Vancouver style. This is intentional. Indian practitioners juggle crowded OPDs; they require crisp, implementable messages. Where evidence is still emerging, authors have labelled recommendations as consensus rather than mandate. Readers are encouraged to cross-reference with national and state advisories before altering protocols.

Gratitude and invitation

On behalf of the entire editorial collective, I thank you for choosing to engage with Gyan Vahini. Your feedback shapes future numbers. Please write to us with success stories—be it a rural anaemia camp inspired by these pages or a postgraduate thesis seeded by our reference lists. Together, let us drive the Presidential theme "Ek Rashtra, Ek Mission—Swasth Nari, Samruddha Vatan" from slogan to measurable outcome.
Happy reading, purposeful doing—and may the haemoglobin of every Indian woman soon reflect the vigour she deserves.

INDEX

S.No.	Topic	Author	Page
1	Overview of Anemia	Dr. Sarita Kumari	17-23
2	Anemia in Adolescence	Dr. M. Chandra Ponnusamy	24-31
3	Managing Anemia During Pregnancy	Dr. Sandhya Rani	32-42
4	Postpartum Anemia: A Critical Concern	Dr. Renu Jain	43-48
5	Addressing Anemia in Perimenopausal & Menopausal Women	Dr. Prabhdeep Kaur	49-54
6	Iron-Deficiency Anemia: A Focus on Treatment	Dr. Priyanka Rai	55-62
7	Comprehensive Management of Sickle Cell Disease	Dr. Vishnu Priya	63-68
8	Thalassemia Management Strategies	Dr. Sugandha Goel	69-73
9	Anemia of Chronic Diseases	Dr Ruche Bhargava	74-78
10	Nutritional Interventions for Anemia Prevention	Dr. Shikha Seth	79-84
11	Future Trends in Anemia Treatment	Dr Neetha George	85-91
12	Public Health Initiatives for Prevention of Anemia	Dr. Okram Sarda Devi	92-97

01

OVERVIEW OF ANEMIA

Author - Dr. Sarita Kumari
Jamshedpur Jharkhand

INTRODUCTION :-

Anemia is a significant global health concern that primarily affects young children, pregnant and postpartum women, and menstruating adolescent girls and women (1). Low- and lower–middle-income countries bear the greatest burden, particularly in rural settings, poorer households, and among populations with no formal education (1). It is estimated that 40% of all children aged 6–59 months, 37% of pregnant women, and 30% of women aged 15–49 years are affected worldwide (1). In 2019, anemia resulted in the loss of 50 million healthy years of life due to disability, with dietary iron deficiency, thalassemia, Sickle Cell trait, and malaria being the largest causes (1).

What Is Anemia?

Anemia is a condition characterized by a lower-than-normal count of red blood cells or hemoglobin concentration. It predominantly affects women and children. There are multiple contributing factors, including inadequate nutrition and various physiological changes, particularly during pregnancy:

1. Pregnancy-Related Changes: A modest drop in hemoglobin and hematocrit can occur because plasma volume expands more than red cell volume (2).

2. Prevalence by Gender: In 2021, 31.2% of women globally had anemia compared to 17.5% of men. This difference is most evident in the reproductive age group (15–49 years), with anemia prevalence of 33.7% in women versus 11.3% in men (3).

WHO Definitions and Proposed Cut-Offs
The World Health Organization (WHO) defines anemia as having a blood hemoglobin concentration below 130 g/L for men, 120 g/L for

non-pregnant women, and 110 g/L for children aged 6–59 months (1). Some researchers have suggested that 110 g/L might be a more suitable cut-off for Indian women of childbearing age (4).

Globally, WHO reports that 40% of children aged 6–59 months, 37% of pregnant women, and 30% of women aged 15–49 years experience anemia, leading to 50 million years lost due to disability in 2019 (5). Anemia prevalence remains high across many countries, including India, and is one of the WHO Global Nutrition Targets for 2025 (6). Unfortunately, progress has been limited, and the target may not be met by 2030 (6).

CAUSES :-

The frequency of specific causes of anemia depends on factors such as geography, ethnicity, socioeconomic status, nutritional factors, and prenatal iron supplementation (7). Broadly, causes can be categorized as **acquired** or **hereditary**.

Acquired Causes

1. **Iron-Deficiency Anemia**
2. **Acute Blood Loss Anemia**
3. **Anemia of Chronic Disease**
4. **Megaloblastic Anemia**
5. **Hemolytic Anemia**
6. **Aplastic (Hypoplastic) Anemia**

Additional details include:

- **Hemorrhagic Causes:** Bleeding in early or late months (antepartum hemorrhage), bleeding piles, and chronic hookworm infestation.
- **Malaria:** A leading acquired cause of hemolytic anemia in endemic regions.
- **Nutritional Deficiency:** Iron deficiency is the most common cause, but deficiencies of folic acid, vitamin B12, and protein also contribute.
- **Miscellaneous Causes:** Bone marrow insufficiency (e.g., aplastic anemia due to drugs or radiation), neoplasms, anemia of chronic disorders, chronic renal disease, and tuberculosis.

Hereditary Causes

1. Thalassemias
2. Sickle-Cell Hemoglobinopathies
3. Other Hemoglobinopathies (including hereditary hemolytic anemias such as spherocytosis)

COMMITTEE ROLE: ANAEMIA MUKT BHARAT (8)

In India, iron-deficiency anemia poses a considerable challenge, leading to impaired cognitive and motor development in children and reduced work capacity in adults. During pregnancy, iron deficiency can result in perinatal loss, prematurity, and low birth weight. To address these challenges, the Anemia Mukt Bharat strategy targets six beneficiary age groups:

- Children aged 6–59 months
- Children aged 5–9 years
- Adolescents aged 10–19 years
- Pregnant and lactating women
- Women of reproductive age (15–49 years)

It aims to reduce anemia through the following six interventions:

1. **Prophylactic Iron-Folic Acid (IFA) Supplementation**

- **6–59 Months:** Biweekly 1 mL of IFA syrup (each mL containing 20 mg of elemental iron and 100 mcg of folic acid).
- **5–10 Years:** Weekly IFA tablets, each containing 45 mg of elemental iron and 400 mcg of folic acid.
- **Adolescents (10–19 Years):** Weekly IFA tablets, each containing 60 mg of elemental iron and 500 mcg of folic acid.
- **Women of Reproductive Age (Non-Pregnant, Non-Lactating):** Weekly IFA tablets, each with 60 mg of elemental iron and 500 mcg of folic acid.
- **Pregnant & Lactating Women:** Daily IFA tablets (60 mg elemental iron + 500 mcg folic acid) starting from the second trimester for at least 180 days, and then continued for 180 days postpartum.

2. Periodic Deworming

- Biannual mass deworming (National Deworming Day) on February 10 and August 10 for children and adolescents aged 1–19 years.
- Deworming for pregnant women during the second trimester through antenatal care.

3. **Intensified Year-Round Behavior Change Communication**

- Ensuring compliance with IFA and deworming.
- Emphasizing appropriate infant and young child feeding (IYCF), including adequate complementary feeding after 6 months.
- Encouraging increased intake of iron- and protein-rich foods, vitamin C–rich foods, dietary diversification, and use of fortified foods.
- Promoting delayed cord clamping.

4. **Testing and Treatment of Anemia Using Digital Methods**

- Digital invasive hemoglobinometers in field settings, sub-health centers, and health and wellness centers.
- Semi-auto analyzers in primary health centers and above.
- Point-of-care treatment based on standardized anemia management protocols.

5. Mandatory Provision of Iron- and Folic Acid–Fortified Foods

- Ensuring that government-funded health programs include fortified foods.

6.**Intensified Awareness, Screening, and Treatment of Non-Nutritional Causes**

- Special focus on malaria, hemoglobinopathies, and fluorosis in endemic areas.

MULTI-SECTORAL INVOLVEMENT

Various sectors and program areas must collaborate to reduce anemia (9):

- **Agriculture and Food Processing:** Increase production of nutrient-rich foods, biofortification, food fortification, and food safety promotion.

- **Disease Control:** Prevent, control, and manage malaria; deworming to address schistosomiasis and soil-transmitted helminths.

- **Education:** Incorporate health and hygiene education in schools, including deworming for school-age children.

- **Genetics:** Same as education, with an emphasis on tackling hereditary conditions.

- **Nutrition:** Focus on dietary diversification, micronutrient supplementation, and maternal/adolescent/infant nutrition.

- **Reproductive Health:** Ensure proper pregnancy, delivery, and postpartum care; delay cord clamping; emphasize birth spacing; and reduce adolescent pregnancy.

- **Water, Sanitation, and Hygiene (WASH):** Improve sanitation, provide safe drinking water, and promote handwashing.

A concerted effort across sectors is crucial for effectively combating anemia. Close coordination among government bodies, NGOs, international agencies, donors, and private-sector players is necessary for success (10).

- **REFERENCES**

1. WHO (World Health Organization)

2. Georgieff MK: Iron deficiency in pregnancy. Am J Obstet Gynecol 223:516, 2020

3. The Lancet: New studies reveal global anemia prevalence remains persistently high among women & children. Anemia rate declines for men.

4. Ghosh S., Palika R., Dasi T., Varshney R.K., Parasannanavar D.J., Gupta S.S., Chitikineni A., Banjara S.K., Pullakhandam R., Thomas T., et al. (2023). Haemoglobin diagnostic cut-offs for anaemia in Indian women of reproductive age. Eur. J. Clin. Nutr. 77:966–971. doi: 10.1038/s41430-023-01308-5.

5. WHO Anaemia Factsheet 2023 [Accessed on 25 March 2024]. Available online: https://www.who.int/news-room/fact-sheets/detail/anaemia

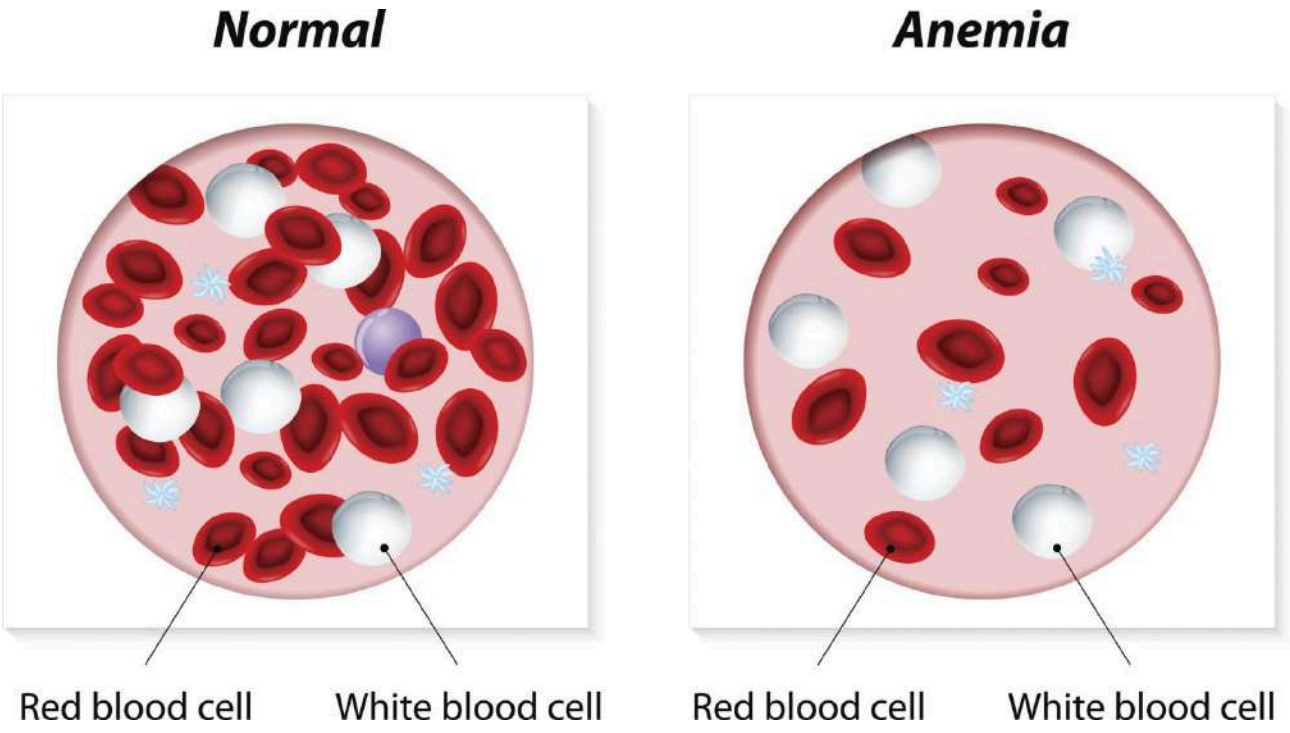
6. Global Health Metrics: Anaemia—Level 1 impairment. [Accessed on 20 March 2024]. Lancet. 2019;393:R2. Available online: https://www.healthdata.org/results/gbd_summaries/2019/anemia-level-1-impairment

7. American College of Obstetrics and Gynecologists, 2021

8. National Health Mission. https://nhm.gov.in

9. USAID Multi-Sectoral Anemia Task Force

10. SPRING (2016). Understanding Anemia: Guidance for Conducting a Landscape Analysis. https://www.spring-nutrition.org/publications/series/understanding-anemia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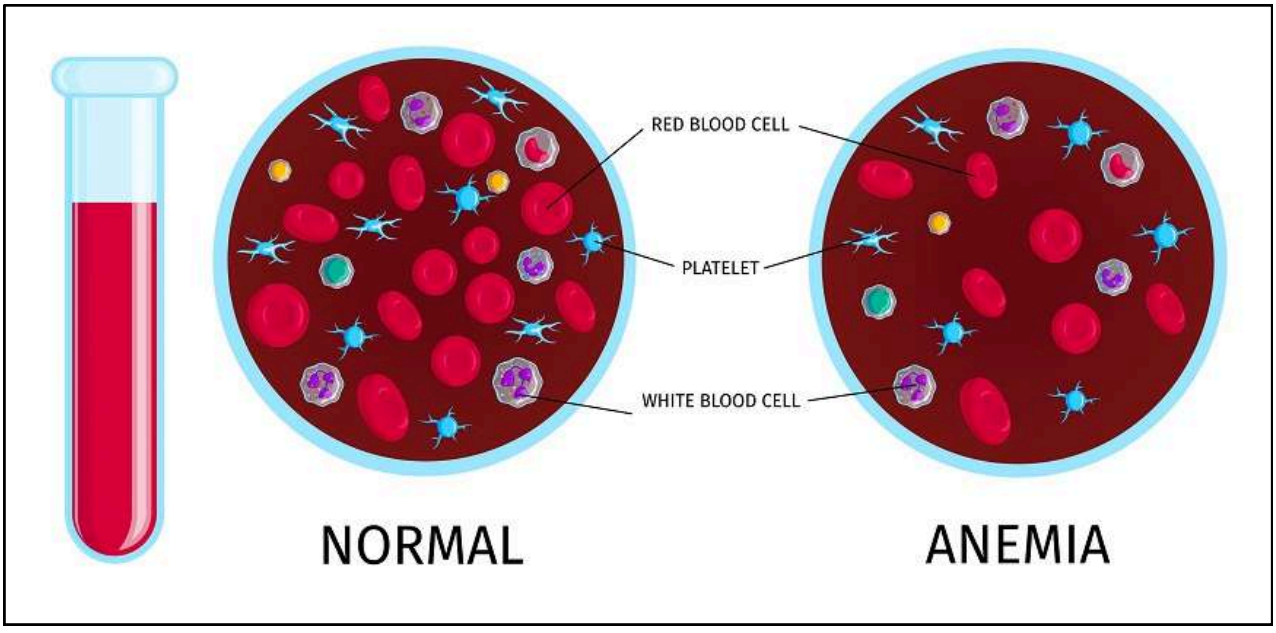
RED BLOOD CELL
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WHITE BLOOD CELL
NORMAL
ANEMIA

02

ANEMIA IN ADOLESCENCE

Author - Dr. M. Chandra Ponnusamy
Namakkal, Tamil Nadu

World health organization (WHO) defines adolescent as the period of life between 11 and 19 years entering into adult life it is a unique face of life as these are most formative years as they experience fast and brisk physical conjunctive intellectual emotional physiological and behavior development
Anaemia is a state in which the hemoglobin (Hb) level and / or red blood cells are insufficient to cope with the body's physiological needs.

Prevalence

It is a major public health problem affecting more than 1.9 billion people globally though present widely across the globe it is more pronounced in low- and middle-income countries

Prevalence in India

Incidence of anaemia in Indian adolescent girls has increased over the years. it is estimated that it is present in around **56%** of adolescent girls which means at any point of time **64 million** girls are suffering from anaemia through anaemia occurs in adolescent boys also it is in much more in girl

Adolescent population in India comprises of 243 million accounting to **21.4%** of the total population. This is the vulnerable period for development of anaemia especially in adolescent girls.

ADVERSE EFFECTS OF ANAEMIA IN ADOLESCENT

As adolescent age is the formative years for development anaemia at this stage has some long-term consequence such as

- Stunted growth
- Poor school performance, reduced attention, span, memory loss, increased school dropout rate
- Reduce the immunity and increased by infection rate
- Delay in onset of menarche and menstrual irregularities of already attained.
- If anaemia girl becomes pregnant chances of intrauterine growth restriction (IUGR) low birth weight, increased perinatal Morbidity and mortality and also increased maternal morbidity and mortality
- Directly or indirectly it affects the national and economic growth as well it can have economical impleations and poor capital formation of country

RISK FACTORS FOR ADULESCENT ANAEMIA

- Underweight and Malnourishment
- Low dietary intake and increase demand due to growth spurt. Iron requirement
- Peaks in adolescence due to rapid growth spurt and increase in blood volume and lean body mass.

The iron requirement increases from

Pre-adolescence	Adolescence
Boys - 0.7 to 0.9 mg / day	1.37 to 1.8 mg / day
Girls - 0.7 to 0.9mg / day	1.40 to 3.27 kg / day

- Adolescents with chronic illness
- Heavy menstrual blood loss less than 80 ml
- Obese and overweight adults adolescent iron deficiency in these individuals may be due to low quality food and increased body requirements due to increase weight.

- Hand hygiene and worm infestation in India is also a major contributor of anaemia in girls one study has reported that one third of girls had worm infestation and prevalence of anaemia is almost double in these girls as compared with girls who were not having a worm infestation

- Adolescent pregnancy is also one of the major risk factors for IDA. The culture of early marriage and pregnancy further the depletes their already low stores of iron and folic acid social pressure does not allow them to delay the first pregnancy after marriage and majority of young adolescent girls conceive soon after marriage.

Cut off the level of the hemoglobin for diagonals of anaemia

Age/ sex	**Hb gram/ dk**
Children 6 months - 6 years	11
Children 6 to 14 years	12
Adolescent 15 to 19 years	12
Adult male	13
Adult female	12
Adult female pregnant	11

If the level fall below those above then the person is diagnosed as having anaemia.

Classification of anaemia according to WHO

Mild anaemia	11.9 gm to 10-gram Hb/100 ml blood
Moderate anaemia	9.9 to 7-gram Hb/ 100 ml blood
Severe anaemia	< 7-gram Hb/ 100 ml blood
Anaemia in Non-pregnant women	< 12-gram Hb / 100 ml blood (above 15 years of age)
Anaemia in pregnant women	< 11-gram Hb/ 100 ml blood

In India various studies conducted in different regions shows the prevalence of anaemia as follows

According to NFHS State	**Prevalence**
Andhra Pradesh	77%
Bihar	78%
Gujarat	37%
Karnataka	41.50%
Madhya Pradesh	52.50%
Maharashtra	85.40%
Shimla	21.50%
Tamil Nadu	58.40%
Uttar Pradesh	56.30%
Rajasthan	69.70%

Classification of anaemia according to WHO

So, at a glance almost > 50% of Indian adolescent girls are anaemia.

Adolescent girls of age 10 to 14 years - 53 %

15 to 19 years - 47 %

This because about three fourth of adolescent female do not meet the dietary requirement due to gender this discrimination and partiality towards girl children.

Anaemia is mainly nutritional disorder mainly caused by iron deficiency

Causes of anaemia

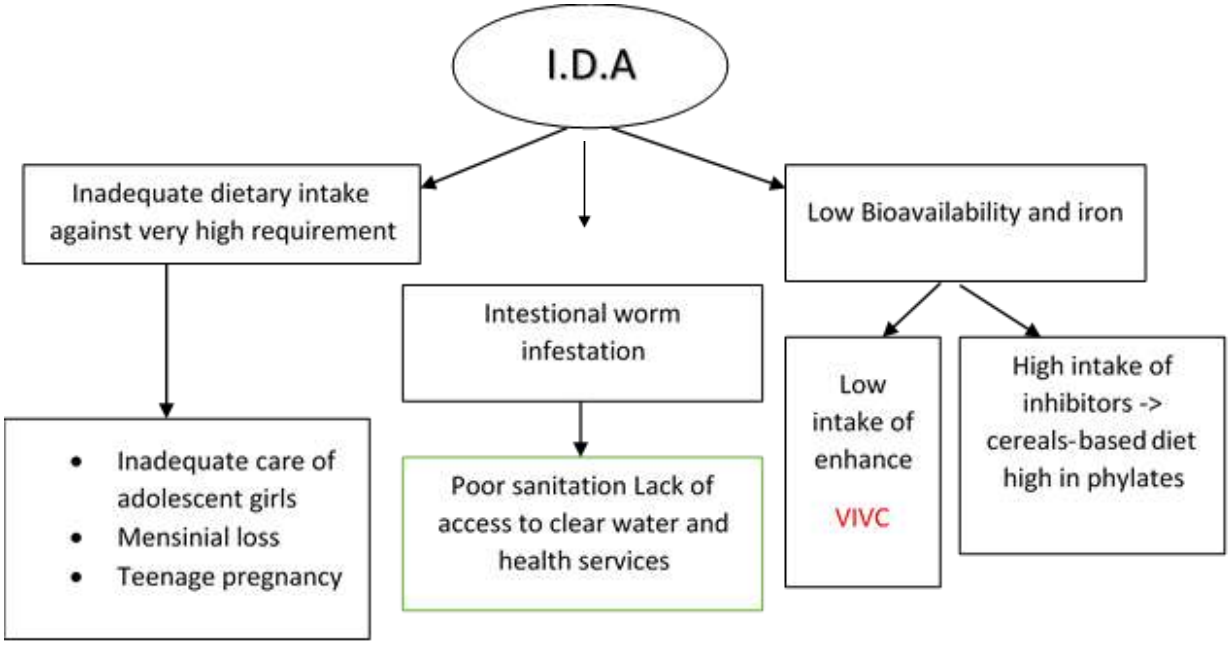
1)Nutritional anaemia widely prevalent

i)iron deficiency - commonest
ii)folic acid and vitamin c deficiency
iii)Vitamin B12

2**)Non-Nutritional causes**

a) Increased demand during adolescence
b) Hookworm infestation
c) Chronic infection example malaria excusive .
d) Blood loss - Menstrual bleeding
e) Teenage moorage and early pregnancy.
f) Genetic disorders
g) Malignancy.

Iron deficiency anaemia-commonest form of nutritional anaemia



Symptoms of anaemia

Looks pale, fatigued, weakness, dizziness, drowsiness, loss of appetite, craving for mud/ clay, passage of worms in stool ,loss of concentration

In moderate to severe anaemia

- Yellowness of tongue, nail, palm and conjunctive of eye.
- Fatique and loss of appelite
- Breathless ness
- Edema of feet

Maybe present

Treatment of anaemia

Primary prevention and correction of anaemia should be the main goal. it requires a multipronged approach to fight this multifactorial disorder

Prevention is by catch the adolescent population enough school health program me involvement and get good results.

Strategic focus is very important to prevent IDA.

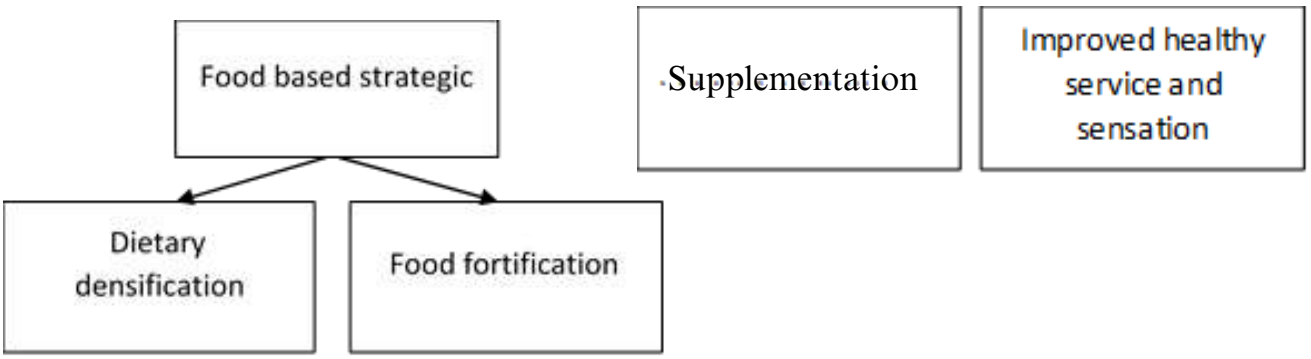
To overcome the problem of adolescent anaemia the Government of India has launched National program me for control of adolescent anaemia in conjunction with unitary National children's fund

Adolescent anaemia control program me (AACP)

Objective of aacp

- Providing iron and folic acid supplementation on a weekly basis
- Biannual deworming
- Dietary education and communication nutritional counselling
- Formation of Balika mandals and identifying peer educators
- Information education and communication interventions to amplify the family and community endorsement s.

The strategies for prevention and control of IDA



Prevention of anaemia in adolescent girls

Screening of all nonpregnant women for anaemia starting in adolescence every 5 to 10 years through the routine health examinations.

Treatment of anaemia in adolescent girls

If after 4 weeks also anemia does not respond in spite of iron rich food intake and adhering to treatment further evaluation is required

Balanced diet rich in iron

Adults and need to eat a balanced diet example a diet ie a diet that provides all nutrition (Carbohydrates, Protein, fats, Vitamins and minerals) in required amounts and proportions for maintaining health and general well-being.

Eating a balanced diet means consuming different type of food items like pulses, chapatti or rice, green vegetables, locally available fruits and milk every day.

Food rich in iron are

1)Green vegetables and fruits

2)Grains, wheat, jowar, bajra, sprouted pulses, groundnuts, sesame, jaggery, dried fruits

3)Liver, egg, fish, meat

4)Vitamin C rich foods helps in absorption of iron, citrus fruits (Oranges, lemon, Indian gooseberry (Amla), Apple, pear are rich in vitamin C
Let us Make anaemia free India

MANAGING ANEMIA DURING PREGNANCY

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Pregnant women are at increased risk of anemia due to the higher blood volume and the body's increased need for iron and vitamins. Factors such as having closely spaced pregnancies, carrying multiples, and not consuming enough iron-rich foods can elevate this risk.

Risks of Anemia in Pregnancy

- Severe or untreated iron-deficiency anemia during pregnancy can increase risk of having:
- A preterm or low-birth-weight baby
- A blood transfusion
- Postpartum depression
- A baby with anemia
- A child with developmental

Anaemia due to Folic acid deficiency causes

baby with a serious birth defect of the spine or brain (neural tube defects) Untreated vitamin B12 deficiency can also raise your risk of having a baby with neural tube defects.

Risk to mother

Iron deficiency anaemia during pregnancy is associated with increased maternal and perinatal morbidity and mortality.

Maternal iron deficiency may also be associated with neurocognitive deficits in infants.

Iron requirements increase during pregnancy and are influenced by hepcidin, the master regulator of iron homeostasis.

Anaemia is increasingly recognised as a potentially modifiable risk factor for postpartum haemorrhage – a leading cause of maternal morbidity and mortality.

Adverse fetal and neonatal outcomes include preterm labour, growth restriction and increased mortality. The enduring global burden of maternal anaemia suggests that currently employed iron supplementation strategies are suboptimal.

Recent developments in our understanding of systemic and placental iron homeostasis may improve therapeutic effectiveness by altering the dose and frequency of oral iron.

Intravenous iron appears to be a safe treatment to correct maternal anaemia rapidly but research on patient-centred outcomes and cost-effectiveness is needed.

Iron is a medication used in the management and treatment of iron deficiency anemia. This activity illustrates the indications, action, and contraindications for iron supplementation as a valuable agent in the management of iron-deficient states such as iron deficiency anemia.

This activity will highlight the mechanism of action, adverse event profile, and other key factors (e.g., off-label uses, dosing, pharmacodynamics, pharmacokinetics, monitoring, relevant interactions) pertinent for members of the healthcare team in the management of patients with iron deficiency and related conditions.

Indications :-

Iron supplementation is indicated for iron-deficient states secondary to conditions such as iron deficiency anemia, iron deficiency without anemia, nutritional deficiency, malabsorption, chronic inflammatory state, blood loss, or an increase in the body's need for iron. Iron is an essential mineral needed for general health. Depleted iron stores lead to decreased production of hemoglobin and circulating erythrocytes in this body, resulting in anemia

Symptoms of iron deficiency can present as fatigue, weakness, shortness of breath, pica and pagophagia, tachycardia, altered mental status, hypothermia, and increased risk of infection

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Treatment primarily aims at replenishing the body's iron stores and providing symptomatic relief. If left untreated, this may lead to adverse events such as neurodevelopmental delay in developing children and poor pregnancy outcomes for expectant mothers.

Mechanism of Action

Iron is a critical component of the body. Its primary role is to store and transport iron (as myoglobin and hemoglobin) throughout the body. In an iron-deficient state, hemoglobin cannot be synthesized, with resultant microcytic anemia due to the formation of small erythrocytes. The role of iron supplementation is to replace those iron stores and to encourage erythropoiesis and oxygen transportation throughout the body.

Administration

Oral Iron Supplementation

Oral iron replacement therapy is the most cost-effective and readily available for the general public as -
1.ferrous sulfate (20% elemental iron),

2.ferrous gluconate (12% elemental iron)

3.ferrous fumarate (33% elemental iron).

For best absorption, the recommendation is to take iron at least 30 minutes before a meal or 2 hours before taking other medications

If the patient cannot tolerate the gastrointestinal side effects, they may take it with small amounts of food
Avoid taking it with milk, calcium, and antacids, high fiber foods, or caffeine. Some studies have suggested taking iron with orange juice or with vitamin C supplementation to help improve absorption.

IV Iron Supplementation

An alternative to oral iron supplementation is via IV infusion.

This may be preferable in patients who:

Cannot tolerate oral iron due to side effects

- Pregnant women who already have significant nausea and vomiting
- Those who have had a gastric bypass, where reduced gastric secretion impairs iron absorption
- Those who have malabsorption conditions that prevent adequate absorption into the body (such as Whipple's disease, SIBO, celiac disease, pernicious anemia
- Those with chronic inflammatory states, such as SLE or rheumatoid arthritis have elevated hepcidin levels that reduce oral iron absorption.

Types of Iron Infusions

Various formulations of iron infusions are available, each designed to meet specific medical needs and patient preferences. Here are some of the most commonly used types:

1.Iron Dextran (InFeD, Dexferrum)

Iron dextran is one of the oldest and most commonly used iron infusion types. It is suitable for treating iron deficiency anemia that has not responded to oral iron supplements. Iron dextran is administered in a diluted form and can be given as a slow IV infusion. One advantage of iron dextran is that it can deliver a large dose of iron in a single session, making it efficient for rapid iron replenishment. However, it requires a test dose before administration to monitor for allergic reactions, as there is a risk of hypersensit

2.Ferric Carboxymaltose (Injectafer)

Ferric carboxymaltose is a newer formulation of iron infusion that allows for higher doses to be administered over a shorter time. It is commonly used to treat iron deficiency anemia in patients with chronic kidney disease or

inflammatory bowel disease. Ferric carboxymaltose is administered as a single or split dose, depending on the patient's iron needs. It is known for having a lower risk of allergic reactions compared to iron dextran, making it a preferred option for some

3. Iron Sucrose (Venofer)
Iron sucrose is another widely used iron infusion that is often administered to patients with chronic kidney disease, including those on dialysis. It is administered in multiple small doses, which reduces the risk of side effects and allergic reactions. Iron sucrose is generally well tolerated and has a lower incidence of adverse reactions compared to iron dextran. This makes it a suitable option for patients who require regular, ongoing iron supplementation.

4. Ferric Gluconate (Ferrlecit)
Ferric gluconate is similar to iron sucrose in terms of safety and tolerability. It is commonly used in patients undergoing hemodialysis who require iron supplementation. Ferric gluconate is administered in multiple small doses over several sessions, which helps minimize the risk of side effects. This type of iron infusion is effective in increasing hemoglobin levels and replenishing iron stores without causing significant discomfort or allergic reactions.

5. Ferumoxytol (Feraheme)
Ferumoxytol is a newer iron infusion formulation that is approved for use in patients with chronic kidney disease. It allows for the rapid administration of a large dose of iron over a short period. Ferumoxytol is typically given as two doses a few days apart. It is effective in quickly replenishing iron levels and improving symptoms of iron deficiency anemia. However, like iron dextran, it requires monitoring for potential allergic reactions, according to the American Society of Nephrology.

6. IM iron is available, but not preferred as patients will have severe site injection pain and inconsistent absorption. It may also stain the skin.sometimes if not given properly causes muscle abscess and granuloma which is very

Adverse Effects

The most common side effects are gastrointestin
al, such as nausea/vomiting, constipation or diarrhea, flatulence, metallic taste, staining of the teeth, or epigastric distress.

Patients may feel uncomfortable with the change in stool caliber and color to green or 'tarry black.'

Many oral iron supplements (ferrous fumarate, ferrous gluconate, ferrous sulfate) formulations are associated with higher GI side effects than IV iron or placebo.

Patients can decrease the adverse effects by taking iron supplements on an adjusted regimen (i.e., three times a week instead of daily), or taking it with food, although this may decrease the absorption and be less convenient for the patient, which may lead to non-compliance.

The adverse effects of IV iron may be infusion reactions and anaphylaxis.

Iron may decrease the absorption of other medications by forming an insoluble complex with those agents. These include methyldopa/levodopa, fluoroquinolones, penicillin, or tetracyclines.

Contraindications

Patients with iron-overloaded states such as hereditary hemochromatosis, hemosiderosis, or have a history of hemolytic anemia.

Monitoring

Labwork consistent with iron deficiency include low serum iron levels, low transferrin saturation, and a high total iron-binding capacity (TIBC).

For patients receiving oral iron, patients will need to return to the office for repeat bloodwork to monitor tolerability to the medication and will need to be on supplementation for months.

For those receiving IV iron, levels should be within normal limits after six weeks of therapy. Iron supplementation may cease once there are adequate iron and transferrin stores in the body. If there is an inadequate response to oral therapy, investigate reasons why: such as noncompliance,

Toxicity

Toxicity is often dose-dependent and can manifest with cardiovascular, metabolic, central nervous, and hepatic instability and damage.

Symptoms of overdose include initial GI upset that slowly develops to acute metabolic encephalopathy, seizures, tachycardia, metabolic acidosis, arrhythmia, hypoxia. Amounts up to 20 mg/kg of elemental iron is usually well-tolerated, but may have mild GI symptoms.

Amounts between 20 to 60 mg/kg is mild to moderately toxic, and over 60 mg/kg can cause severe symptoms and morbidity due to circulatory collapse.

Iron overdose can have therapy using gastric lavage with an iron chelator such as deferoxamine or GI decontamination procedures such as lavage solutions and whole-bowel irrigation.

Enhancing Healthcare Team Outcomes

Initiating iron supplementation to address an iron-deficiency state is often managed by the primary care provider.

sometimes it may be managed by specialists including the hematologist, gastroenterologist, or nephrologist, depending on the underlying cause of the anemia.

In the early stages, anemia may be present on routine bloodwork. Initial testing includes a peripheral smear, complete blood count (CBC) with differential, which includes values such as WBC count, hemoglobin, hematocrit, RBC count, RBC indices.

A reticulocyte count is helpful as well.

If asymptomatic, the patient can be monitored with yearly CBC to check for any changes.

If symptomatic more aggressive methods to identify the underlying cause are necessary.

If iron deficiency is suspected, these patients should have iron studies assessed to check for serum iron, total iron-binding capacity (TIBC), transferrin saturation, and ferritin levels to determine if it is iron deficiency anemia, the most likely cause of microcytic anemia vs. other etiologies.

Other tests that the clinician can order are hemosiderin and hepcidin, but are not necessary.

Once the iron-deficiency is confirmed, then iron supplementation may be started.

It is the responsibility of the primary provider and other health professionals to ensure that the patient is not assumed to have iron deficiency anemia based on a CBC and receiving unnecessary iron supplementation without a complete workup.

Anemia is a significant global health issue, and healthcare professionals must coordinate to ensure that if the patient is not improving with oral iron supplementation, to try another route of administration, or to check for another underlying cause of the anemia.

If their anemia is indeed due to iron deficiency, then supplementation should have tangible improvements on repeat CBC and bloodwork.

The need for care coordination of all healthcare professionals on the interprofessional team involved in the management of the patient is the recommended approach to provide symptomatic relief and improve outcomes

References

1.Lopez A, Cacoub P, Macdougall IC, Peyrin-Biroulet L. Iron deficiency anaemia. Lancet. 2016 Feb 27;387(10021):907-16.

2.Low MS, Speedy J, Styles CE, De-Regil LM, Pasricha SR. Daily iron supplementation for improving anaemia, iron status and health in menstruating women. Cochrane Database Syst Rev. 2016 Apr 18;4(4):CD009747.

3.Zimmermann MB, Hurrell RF. Nutritional iron deficiency. Lancet. 2007 Aug 11;370(9586):511 -20.

4.Geisser P, Burckhardt S. The pharmacokinetics and pharmacodynamics of iron preparations. Pharmaceutics. 2011 Jan 04;3(1):12-33.

5.Ems T, St Lucia K, Huecker MR. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Apr 17, 2023. Biochemistry, Iron Absorption.

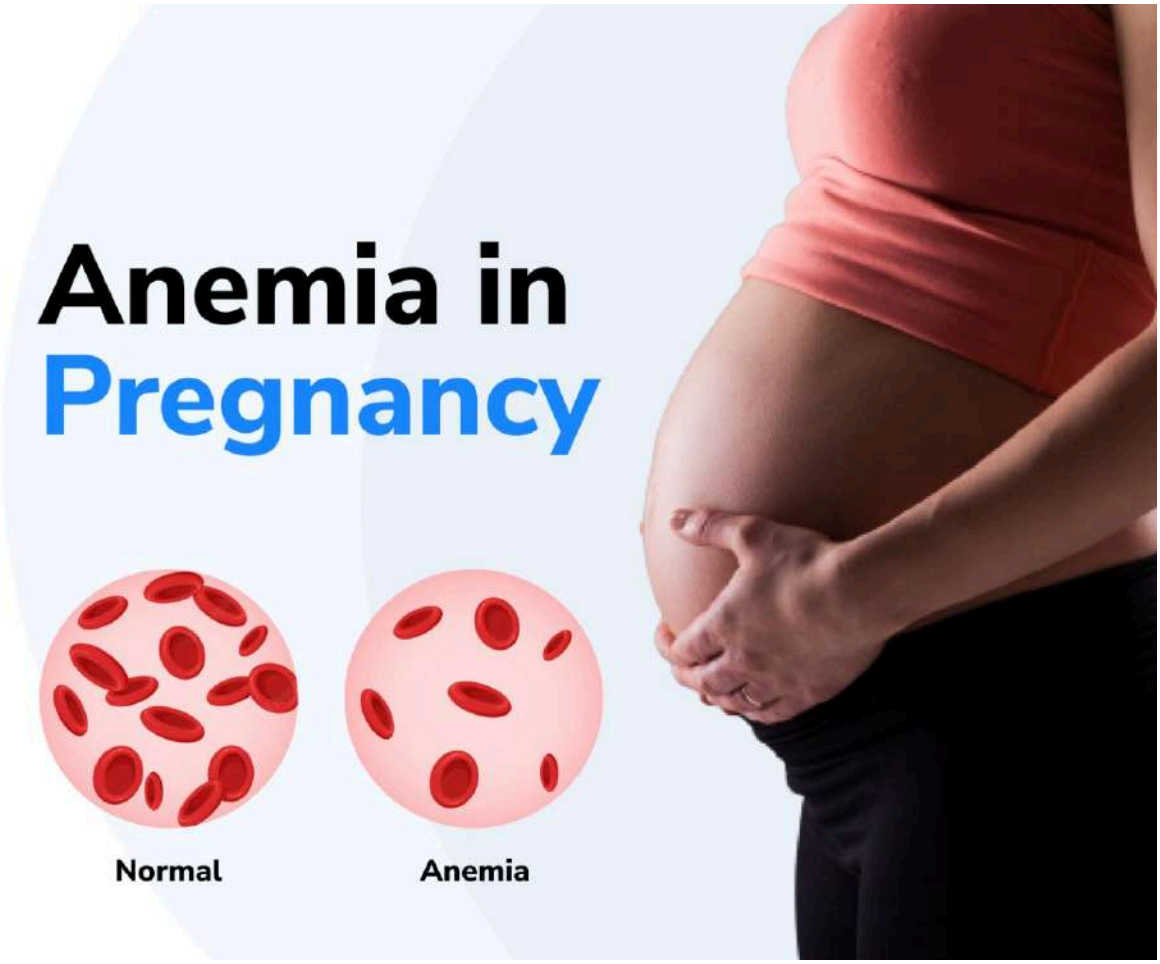
6.Lane DJ, Jansson PJ, Richardson DR. Bonnie and Clyde: Vitamin C and iron are partners in crime in iron deficiency anaemia and its potential role in the elderly. Aging (Albany NY). 2016 May;8(5):1150-2.

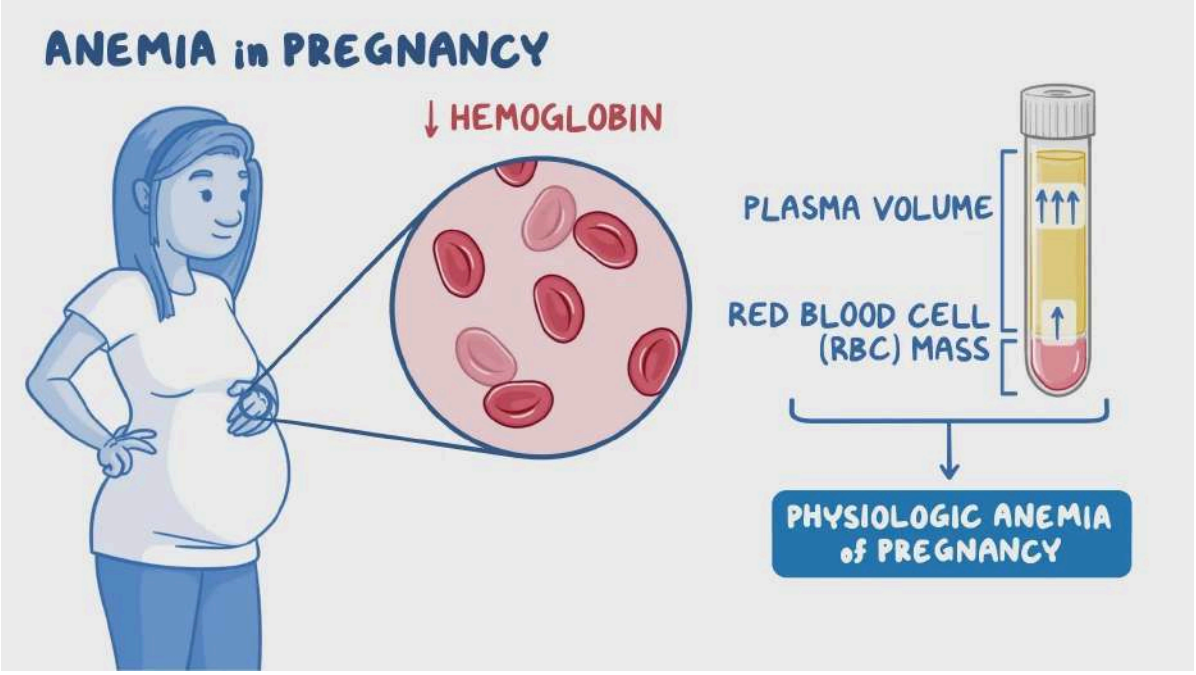
7.Bregman DB, Morris D, Koch TA, He A, Goodnough LT. Hepcidin levels predict nonresponsiveness to oral iron therapy in patients with iron deficiency anemia. Am J Hematol. 2013 Feb;88(2):97-101.

8.Auerbach M, Ballard H, Glaspy J. Clinical update: intravenous iron for anaemia. Lancet. 2007 May 05;369(9572):1502-1504.

9.Tolkien Z, Stecher L, Mander AP, Pereira DI, Powell JJ. Ferrous sulfate supplementatio causes significant gastrointestinal side-effects in adults: a systematic review and meta- analysis. PLoS One. 2015;

10(2):e0117383. 10.Auerbach M, Schrier S. Treatment of iron deficiency is getting trendy. Lancet Haematol. 2017


Anemia in
Pregnancy
Normal
Anemia


ANEMIA in PREGNANCY
↓ HEMOGLOBIN
PLASMA VOLUME
RED BLOOD CELL (RBC) MASS
PHYSIOLOGIC ANEMIA of PREGNANCY

04

POSTPARTUM ANEMIA: A CRITICAL CONCERN

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INTRODUCTION :-

Anaemia is defined as a reduction in haemoglobin concentration below a threshold. The World Health Organisation defines postpartum anemia (PPA) as a haemoglobin concentration of < 11 g/dl at one week post-delivery and < 12 g/dl in the first postpartum year. Grading of PPA severity as mild, moderate, and severe with Hb levels of 10–10.9, 7–9.9, and below 7 gm/dL, respectively, is similar to Hb cut-offs recommended by the WHO for grading of anemia during pregnancy.

The prevalence of anemia in women after childbirth remains unacceptably high in both developed (22–50%) and developing (50–80%) countries. The prevalence of PPA in India is around 65%, ranging from 26.5 to 94.6% in rural parts of Karnataka and Rajasthan. Another study reported that the prevalence of PPA in urban Puducherry was 76.2%.

Postpartum anemia is mainly caused by untreated antenatal iron deficiency or anemia together with underlying diseases (hemoglobinopathies), infections (malaria and worm infestation), nutritional deficiency (vitamins A and B12; riboflavin; and folate) and antepartum and postpartum hemorrhage.
Untreated postpartum anemia affects the wellbeing of both the mother and child. Maternal iron deficiency or anemia related complications may impair physical capacity and performance and negatively impact health-related quality of life. The other adverse outcomes of PPA include emotional instability, decline in cognitive abilities as well as higher chances of infections, venous thromboembolism, and postpartum depression. It may also contribute to insufficient breastmilk supply which may lead to a shorter duration of breastfeeding. It may also result in poor interaction between mother and child, and delay in developmental milestones in infants.

DIAGNOSIS :-

Diagnosis of anemia in the post-partum period can be challenging for several reasons. The maternity ward stay after delivery is an important window of opportunity for its diagnosis and treatment since the next point for medical assessment is only after 4–6 weeks and healthcare utilization can be absent in 10–40% of puerperal women depending on the specific area and population.

Considering the high prevalence of PPA in India, the health consequences, and the benefits of early diagnosis and treatment prior to discharge, **universal screening should be performed with Hb estimation and complete blood count (CBC), in every postpartum woman within 24–48 hours of delivery**, prior to discharge. This is simple, economical, quick, and helpful for early IDA prediction. A normal/borderline ferritin level does not exclude iron deficiency anemia as it is an acute phase reactant. Although reduced serum ferritin is suggestive of iron deficiency, it may be raised out of proportion to iron stores due to inflammation, infection, malignancy, liver disease, or other factors. Hence routine screening with serum ferritin is not recommended.

MANAGEMENT OF IRON DEFICIENCY ANEMIA IN POSTPARTUM PERIOD

Treatment for iron deficiency anemia (IDA) involves oral or parenteral iron supplementation and more rarely transfusion of blood products. In general, guidelines recommend oral iron for mild PPA, and i.v. iron for moderate to severe anemia.

Oral iron

- WHO recommends that OI therapy may be given to postpartum women for 6–12 weeks postdelivery and women with PPA should be treated with daily iron (with folic acid) supplements until Hb reaches normal levels. In women with mild to moderate PPA who are hemodynamically stable, asymptomatic or mildly symptomatic, other guidelines also recommend the continuation of iron supplements for 3 months (Turkish consensus report, NATA consensus).

- Oral iron supplementation is a common therapy for IDA, but frequent gastrointestinal (GI) side effects significantly affect patients' adherence and efficacy of therapy. Oral preparations are insufficient in moderate-to-severe anemia where a rapid improvement in hemoglobin (Hb) levels and iron stores is essential. Hence, parenteral iron preparations are primary mode of treatment for moderate-to-severe anemia.

Parenteral iron therapy

Parenteral iron is emerging as an alternative treatment for significant postpartum anemia. It is preferred over oral due to poor patient compliance, intolerability, insufficient treatment response, and long duration of treatment associated with the latter.

A. Intramuscular (IM) therapy.

- Intramuscular injections are associated with pain as well as chances of permanent skin staining, and the occurrence of gluteal sarcomas and sterile abscesses.
- Absorption of iron following IM therapy is slow and variable, with the inability to inject in patients with decreased muscle mass.
- It is not less toxic or safer compared to the IV route.
- Moreover, for most of the patients, the required dose of I.V. Iron can be injected in a single visit , thus minimizing the frequent visits and ensuring better compliance and clinical outcomes. Hence IV iron therapy is preferred over intramuscular (IM) therapy.

B. Guidelines for using intravenous iron (Inj Iron Sucrose and Inj FCM) in lactating women.

- **Indication**- Post natal mother up to 42 days after delivery with confirmed iron deficiency anemia and Hb level between 5 to 9gm/dl, intolerance to oral iron or failed oral iron treatment, IV iron should be used for management of anemia.
- ·Contraindications-

1.Evidence of iron overload (serum ferritin > 150 µg/l).
2. Known case of hypersensitivity of iron preparations.
3.Anemia is not caused by iron deficiency.
4.Liver disorder, renal failure, acute cardiac failure.
5.Known case of sickle cell anemia, hemolytic anemia or thalassemia.

- Dose calculation- Ganjoni Formula

Iron need (mg iron) =2.4× body weight (kg) × (target Hb– actual Hb) + 500 for iron stores (if women weight is <35kg allowance for iron store is 15mg/kg body weight.)

- Injection iron sucrose should not exceed 600mg (3 doses of 200mg each) in a week.
- Inj FCM should not exceed 1000 mg per session.

a) Iron sucrose- The maximal single dose per day is 200 mg, so its use is limited due to multiple infusions.

b)Ferric carboxymaltose

- Advantages of FCM
- It has been demonstrated to have superior efficacy relative to oral iron in improving the Hb levels and attaining better iron stores. Additionally, FCM is reported to have a superior and sustained effect on the Hb relative to iron sucrose (IS)
- It has a better safety profile relative to oral iron and Iron Sucrose.
- FCM infusions are reported to be more economical than IS infusions.
- FCM is an economical and effective treatment option relative to red cell transfusion in women not responding to OI.
- As opposed to IS, a test is not required with FCM, thus easing the administration of IV iron in a timely and economical manner.

POSTPARTUM FOLLOWUP

In all PPW, repeat Hb estimation should be performed at 6 weeks postdelivery. Oral iron therapy is not required during or following FCM administration. As 6 weeks is the appropriate time for iron supplements to replenish the iron stores, the first follow-up visit at 6 weeks is an excellent opportunity to assess the effect of treatment by re-estimating the Hb levels.

CONCLUSION

Anemia among postpartum women is a public health issue and the condition is likely undertreated, threatening women's and children's health in the immediate postpartum period and long-term. Postpartum
anemia management is effective in improving maternal peripartum outcome. It reduces physical and mental fatigue and increases quality of life of new mothers. Evidence suggests that IV iron should be the first-

choice treatment for PPA. However, if IV iron administration is not feasible, oral iron supplementation should not be omitted.

REFERENCES

1.Milman N. 2015. Postpartum Anemia - Still a Major Problem on a Global Scale. J Pregnancy Child Heal 02:4172

2.Ando K, Morita S, Higashi T, Fukuhara S, Watanabe S, Park J, Kikuchi M, Kawano K, Wasada I, Hotta T. Health-related quality of life among Japa nese women with iron-deficiency anemia. Qual Life Res. 2006;15:1559–63

3.World Health Organisation. 2016. Guideline Iron Supplementation in postpartum women.

4.Henly SJ, Anderson CM, Avery MD, Hills-Bonczyk SG, Potter S, Duckett LJ. Anemia and insufficient milk in first-time mothers. Birth. 1995;22:86–92.

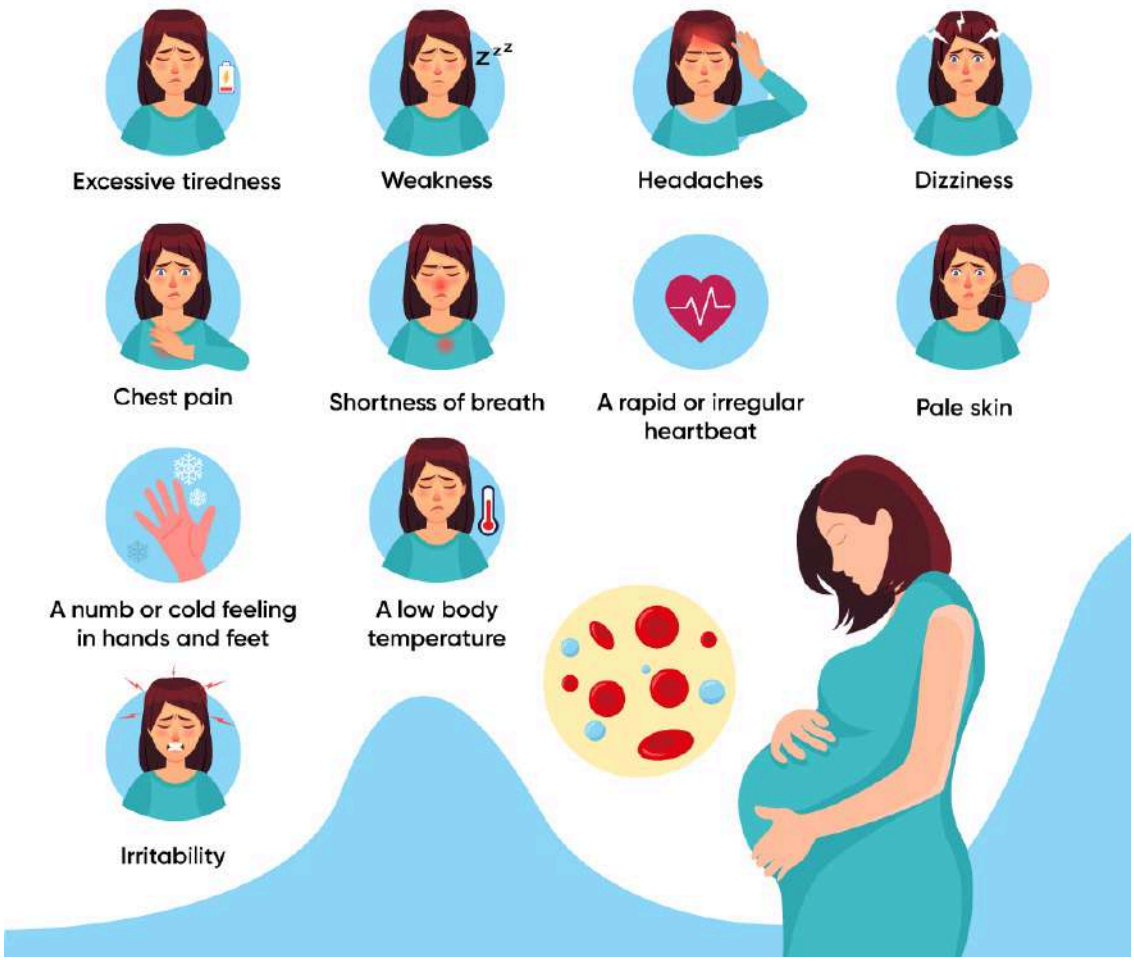
5.Sekaran SK, Mukherjee B, Sharma JB et al. Federation of Obstetric and Gynecological Societies of India Consensus Recommendations for the Management of Postpartum Anemia with Specific Reference to Usage of Ferric Carboxymaltose. Journal of South Asian Federation of Obstetrics and Gynaecology, 2024 April:16 (Supply1) S 43-49.

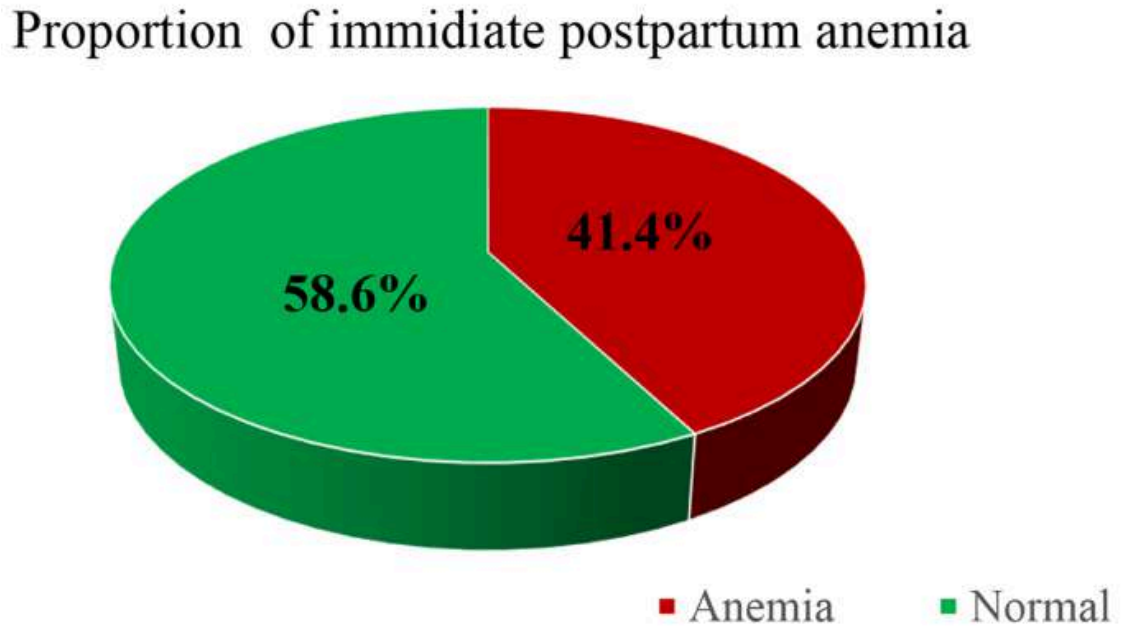
6.Sharma N, Thiek JL, Natung T. Comparative study of efficacy and safety of ferric carboxymaltose versus iron sucrose in post-partum anaemia. J Obstet Gynecol India 2017;67(4):253–257.

7.Neefa V, Choorapoikayila S, Hof L. Current concepts in postpartum anemia management. Obstetric and gynecological anesthesia.June2024;37(3):234-238

8.Api O, Breyman C, Çetiner M, et al. Diagnosis and treatment of iron deficiency anemia during pregnancy and the postpartum period: Iron deficiency anemia working group consensus report. Turk J Obstet Gynecol 2015;12(3):173–181.

9.Muñoz M, Peña–Rosas JP, Robinson S, et al. Patient blood management in obstetrics: Management of anaemia and haematinic deficiencies in pregnancy and in the post-partum period: NATA consensus statement. Transfus Med 2018;28(1):22–39.


Symptoms of Anemia in Pregnancy
Excessive tiredness
Weakness
Headaches
Dizziness
Chest pain
Shortness of breath
A rapid or irregular heartbeat
Pale skin
A numb or cold feeling in hands and feet
A low body temperature
Irritability


Proportion of immidiate postpartum anemia
41.4%
58.6%
Anemia
Normal

05

ADDRESSING ANEMIA IN PERIMENOPAUSAL & MENOPAUSAL WOMEN

Author :-Dr Prabhdeep Kaur
(MBBS DGO DNB) Bhilai C.G.

Introduction

Anemia is a condition defined by a deficiency of red blood cells or hemoglobin in the blood, resulting in reduced oxygen transport to the body's tissues. It is particularly pertinent to discuss anemia in perimenopausal and menopausal women, as hormonal changes, dietary practices, and physiological factors intricately weave together to influence the prevalence and severity of anemia in this demographic group. This article reviews the prevalence, causes, symptoms, types, and management strategies for anemia in perimenopausal and menopausal women, backed by current research and guidelines.

Prevalence of Anemia

Studies suggest that anemia affects approximately 2% to 5% of menstruating women, with prevalence rates increasing during the perimenopausal phase (Jorstad et al., 2020). After menopause, the prevalence remains significant, partly due to the aging process and a higher incidence of chronic diseases among older women. According to the World Health Organization (WHO), iron-deficiency anemia is one of the most prevalent forms of anemia globally, affecting millions of women across all age groups (WHO, 2021).

The main findings regarding anemia prevalence among reproductive-age women in India are{ Nowaj sharif et al 2023 }:

1. **High Prevalence Across Social Groups:** Anemia prevalence is high across all social groups .
2. **Increase Over Time:** The prevalence of anemia has slightly increased from 2005-06 to 2019-21.
3. **Geographical Variation:** Higher prevalence rates are observed in eastern, north-eastern, and central states, with states like Assam, Tripura, Bihar, Jharkhand, Odisha, and West Bengal showing very high rates.
4. **Economic Status:** Economic status is a significant determinant, with poorer women having higher anemia prevalence. Poor women have worse condition.

5. **Education:** Higher education levels are associated with lower anemia prevalence across all social groups.

6. **Rural vs. Urban:** Rural women are more prone to anemia than urban women, likely due to less access to health information, education, and quality food.

7. **Age and Childbearing:** Anemia prevalence decreases with age but increases with the number of children ever born.

8. Nutritional Factors: Regular intake of pulses and improved sources of drinking water are associated with lower anemia prevalence.

Causes of Anemia in Perimenopausal and Menopausal Women

1. Menstrual Blood Loss

One of the primary causes of anemia in perimenopausal women is heavy menstrual bleeding (menorrhagia), often exacerbated by hormonal imbalances. During perimenopause, estrogen and progesterone levels fluctuate, which can lead to irregular and heavy menstrual cycles. This increased blood loss can deplete iron stores, leading to iron-deficiency anemia (Malcolm G Munro et al 2023).

2. Nutritional Deficiencies

As dietary habits shift during menopause, many women may not meet their nutritional needs. A diet lacking in essential nutrients, particularly iron, vitamin B12, and folate, contributes to the risk of developing anemia. Vegetarians and vegans may face a higher risk due to lower intake of heme iron, which is found in animal products and is more readily absorbed by the body (Cynthia A Thomson et al 2011).

3. Chronic Diseases

The incidence of chronic diseases often increases with age, contributing to anemia. Diseases such as chronic kidney disease, cancer, rheumatoid arthritis, and diabetes can lead to anemia of chronic disease. In this form, the body's ability to utilize iron effectively is compromised, alongside decreased red blood cell production The anaemia of chronic inflammatory processes is common in everyday clinical practice.

However, despite the fact that it deteriorates the quality of life of the patient and can negatively affect survival, it is often neglected and not fully assessed by doctors because it is associated with other, usually serious, diseases upon which all therapeutic objectives are focused (Michał Wiciński et al 2020)

4. Gastrointestinal Changes

Menopausal women often face gastrointestinal changes, including reduced gastric acid production and altered gut microbiota ,irritable bowel syndrome, sleep disturbance. These changes can impair nutrient absorption and increase the risk of anemia. Atrophic gastritis, a condition that can occur with age, further complicates vitamin B12 absorption, necessitating vigilance among this population (Pei-Lin Yanget al 2021).

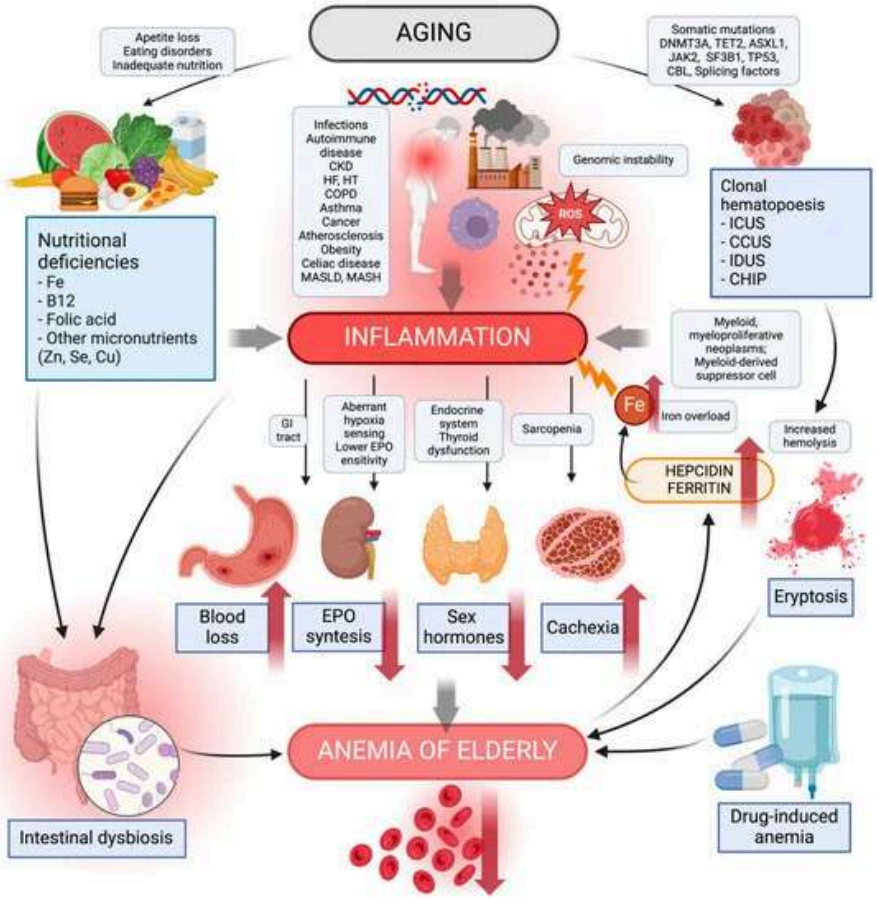
Symptoms of Anemia

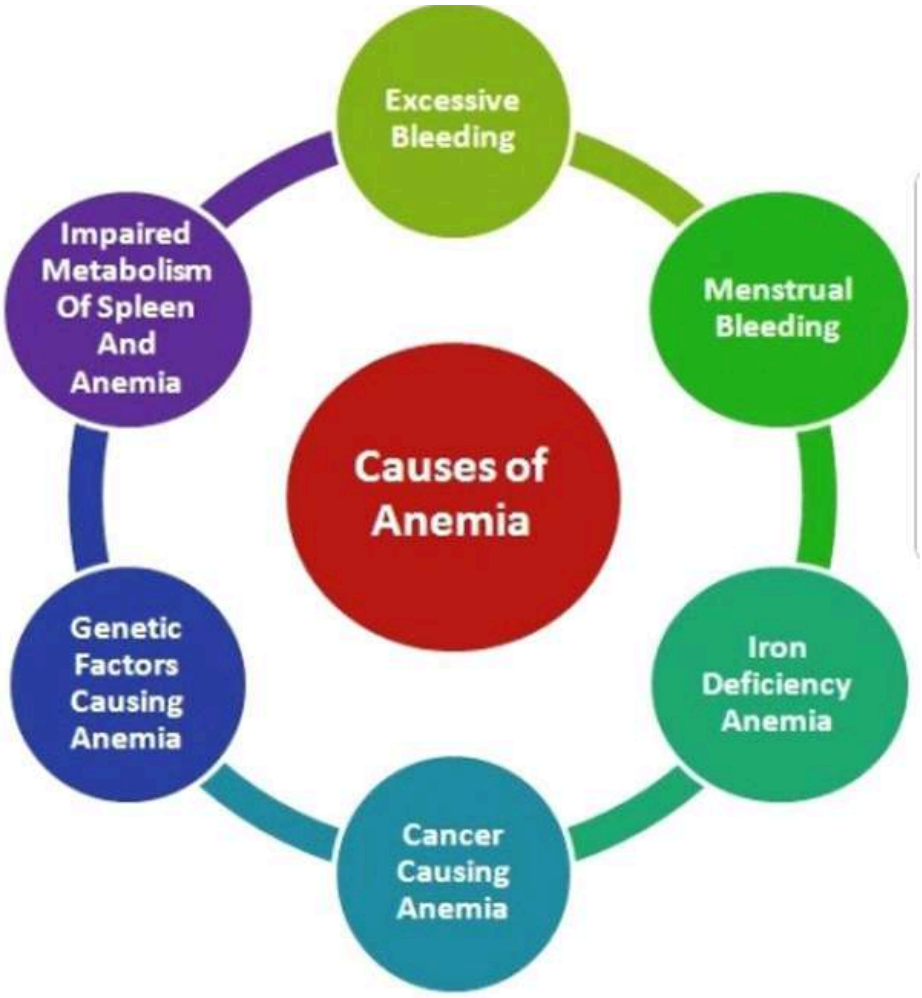
Recognizing the symptoms of anemia is crucial for timely diagnosis and management. Common symptoms include:

- Fatigue and weakness
- Pale skin and mucous membranes
- Dizziness or light-headedness
- Shortness of breath, especially during physical activities.
-Cold hands and feet
- Heart palpitations

It is essential for women experiencing these symptoms, particularly during perimenopause and menopause, to consult healthcare providers, as these symptoms may overlap with other menopausal symptoms such as fatigue, sleep disturbances, and mood changes.

Types of Anemia





Diagnosing anemia involves a comprehensive evaluation, including a thorough medical history, clinical examination, and laboratory tests. A complete blood count (CBC) is the primary test to determine hemoglobin levels, hematocrit, and red blood cell indices. Additional tests may include serum ferritin, iron studies, vitamin B12, and folate levels to help ascertain the underlying cause (Friedman & Rose, 2019).

Management

1. Dietary Modifications

Incorporating iron-rich foods is vital for managing iron-deficiency anemia. Foods such as beet root, dates, red meat, poultry, fish, lentils, beans, tofu, and fortified cereals are excellent sources. Pairing non-heme iron sources (e.g., plant-based) with vitamin C-rich foods (e.g., citrus fruits) can enhance absorption.

2. Supplements

Iron supplementation is often warranted when dietary intake is insufficient. The recommended daily allowance (RDA) for iron in postmenopausal women is 8 mg. However, if a woman is diagnosed with iron-deficiency anemia, higher doses, typically 100-200 mg of elemental iron daily, may be prescribed (Khan et al., 2019).

3. Treatment of Underlying Conditions

Addressing chronic diseases contributing to anemia is crucial. For instance, managing gastrointestinal conditions, optimizing chronic disease treatment, and addressing hormonal imbalances can improve anemia-related symptoms and overall health.

4. Regular Monitoring

Regular monitoring of hemoglobin levels and overall health is essential, particularly for those with a history of anemia or related risk factors.

Conclusion

Anemia poses a significant health challenge for perimenopausal and menopausal women, impacted by hormonal changes, dietary habits, and underlying health conditions. Early recognition, proper diagnosis, and

comprehensive management, including dietary modifications and supplements, can greatly improve outcomes. Women in this phase of life should be vigilant for symptoms of anemia and seek medical advice to ensure optimal health and quality of life during this crucial transition.

References

1. Malcolm G Munro et al The relationship between heavy menstrual bleeding, iron deficiency, and iron deficiency anemia. Am J Obstet Gynecol. 2023 Jul;229(1):1-9.

2. Friedman, J. R., & Rose, I. (2019). Diagnosis and management of anemia in older adults. American Family Physician, 99(7), 611-618.

3. Pei-Lin Yang, Margaret M. Heitkemper & Kendra J. Kamp Irritable bowel syndrome in midlife women: a narrative review Women's Midlife Health volume 7, Article number: 4 (2021).

4. Jorstad, H. T., et al. (2020). Anemia prevalence and associated factors among premenopausal women. BMC Women's Health, 20(1), 1-9.

5. Cynthia A Thomson et al, Nutrient intake and anemia risk in the women's health initiative observational study. J Am Diet Assoc. 2011 Apr;111(4):532-41.

6 Michał Wiciński et al Anemia of Chronic Diseases: Wider Diagnostics—Better Treatment? Nutrients 2020, 12(6), 1784; https://doi.org/10.3390/nu12061784

7. WHO. (2021). Anaemia. World Health Organization. Retrieved from [WHO website](https://www.who.int/news-room/fact-sheets/detail/anaemia).

8. Sharif N, Das B, Alam A (2023) Prevalence of anemia among reproductive women in different social group in India: Cross-sectional study using nationally representative data. PLoS ONE 18(2): e0281015

06

IRON-DEFICIENCY ANEMIA: A FOCUS ON TREATMENT

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Iron deficiency (ID) and iron deficiency anemia (IDA) pose a serious concern to women of all reproductive ages . Iron deficiency has been linked to and results in a variety of detrimental health outcomes that impact women's physical and mental health in all facets(1)

In India, 50 % of population suffers from iron deficiency anaemia ,which leads to poor pregnancy outcomes and 20% maternal mortality. The surge is highest in children between the ages of 6 and 59 months . in comparison to the The National Family Health Survey-4 (NFHS-4) anaemia affected affected 67.1% of Indian children aged 6–59 months,according to NFHS 5 (2019-2021).In india ,anemia prevalence among women of reproductive age has similarly grown,going from 53 % in NFHS-4 (2015-2016) to 57 % in NFHS-5 (2019-2021).(2)

Management –

1.ORAL IRON THERAPY

2.PARENTERAL IRON THERAPY

3.BLOOD TRANSFUSION

1.ORAL IRON THERAPY :-

Oral iron is commonly used as first line of treatment because of its broad availability ,simplicity of administration ,as well as affordable mainstream formulations.Effective iron replacement with oral supplements necessitates relatively high doses of elemental iron 50–200 mg/day of elemental iron for 3–12 weeks.Only about 10 -20 % of it is absorbed ,which leads to an excess of iron building up in the digestive tract and causing gastrointestinal problems. (3,4)

Ferrous Salts

Most widely used oral iron supplements are ferrous salts containing gluconate, fumarate, or sulfate. Other substances include ascorbate, carbonate, tartrate, iodine, sodium citrate, aspartate, succinate, ferrous glycine sulfate, bisglycinate, and chloride.

Ferrous salts come in syrup or tablet form (5)

FERRIC COMPLEXES -Supplements having ferric polysaccharide complexes (mixed polysaccharides,polymaltose,or polydextrose)offer an alternative to ferrous salts.iron and monomeric or oligomeric saccharidesare released when they are broken down by gastric juice .These saccharides can reduce and change fe 3+ in to Fe 2+,which increases the iron's bioavailability.(6) Fe3+ attached to succinylated milk proteins,or iron protein succinylate ,is another kind of ferric supplement (7). When compared to traditional ferrous salts ,their prioce is much higher .

Other approaches for oral iron supplementation include heme iron polypeptide and other carbonyl iron.

TYPES OF SUPPLEMENTS	Amount of elemental iron, *mg per tablet	Advantages	Disadvantages
FERROUS SALTS 1.FERROUS SULFATE	65	Cheaper, higher efficacy, wider range of availability	Poor tolerability
2.FERROUS FUMARATE	100	Cheaper, higher efficacy, wider range of availability	Poor tolerability
3.FERROUS GLUCONATE	35	Cheaper, higher efficacy, wider range of availability	Poor tolerability
4.FERROUS BISGLYCINATE	50	Cheaper, higher efficacy, wider range of availability	Poor tolerability
FERRIC COMPLEXES 1.FERRIC POLYSACCHARIDES	150	Better tolerability than ferrous salts	Lower efficacy than ferrous salt

2.FERRIC POLYMALTOSE	100	Better tolerability than ferrous salts	Lower efficacy than ferrous salt
3.FERRIC POLYDEXTROSE	150	Better tolerability than ferrous salts	Lower efficacy than ferrous salt
4. Iron protein succinylate	40	Higher efficacy, fair tolerability	Expensive
5. Ferric citrate	210	Efficacious in CKD patients	Expensive
6. Ferric maltol	30	Efficacious and tolerable in irritable bowel syndrome patients	Expensive with risk of irritable bowel disease flare
7. Sucrosomial iron	30	Good tolerability in Irritable bowel disease patients	Expensive and doesn't rebuild iron stores
8. Liposomal iron	30	Easily tolerable in irritable bowel syndrome patients	Very less data regarding drug, no iron stores are rebuild
OTHER 1. Carbonyl iron	18	Low cost with wider availability	
2. Heme iron polypeptide	12	Good Efficacy in CKD patients	Scarce data, doesn't rebuild iron stores

2.PARENTERAL IRON THERAPY

Even though oral iron therapy may be helpful for iron deficient individuals without inflammation ,intravenous iron is beneficial for several patient populations,such as those with inflammation(kidney disease ,,heart failure,or rheumatological diseases),those who cant oral

and those or those who donot follow oral iron therapy (8,9).Oral iron is not well taken even in the best situations and , patients frequently stop taking it for several reasons ,such as requirement for several daily dosages and unbearable side effects (10).

Current FDA approved iron formulations are as follows

Iron preparations	Maximal single dose	Plasma half life	Special features
1.iron sucrose	200 mg	6 hrs	Can be given in patients with chronic kidney disease
2.sodium ferric gluconate	125 mg	1 hr	Can be given in dialysis derpendent ckd patients
3.low molecular weight iron dextran	20mg/kg	5-20 hrs	Can be given in patients where rapid correction of iron is needed
4.ferric carboxymaltose	750 mg	7 -12 hrs	Low immunogenic potential ,low risk of . anaphylaxis
5.ferric derrisomaltose	1000 mg	20 hrs	Rapid coorection of iron deficit
6.ferrumoxytol	510 mg	15 hrs	Not approved due to reports of serious cardiac disorders

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Current FDA approved iron formulations are as follows

Management of iron deficiency anaemia in pregnant females

1.All pregnant females should be offered hb testing at booking and at around 28 weeks .

2. If hb <11 g/dl it is not possible to replete iron levels with diet alone hence oral iron supplementation

3. 40 to 80 mg oral iron every week is recommended and checking hb at 2 to 3 weeks to ensure an adequate response .

4. specialist medical care to be taken if anemia is severe < 7g/dl or associated with severe symptoms or gestation > 34 weeks or if there is no response to oral iron .

5. iv iron is recommended for women presenting beyond 34 weeks with confirmed iron deficiency anameia and an hb <10 g/dl.(11)

3. BLOOD TRANSFUSION

Severe IDA lacks a defined hemoglobin threshold and may or may not be linked to the traditional symptoms of anemia, including pallor and exhaustion. However, because severe IDA raises the possibility of employing allogeneic red blood cells as a source of iron replacement, it is relevant to transfusion medicine. In theory, a unit of red blood cells can correct microvascular hypoxemia more quickly since it provides 150–200 mg of hemoglobin in addition to elemental iron. Red blood cell transfusion is therefore frequently given to patients with severe IDA who exhibit hemodynamic instability, angina, neurologic symptoms, or clinical signs of heart failure. Ironically, there are some situations in which using red blood cells could be harmful.(12,13)

In stable individuals, oral iron is still a viable treatment option for Iron deficiency ; however, IV iron is more beneficial for many groups. As a result, IV iron should be taken into consideration when there are no contraindications, when a poor response to oral iron is expected, when quick hematologic responses are required, and/or when the product is readily available. Only severe, symptomatic IDA with hemodynamic instability should warrant the cautious use of red cell blood transfusions.(7)

References :

1)Cappellini MD, Santini V, Braxs C, Shander A. Iron metabolism and iron deficiency anemia in women. Fertil Steril. 2022 Oct;118(4):607-614. doi: 10.1016/j.fertnstert.2022.08.014. Epub 2022 Sep 6. PMID: 36075747.

2) jana, A., Saha, U.R., Reshmi, R.S. et al. Relationship between low birth weight and infant mortality: evidence from National Family Health Survey 2019-21, India. Arch Public Health 81, 28 (2023). https://doi.org/10.1186/s13690-023-01037-y

3)Celis AI, Relman DA, Huang KC. The impact of iron and heme availability on the healthy human gut microbiome in vivo and in vitro. Cell Chem Biol. 2023;30(1):110-126.e3. [DOI] [PMC free article] [PubMed] [Google Scholar]

4)Kortman GA, Raffatellu M, Swinkels DW, Tjalsma H. Nutritional iron turned inside out: intestinal stress from a gut microbial perspective. FEMS Microbiol Rev. 2014;38(6):1202-1234. [DOI] [PubMed] [Google Scholar]

5) Pantopoulos K. Oral iron supplementation: new formulations, old questions. Haematologica. 2024 Sep 1;109(9):2790-2801. doi: 10.3324/haematol.2024.284967. PMID: 38618666; PMCID: PMC11367235.

6) Feng Y, Wassie T, Wu Y, Wu X. Advances on novel iron saccharide-iron (III) complexes as nutritional supplements. Crit Rev Food Sci Nutr. 2023. Jun 27. doi: 10.1080/10408398.2023.2222175. [Epub ahead of print].

7)Santiago P. Ferrous versus ferric oral iron formulations for the treatment of iron deficiency: a clinical overview. ScientificWorldJournal. 2012;2012:846824.

8)Auerbach M., Pappadakis J. A., Bahrain H., Auerbach S. A., Ballard H., Dahl N. V. Safety and efficacy of rapidly administered (one hour) one gram of low molecular weight iron dextran (INFeD) for the treatment of iron deficient anemia. American Journal of Hematology. 2011;86(10):860–862. doi: 10.1002/ajh.22153. [DOI] [PubMed] [Google Scholar]

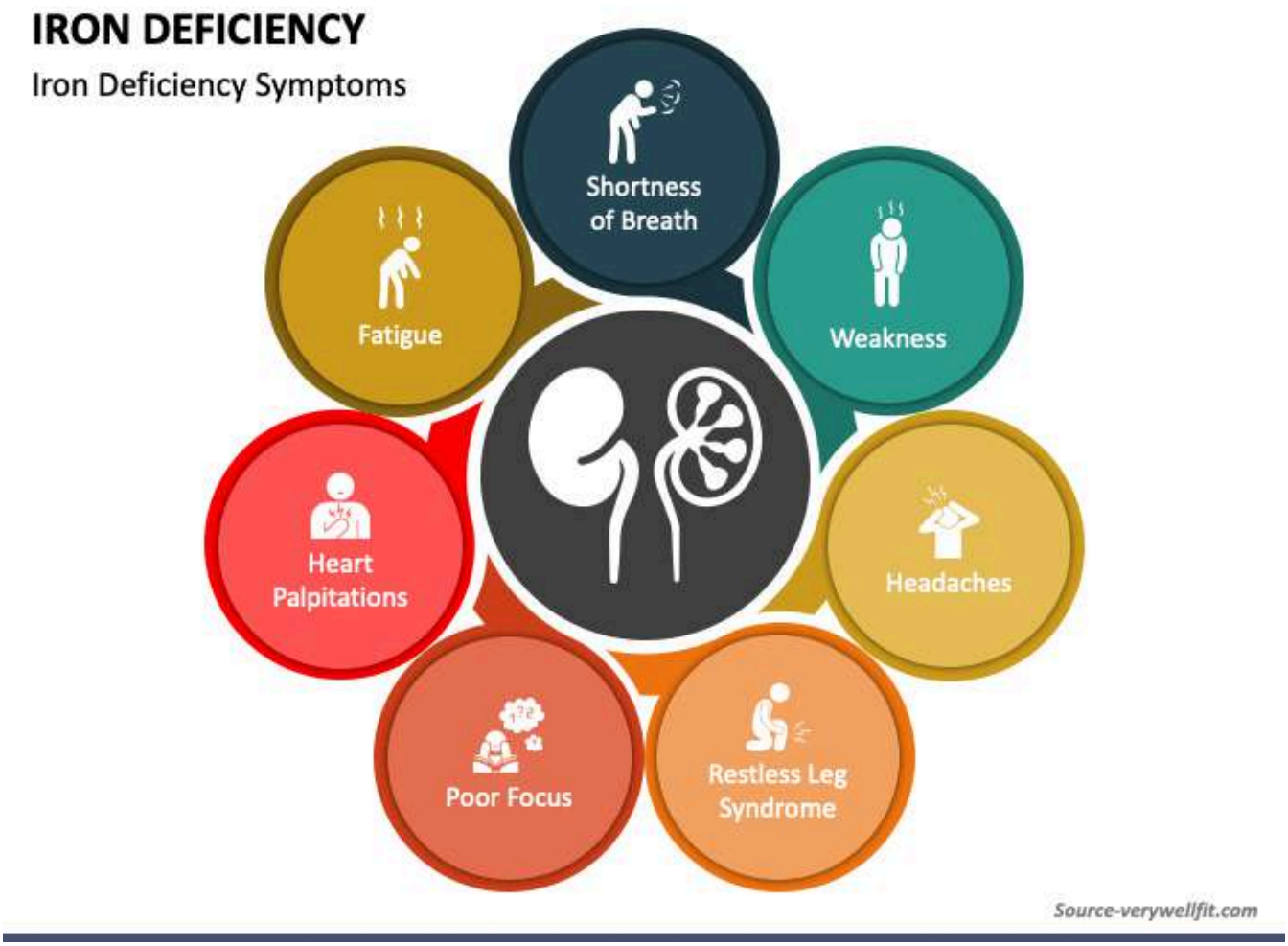
9)6.Goodnough L. T., Nemeth E., Ganz T. Detection, evaluation, and management of iron-restricted erythropoiesis. Blood. 2010;116(23):4754–4761. doi: 10.1182/blood-2010-05-286260. [DOI] [PubMed] [Google Scholar]

10)Bonnar J., Goldberg A., Smith J. A. Do pregnant women take their iron? The Lancet. 1969;1(7592):457–458. doi: 10.1016/s0140-6736(69)91492-5. [DOI] [PubMed] [Google Scholar]

11)Pavord S, Daru J, Prasannan N, Robinson S, Stanworth S, Girling J; BSH Committee. UK guidelines on the management of iron deficiency in pregnancy. Br J Haematol. 2020 Mar;188(6):819-830. doi: 10.1111/bjh.16221. Epub 2019 Oct 2. PMID: 31578718.

12)Rao SV, Jollis JG, Harrington RA, et al. Relationship of blood transfusion and clinical outcomes in patients with acute coronary syndromes. JAMA. 2004; 292: 1555–1562. [DOI] [PubMed] [Google Scholar]

13)15.Cooper HA, Rao SV, Greenburg MD, et al. Conservative versus liberal red cell transfusion in acute myocardial infarction. Am J Cardiol. 2011; 108: 1108–1111. [DOI] [PubMed] [Google Scholar]


IRON DEFICIENCY
Iron Deficiency Symptoms
Shortness of Breath
Fatigue
Weakness
Heart Palpitations
Headaches
Poor Focus
Restless Leg Syndrome
Source-verywellfit.com

07

COMPREHENSIVE MANAGEMENT OF SICKLE CELL DISEASE

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Professor and Unit head

Author
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Sickle cell disease is abnormal Hemoglobin with a defective amino acid substitution in the globin chain which leads to fragile hemoglobin.

Epidemiology

There are approximately 6.4 million people living with SCD worldwide and more than 1 million in India, causing considerable burden of the disease

Pathophysiology

The pathophysiology of SCD is the consequence of polymerization of the abnormal sickle hemoglobin in low oxygen conditions leading to the formation of rigid and fragile sickle-shaped red cells. These cells are prone to increased breakdown, which causes haemolytic anemia and the sickle-shaped red cells do not flow through blood vessels easily, causing blockage (vaso-occlusion) in small vessels, leading to most of the clinical features, including acute painful crises. Pregnancy worsens SCD resulting in severe complications for the mother and fetus and also increases the chances of maternal and fetal death.

Optimization of healthcare of women prior to pregnancy

- Annual review must be conducted and all women with SCD should be encouraged to engage with partner testing prior to embarking on pregnancy.
- Optimization of health should be done before embarking on pregnancy.
- High-risk couples should be counselled prior to pregnancy about their reproductive options: non-intervention, prenatal diagnosis or pre-implantation genetic testing.
- Folic acid (5 mg daily) should be given from before conception and throughout pregnancy

- Vitamin D levels should be optimized for all pregnant women with SCD.
- Daily antibiotic prophylaxis is recommended.
- Vaccinations should be kept updated and should include flu vaccination

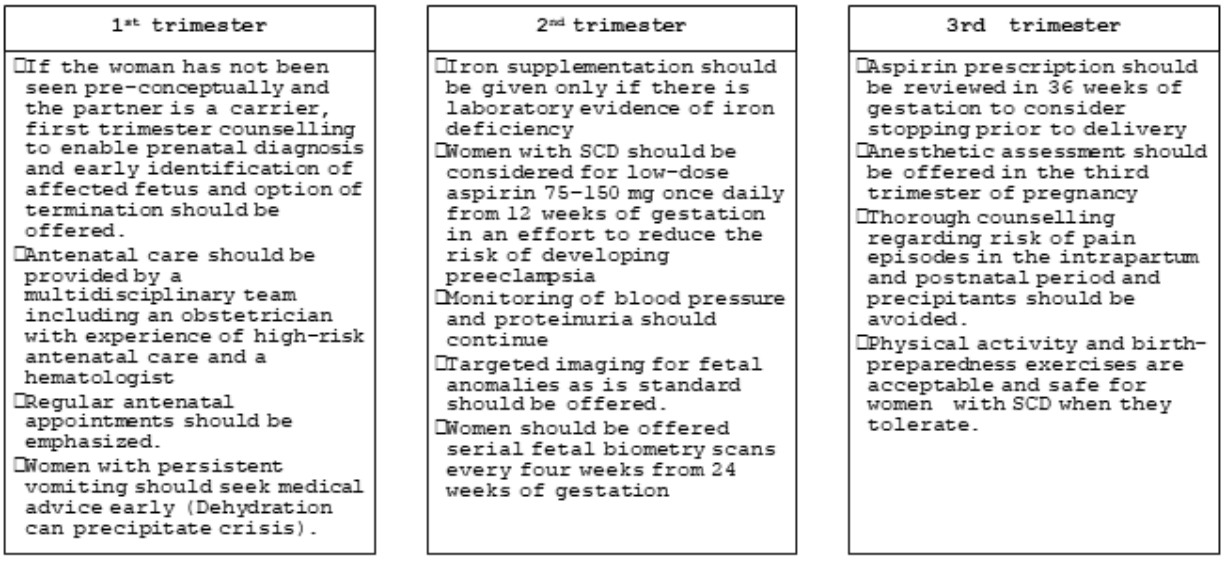
Table 1. Systems review at contact with SCD woman who is embarking on pregnancy

Chronic complication / Drugs administration	**Action to be taken**
Renal disease and hypertension	Blood pressure, creatinine and urinary protein monitoring
Antihypertensives	Angiotension Receptor Blockers / ACE inhibitors should be stopped and converted to other drugs.
Pulmonary hypertension	Echocardiography if not performed within 1 year or if symptomatic. Abnormalities should be discussed with a cardiologist
Chronic lung disease	Oxygen saturations on all women. Sleep studies and pulmonary function tests if indicated
Avascular necrosis of hip	Review hip complications which may worsen during pregnancy
Stroke	If previous stroke, consider role of transfusion during pregnancy and thromboprophylaxis review
Long-term opioids for chronic pain	Pain specialist for review of medications
Hydroxycarbamide	Discontinue.
Iron chelators	Discontinue

Care during antenatal admissions

- Women with SCD should be prescribed prophylactic low-molecular-weight heparin during any antenatal hospital admission.
- Vigilance towards development of acute chest syndrome should be maintained throughout hospital admission
- Protocols for high dependency unit admissions or intensive care unit admissions should be well-documented
- Antibiotics, with cover for atypical organisms, should be used even if blood cultures and sputum cultures are negative

Figure 1. Trimester-wise management approach to women with SCD



Peripartum considerations

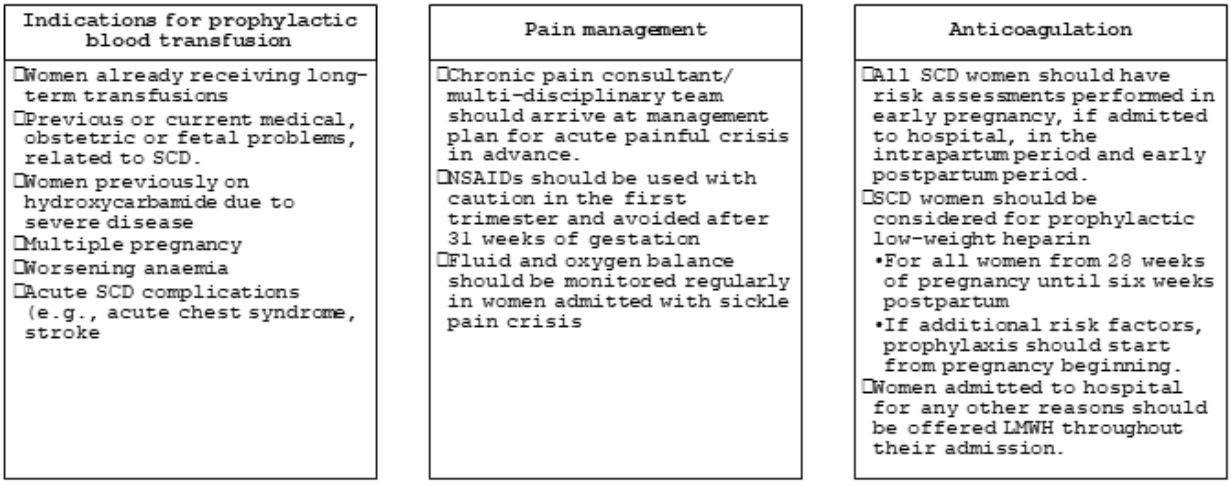
- Women with SCD should be advised to give birth in tertiary care centers that are able to manage both the complications of SCD and high-risk pregnancies .
- Pregnant women with SCD who have a normally growing baby should be delivered between 38 and 40 weeks of gestation.
- They can be offered vaginal delivery and vaginal birth after previous caesarean (VBAC) if there are no other contraindications.
- Those who have hip replacements (because of avascular necrosis) suitable positions for delivery should be discussed prior to delivery.
- Cross-matched blood should be kept ready during delivery

- Women should be kept warm and given adequate fluid during labour, using a fluid balance chart to avoid fluid overload and avoid dehydration.
- Continuous intrapartum electronic fetal heart rate monitoring is recommended owing to the increased risk of fetal distress, which may necessitate operative delivery.
- Opiates (except pethidine) may be used for analgesia
- Regional analgesia is recommended for caesarean section

Postpartum

- Thromboprophylaxis with LMWH for six weeks after delivery.
- Contraceptive advice should be given and should be individualized
- Methods that eliminate user failure, such as LNG- IUS and intramuscular DMPA are preferred.
- Progesterone-only preparations reduce sickle-cell associated pain and crises.

Figure 2. Special considerations in women with SCD



Iron therapy in sickle cell disease

Usually, iron supplementation is avoided in hemolytic anemias because there can be a coexisting iron overload. However, there may be a coexisting iron-deficiency anemia, which requires iron supplementation. This should be given only if there is laboratory evidence of iron deficiency. Iron panel like MCV (low), PCV (low), TIBC (high), Ferritin (low) can suggest co-exisitng iron deficiency anemia. In this situation, oral iron therapy can be considered for a short duration. Once these parameters show improvement, there is no further indication for continuing iron therapy. Also, when iron is given, administration of folic acid and vitamin B12 should be extra-meticulous due to increased load on iron synthesis metabolism.

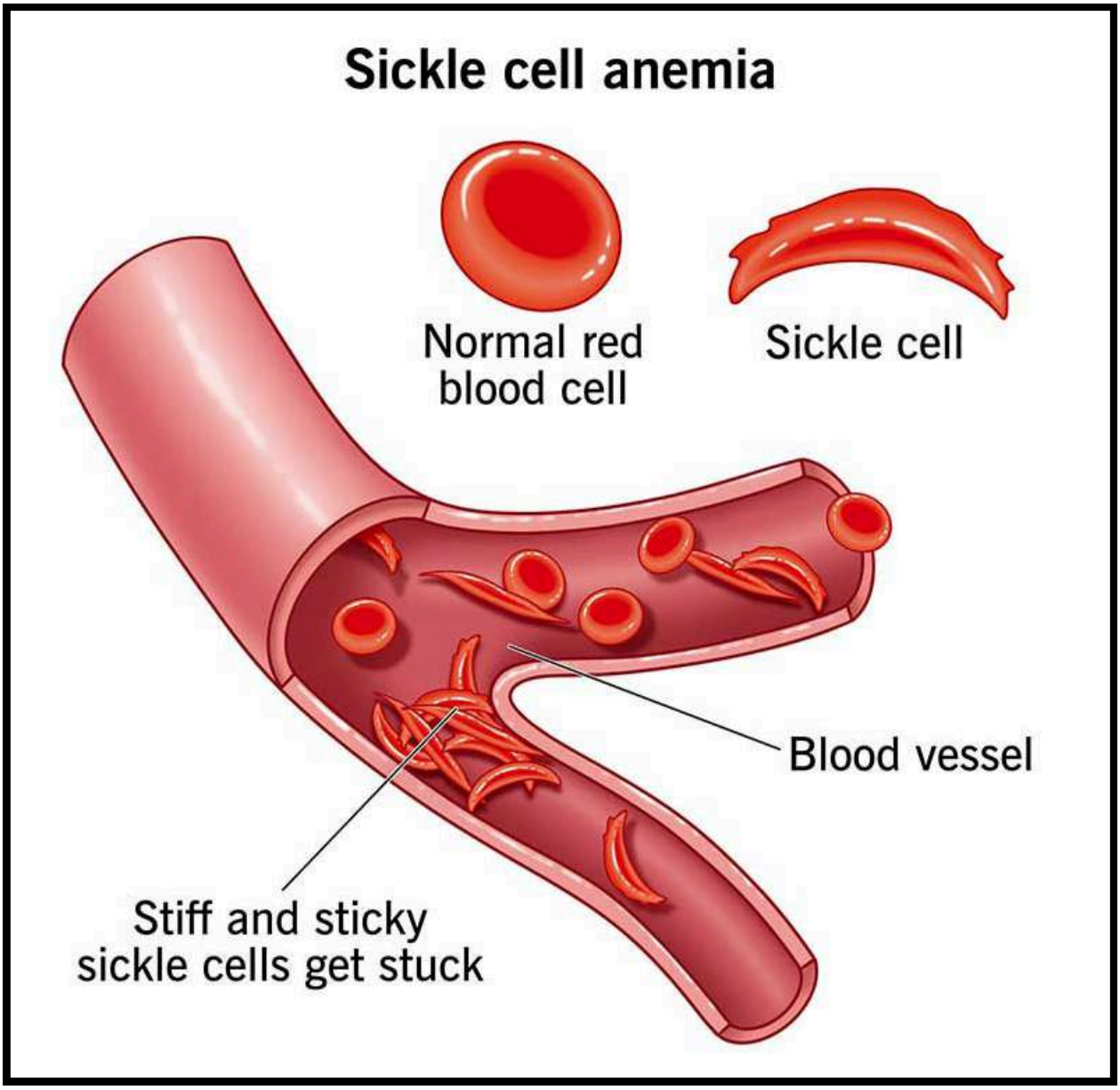
References

1. Oteng-Ntim E, Pavord S, Howard R, et al. Management of sickle cell disease in pregnancy. A British Society for Haematology Guideline. Br J Haematol. 2021;194(6):980-995. doi:10.1111/bjh.17671

2. Amer YS, Sabr Y, ElGohary GM, et al. Quality assessment of evidence-based clinical practice guidelines for the management of pregnant women with sickle cell disease using the AGREE II instrument: a systematic review. BMC Pregnancy Childbirth. 2020;20(1):595. Published 2020 Oct 7. doi:10.1186/s12884-020-03241-y

3. Shegekar T, Pajai S. A Comprehensive Review of Pregnancy in Sickle Cell Disease. Cureus. 2023;15(6):e41165. Published 2023 Jun 30. doi:10.7759/cureus.41165

4. Stratton P. Standardizing care of those at great risk: the importance of sickle cell in pregnancy practice guidelines. Br J Haematol. 2021;194(6):950-953. doi:10.1111/bjh.17667


Sickle cell anemia
Normal red blood cell
Sickle cell
Blood vessel
Stiff and sticky sickle cells get stuck

THALASSEMIA MANAGEMENT STRATEGIES

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Thalassemia is an inherited blood disorder characterized by abnormal hemoglobin production, leading to anemia and related complications. Effective management strategies aim to reduce symptoms, prevent complications, and improve quality of life. Effective thalassemia management, focusing on treatment guidelines, genetic counseling, iron chelation therapy, and the role of research committees. Advances in bone marrow transplantation, gene therapy, and supportive care have improved outcomes for patients with thalassemia major and intermedia. Additionally, this paper highlights the importance of early diagnosis and multidisciplinary approaches to patient care.

1.Treatment Guidelines and Genetic Counseling

Standard Treatment Protocols

Management of thalassemia depends on the severity of the condition. The two primary types, thalassemia minor and thalassemia major, require different approaches:

- **Thalassemia Minor:** Usually asymptomatic or presenting with mild anemia, requiring minimal medical intervention but necessitating genetic counseling to prevent severe cases in offspring. [1]
- **Thalassemia Major:** Requires lifelong blood transfusions, iron chelation therapy, and potential curative treatments such as bone marrow transplantation. [1]

1.1 Blood Transfusion and Chelation Therapy

Patients with moderate to severe thalassemia require lifelong blood transfusions to maintain hemoglobin levels (1). Regular transfusions prevent growth retardation and organ damage.

Transfusions maintain hemoglobin levels above 9–10.5 g/dL, reducing complications such as growth retardation and bone deformities (3). However, repeated transfusions lead to iron overload, necessitating iron chelation therapy using drugs like deferoxamine, deferasirox, and deferiprone.

1.2. Hematopoietic Stem Cell Transplantation (HSCT):

HSCT is the only curative therapy for thalassemia [6].

Best outcomes occur in children with HLA-matched sibling donors.

Recent advancements in haploidentical transplantation are expanding treatment options.

1.3 Gene Therapy:

Experimental approaches involve lentiviral gene addition or gene editing (CRISPR-Cas9) to correct defective genes.

Trials have shown promising results, potentially offering a long-term cure.

1.4 Genetic Counseling and Carrier Screening

Genetic counseling plays a crucial role in preventing thalassemia. Carrier screening is recommended for at-risk populations, utilizing hemoglobin electrophoresis and DNA testing. Prenatal diagnosis through chorionic villus sampling or amniocentesis helps detect affected fetuses. Preimplantation genetic testing (PGT) during in vitro fertilization allows selection of unaffected embryos, reducing disease incidence.

2. Iron Chelation Therapy: Techniques and Equipment

Frequent transfusions lead to iron overload, affecting the heart, liver, and endocrine organs. (1)

Chelation therapy helps in preventing iron-related complications.

2.1 Chelation Methods (2)

- **Deferoxamine (DFO):** Administered via subcutaneous infusion over 8–12 hours.

- **Deferasirox (DFX):** An oral chelator with once-daily dosing, improving adherence.

- **Deferiprone (DFP):** An oral chelator often used in combination therapy for severe iron overload.

-Combination therapy (DFP + DFO or DFP + DFX) is often recommended for optimal iron control.

2.2 Advances in Chelation Monitoring

Serum ferritin testing and Magnetic resonance imaging (MRI) techniques, such as T2* MRI, assess iron deposition in the heart and liver, guiding therapy adjustments. Advances in chelation drug formulations continue to enhance patient outcomes [5].

3. Committee's Role in Supporting Research and Treatment

3.1 Clinical Trials and Research Initiatives

Research committees play a pivotal role in advancing thalassemia treatment through clinical trials. Investigations into gene therapy, CRISPR-based gene editing, and improved transfusion protocols contribute to better disease management [8].

Collaborate with international organizations like Thalassemia International Federation (TIF) to improve care standards.

3.2. Research Funding and Clinical Trials:

Support gene therapy research, newer chelators, and biomarker development [7].

Encourage public-private partnerships to drive innovation like The Rotary Blood Bank, Jodhpur, Rajasthan operates a day-care Thalassemia Centre, providing free transfusion facilities to 90 children daily.

3.3. Patient Support and Education:

Establish patient registries to track treatment outcomes and improve personalized care. [4]

Conduct awareness programs on carrier screening and preventive strategies.

3.4 Policy Development and Patient Support

Committees collaborate with healthcare institutions to establish treatment guidelines and ensure accessibility to essential therapies. Support programs for patients and caregivers enhance disease awareness and quality of life.

Conclusion

Thalassemia management requires a multidisciplinary approach, including advanced therapies, genetic counseling, and research support. Continuous efforts in gene therapy, novel chelation strategies, and policy advocacy will enhance patient outcomes and reduce disease burden.

References

(1) Taher, A. T., Musallam, K. M., Cappellini, M. D. (2011). *Thalassemia Intermedia: An Update. Mediterranean Journal of Hematology and Infectious Diseases, 3(1), e2011037.
This review article discusses the management of thalassemia intermedia, including the role of occasional transfusions and the use of iron chelation therapy to prevent iron overload.

(2) Porter, J. B., Garbowski, M. W. (2013). *The Pathophysiology of Transfusion Iron Overload*. Hematology/Oncology Clinics of North America, 27(2), 243–259.

(3) Vichinsky E, Cohen A, Thompson AA, Giardina PJ, Lal A, Paley C, Cheng WY, McCormick N, Sasane M, Qiu Y, Kwiatkowski JL. Epidemiologic and clinical characteristics of nontransfusion-dependent thalassemia in the United States. Pediatr Blood Cancer. 2018 Jul;65(7):e27067.

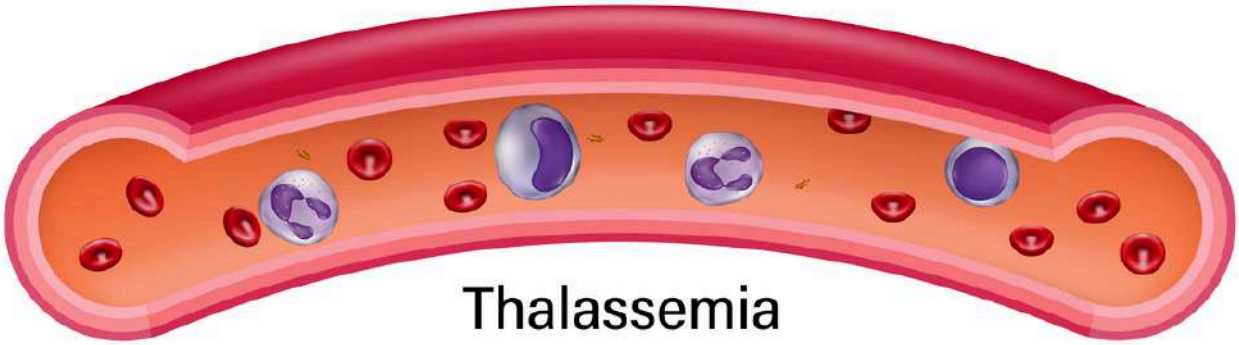
(4) Ahmadpanah M, Asadi Y, Haghighi M, Ghasemibasir H, Khanlarzadeh E, Brand S. In Patients with Minor Beta-Thalassemia, Cognitive Performance Is Related to Length of Education, But Not to Minor Beta-Thalassemia or Hemoglobin Levels. Iran J Psychiatry. 2019 Jan;14(1):47-53.

(5) Ansari S, Rashid N, Hanifa A, Siddiqui S, Kaleem B, Naz A, Perveen K, Hussain Z, Ansari I, Jabbar Q, Khan T, Nadeem M, Shamsi T. Laboratory diagnosis for thalassemia intermedia: Are we there yet? J Clin Lab Anal. 2019 Jan;33(1):e22647.

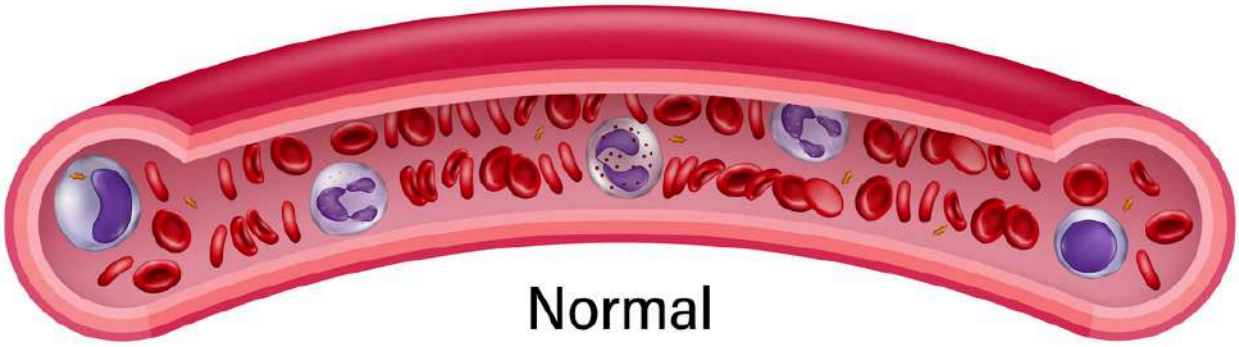
(6) Jariwala K, Mishra K, Ghosh K. Comparative study of alloimmunization against red cell antigens in sickle cell disease & thalassaemia major patients on regular red cell transfusion. Indian J Med Res. 2019 Jan;149(1):34-40

(7) Manzoor I, Zakar R. Sociodemographic determinants associated with parental knowledge of screening services for thalassemia major in Lahore. Pak J Med Sci. 2019 Mar-Apr;35(2):483-488

(8) Leung, T. N., Lau, T. K., Chung, T. K. H. (2005). *Thalassaemia Screening in Pregnancy*. *Current Opinion in Obstetrics and Gynecology*, 17(2), 129–134



Thalassemia



Normal

ANEMIA OF CHRONIC DISEASES

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Introduction

Anemia is a global public health problem with significant adverse compact on the health of individuals across all age groups. Majority suffer from nutritional deficiency anemia related to iron and vitamin B12 deficiencies. However a significant number of chronic diseases can also contribute to the development of anemia.

These diseases often disrupt the body's normal production, utilization and destruction of red blood cells, leading to a state of insufficient oxygen delivery to tissues.

Causes of Anemia of Chronic Disease (ACD)

A. Autoimmune Disease

The chronic inflammatory process in autoimmune diseases disrupts the various aspects of RBC production and survival, leading to anemia. Some common autoimmune disease associated with anemia include.

1) Rheumatoid Arthritis (RA)

2)Systemic Lupus Erythematosus (SLE)

3)Inflammatory Bowel Disease (IBD)

Table 1. Underlying Causes of Anemia of Chronic Disease.

Associated Diseases	Estimat Prevalen
	percen
Infections (acute and chronic)	18–95
Viral infections, including human immunodeficiency virus infection	
Bacterial	
Parasitic	
Fungal	
Cancer†	30–77
Hematologic	
Solid tumor	
Autoimmune	8–71
Rheumatoid arthritis	
Systemic lupus erythematosus and connective-tissue diseases	
Vasculitis	
Sarcoidosis	
Inflammatory bowel disease	
Chronic rejection after solid-organ transplantation	8–70
Chronic kidney disease and inflammation	23–50

Rheumatoid Arthritis

Anemia is a common complication of RA affecting upto 60% of people with this condition.

Causes of anemia in RA

(a) Anemia of chronic disease (ACD). This is the most common type of anemia in RA. The chronic inflammation disrupts erythropoiesis.

(b) Iron deficiency anemia due to blood loss through gastrointestinal tract, which can be a side effect of some RA medication.

(c) Vitamin B12 deficiency especially if the individual is following a vegetarian or vegan diet.

(d) Some RA medication such as Methotrexate and NSAIDS can increase the risk of anemia.

Systemic Lupus Erythematosus

Anemia a common complication in people with SLE. It effects approximately 50% of individuals with active lupus.

Causes of anemia in Lupus

Several factor contribute to the development of anemia in lupus.

(a) Anemia of chronic disease (ACD)- The chronic inflammation interferes with the body's ability to utilize iron effectively .

(b) Autoimmune hemolytic anemia.

(c) Iron deficiency - (i)Blood loss due to Lupus related conditions like Kidney disease or Gastrointestinal issues.

(ii) Certain medications used to treat Lupus can also cause gastrointestinal bleeding.

(d) Bone Marrow Suppression- Some immunosuppressants can suppress bone marrow function, leading to decreased red blood cell production.

(e) Kidney disease- Lupus can affect the kidney , leading to decreased production of erythropoietin, hence anemia.

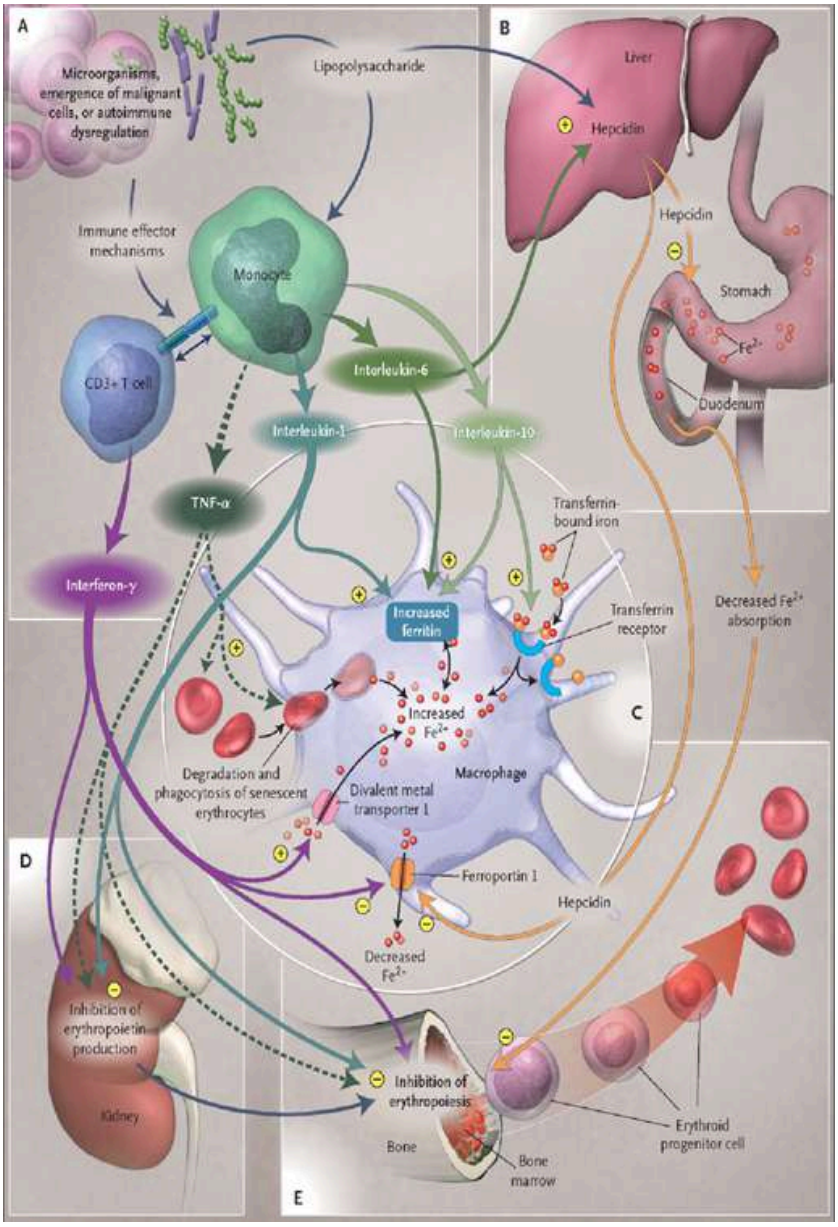
Inflammatory Bowel Diseases

Causes of anemia in IBD

(a)Chronic inflammation can interfere with the body's ability to utilize iron effectively.

(b)VitaminB12 and Folate deficiencies due to mal absorption lead to anemia.

(c)Medications- Some medications used in IBD suppress the bone marrow.



Inflammation triggers the release of Hepcidin - a hormone that regulates iron availability

Hepcidin reduces the absorption of iron from the gut and limits the release of stored iron , hindering RBC production

B. Cancer
Certain types of cancers like leukemia and lymphoma can directly suppress the bone marrow leading to anemia.

C .Chronic Kidney Diseases
When kidney function declines erythropoietin production decreases, leading to anemia.

D .Chronic Infections- Long term infections such as HIV/HCV/AIDS and Tuberculosis can cause chronic inflammation which can interfere with RBC production and increase their breakdown. Some parasitic infection can directly damage the gastro intestinal tract leading to mal absorption of nutrients and non iron deficiency anemia.

E. Heart failure – In severe case of heart failure, the heart may not be able to pump enough blood to the kidneys leading to decreased erythropoietein production and hence anemia.

F. Liver Disease- The liver plays a role in iron metabolism and iron recycling. Liver disease like cirrhosis can lead to iron deficiency anemia.
Additionally liver disease can impair the production of clotting factors, increasing the risk of bleeding and iron loss.

G. Endocrine disorder- Hypothyroidism and Hyperthyroidism can disrupt the normal production and function of RBC's leading to anemia.

Diagnosis
-It's important to remember that anemia of chronic disease is a consequence of another condition, so managing the primary disease is crucial.
-Diagnosis involves blood tests to assess red blood cell levels, iron levels, and inflammatory markers.
CBC, Iron study, Vit B12 and folate levels
Relevant investigation for the underlying disease
Bone marrow biopsy.

Treatments

Addressing the underlying Chronic Disease

-Iron supplementation

-VitB12 Or Folate supplements

-Erythropoietin therapy

-Blood transfusion in severe cases.

-Use of DMARDS and other medication to manage the RA

-Treatment of underlying IBD.

-In autoimmune hemolytic anemia immune suppressants may be necessary.

References

https://www.msdmanuals.com/professional/hematology-and-oncology/anemias-caused-by-deficient-erythropoiesis/anemia-of-chronic-disease

https://pmc.ncbi.nlm.nih.gov/articles/PMC4952640/

10

NUTRITIONAL INTERVENTIONS FOR ANEMIA PREVENTION

Author

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Anaemia is a disease defined by low Haemoglobin (below (11-12gm%) and poor oxygen transportation to the each cell and caused by nutritional deficiency of iron, and proteins that are required to form Haem + globin = Haemoglobin. Anaemia is the most common medical disorder in our country (60-80%) in all age groups and the major drawback is that despite so many programs and plans we are not able to reduce the prevalence of anemia much in our country over last few decades. Here we have discussed few interventions and programs in relation to anemia prevention. ideal plans are those that are affordable, readily acceptable, sustainable, and locally available.

Prevalence in India:

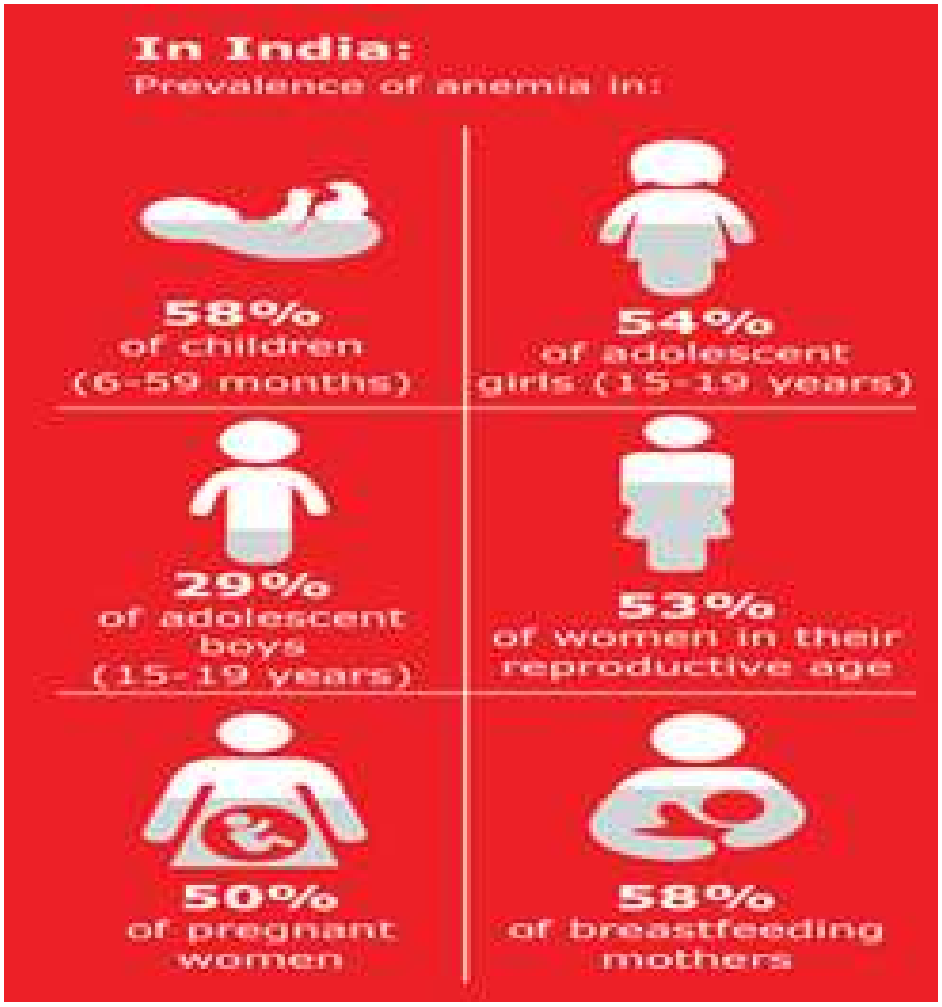

Figure - 1

There are three basic strategies for addressing anemia

- **Dietary diversificationto** improve the absorption of micronutrients (IRON), macronutrient (PROTEINS) and creating awareness for quality foods.
- **Fortificationof** staple food, beverages, ingredients used in cooking (SALT, OIL), or point of use fortification via micronutrient powder sprinkles are sustainable and cost effective measures. Following are the options
- Mass fortification of salt with iron
- Targeted fortification: selected foods for anemic adolscents and pregnant.
- Commercial fortification: for a business or brand advantage
- Biofortification: through agronomic practices, plant breeding.

Supplementation: capsules, tablets, and drops in the target population.

Recommendations:

high prevalence areas >40%	adolescents - 30-60mg elemental iron for three months in a year.neeli IFA	IFA preparations 300mg FeSO4 or 180mg Ferrous fumarate, or 500mg ferrous gluconate	Pink tab - Toddlers Blue IFA - adolescents weekly supplimentation	Pregnancy 6 months in pregnancy starting from 2nd trimester Laal goli IFA
Drug interactions awareness	taking IFA with lemon water, well before meals	anti-helminthic Tt. Periodic.	avoiding with other drugs - micronutrients	3-4 hrs difference in Iron & calcium
Dietary diversification	prefering fresh, wholegrains,	recipe innovation with greens/dal/egg/ non-veg, fruits	animal source better absorbed (heam)	avoiding tea/ coffee/ dairy with IFA

Food processing to improve bio availability	Soaking, germination,	fermentation,	dehulling	adding phytases
Behaviour change	hand hygeine	sanitation practices	Cleanliness	cooking in iron utensils with optimal water.
Government programs	NIPI	WIFS	Mission POSHAN 2.0	I-NIPI AMB

Iron Rich local foods:

Rajma (kidney beans), Chana (Chick peas), Green leafy vegetables; as Paalak (spinach), sarson ka saag (Mustard greens), Methi (Fenugreek leaves), Chaulai Whole grains as; Bajra (Pearl Millet), Jau (Barley), quinoa, daal (Lentils),Bengal gram, nuts(almonds, cashews, pinenuts), seeds(pumpkin, sesame, flex, hemp), Tofu, Soyabean

Amla, lemon, orange like citrus fruits improves absorption.

Non vegetarian food have haem iron which is better absorbed compared to non-haem veg iron.

Public health campaigns

- National Nutritional Anaemia Prophylaxis Programme dates back to 1970, was revised and expanded to include beneficiaries from all age groups in 2011 and named as National Iron Plus Initiative (NIPI). It focuses on three vital strategies: promotion of regular consumption of foods rich in iron, provisions of iron and folate supplements in the form of tablets to the high risk groups, and identification and treatment of severely anemic cases

- Weekly Iron Folic-acid Supplementation (WIFS) - supervised blue IFA tablet distribution to adolescents (10-19 years) on fixed day of week.

Anemia Mukt Bhart (AMB): Intensified National Iron Plus Initiative (I-NIPI) via 6 x 6 x 6 strategy: six beneficiary age groups as in figure-1, through 6 interventions - 1. Prophylactic IFA Supplementation; 2. Periodic de-worming; 3. Intensified Behaviour Change Communication; 4. digital haemoglobinometere based Testing anemia, 5. point-of-care treatment; 6. provision of iron fortified foods: and Addressing endemic pockets, via six

institutional mechanisms - 1.Inter-ministerial coordination; 2. Convergence with other ministries; 3. strengthening supply chain and logistics; 4. Engaging National Centre of Excellence and Advanced research, 5. capacity building of health-care providers; 6. AMB dashboard monitoring.All Resources and training materials can be downloaded from the Anemia Mukt Bharat Portal: www.anemiamuktbharat.info (figure -2)

Figure -2 (Anemia Mukt Bharat-AMB)

- **MISSION POSHAN 2.0:** Anemia is associated with Nutritional deficiency both macro and micro-nutrients –majorly Iron and proteins. Govt address the challenge of malnutrition for improved health,and immunity by community engagement, outreach, behavioural changes advocacy. The supplementary nutrition is provided to bridge the gap in the intake of nutrients.Poshan Maahs and Pakhwadas celebrated in the months of September and April respectively for awareness on anaemia.

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- **PM-POSHAN**: Pradhan Mantri Poshan Shakti Nirman scheme. targets towards anaemia prevelance reductin by 3% per year. fortified rice enriched with iron, folic acid and vitamin B12 under the Rice Fortification Initiative in a phased manner

Indirect anemia support for pregnancy:

- **Surakshit Matritva Aashwasan** (SUMAN) provides assured, dignified, respectful and quality healthcare at no cost and zero tolerance

- **Janani Suraksha Yojana (JSY)** & **Janani Shishu Suraksha** Karyakram (JSSK),, for promoting institutional delivery.

- **Pradhan Mantri Surakshit Matritva Abhiyan** (PMSMA) provides pregnant women a fixed day, free of cost assured and quality antenatal check up by a Specialist/

- MAA: March against Anemia - a mission to eradicate Anemia from India by targeting Expectant Mothers and the First 1000 days of a child's life

Regarding Haemoglobinopathies:

- Thalassemics India and Pahunch project:Free of cost iron chelation medicines, blood leucocyte filters, infusion pumps are given to needy patients across the county in collaboration with various NGOs.

- Thalassemia Bal sewa yojana (TBSY) project is to help underprivileged cases with thalassemia in their treatment by MoHFW.

Hematopoietic Stem Cell Transplantation (HSCT) : transplantation of stem cells from various sources (bone marrow, growth factor–stimulated peripheral blood, and umbilical cord blood) for the treatment funded by **Coal India.**

Federation of Obstetric and Gynaecological societies of India (FOGSI)-. Led initiatives

- 12 ka Naara campaign: to raise awareness about anaemia through free haemoglobin testing and educational initiatives across 21 cities or 13 states. It is to track Iron deficiency anemia (IDA) and maintaining it optimal at 12gm% .

- Nari Swasthya Janandolan Yatra – Na Na Anaemia Ride – Ganga yatra: launched on 29th nov. from Rishikesh Ganga ghat amalgamating free health camps, public forums and educational CMEs, planned in 5 states over 40 days – Uttarakhand, Jharkhand, Uttar Pradesh, Bihar and Bengal; all targeted towards decreasing the incidence of anemia in our country.

Awareness Days

- World sickle cell day 19th June by United Nations.
- World thalassemia gay – 8th may.
- National anaemia day – march 21

Conclusion:

Experts believe that there is a need to intensify efforts to address all causes of anaemia for a speedy decline of the condition's prevalence among all age groups in a mission mode using a multi-pronged strategy .

FUTURE TRENDS IN ANEMIA TREATMENT

Author
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NEWER PARENTRAL IRON PREPARATIONS

1.Ferric derisomaltose (previously called iron isomaltoside)

Monoferric (United States, Canada), Monofer (United Kingdom, other countries) 100 mg/mL

Weight ≥ 50 kg: Single dose of 1000 mg

Weight ≥ 50 kg: Up to 3 doses of 500 mg given over 7 day

Test dose not required

2. Ferric gluconate (FG) Ferrlecit 12.5 mg/mL Multiple doses of 125 to 250 mg .Test dose Not required, but recommended if the patient has a history of multiple drug allergies

3.Ferumoxytol Feraheme (United States), Rienso (United Kingdom and other countries) 30 mg/mL Single dose of 1020 mg or 2 doses of 510 mg, given 3 to 8 days apart .Test Not required

4.Iron dextran, low molecular weight (LMW ID) INFeD (United States), Dexiron (Canada), CosmoFer (United Kingdom and other countries) 50 mg/mL Single dose of 1000 mg (diluted in 250 mL normal saline) given over 1 hour or Multiple doses .Test with 25 mg (0.5 mL) prior to the first dose.

5.Ferric carboxymaltose (FCM) Injectafer (United States), Ferinject (United Kingdom and other countries) 50 mg/mL Weight ≥ 50 kg: 1 or 2 doses of 750 mg, given 7 or more days apart or Weight .Ferric carboxymaltose (FCM) Injectafer (United States), Ferinject (United Kingdom and other countries) 50 mg/mL Weight ≥ 50 kg: 1 or 2 doses of 750 mg, given 7 or more days apart or Weight .Test Not required

We do not routinely premedicate for any of the IV iron products. For patients with asthma or multiple drug allergies, we often give methylprednisolone and a histamine 2 (H2) receptor blocker prior to the iron infusion. For patients with inflammatory arthritis, we often give methylprednisolone followed by a brief course of oral prednisone. We do not give diphenhydramine as a premedication

NEW ORAL IRON PREPARATIONS VERSUS OLDER ORAL IRON PREPARATIONS

TABLE 1

Type of supplements	Amount of elemental iron,* mg per tablet	Approximate cost,** $ per tablet	Advantages	Disadvantages
Ferrous salts				
Ferrous sulfate	65	0.07	Low cost, high efficacy, wide availability	Poor tolerability
Ferrous fumarate	100	0.26		
Ferrous gluconate	35	0.10		
Ferrous bisglycinate	50	0.15		
Ferrous ascorbate	65	0.45		
Ferric complexes				
Ferric polysaccharide (Ferrex™ 150)	150	0.08	Possibly fair tolerability	Relatively low efficacy
Ferric polymaltose (Maltofer®)	100	0.90		
Ferric polydextrose (Feramax® 150)	150	0.85		
Iron protein succinylate (Ferretts®)	40***	3.40***	High efficacy, fair tolerability	High cost
Ferric citrate (Auryxia®)	210	7.18	Efficacy in CKD patients	
Ferric maltol (ACCRUFeR®)	30	8.58	Efficacy and tolerability in IBD patients	High cost, risk of IBD flare
Sucrosomial® iron (SiderAL®)****	30	2.00		High cost, no iron stores rebuild
Liposomal iron	30	0.83		Scarce data, no iron stores rebuild
Other				
Carbonyl iron	18	0.33	Low cost, wide availability	Scarce data, no iron stores rebuild
Heme iron polypeptide (Proferrin-ES®)	12	0.60	Efficacy in CKD patients	

*Elemental iron content may vary in different products and countries. **Prices may vary among different vendors. ***In liquid form (elemental iron content and price per 15 mL). ****Not available in the USA. CKD: chronic kidney disease; IBD: inflammatory bowel disease.

Innovative drug therapies for anemia

They include gene therapies, activins, hepcidin antagonists, and hypoxia-inducible factor-prolyl hydroxylase inhibitors. These therapies are being developed to treat a variety of anemias, including sickle cell disease, β-thalassemia, and iron deficiency anemia.

a)Gene therapies Gene therapy represents an innovative and encouraging strategy currently under evaluation in several RA and recently approved for β-thalassemia. Moreover, the advent of gene-editing technologies represents an additional option, mainly focused on correcting the defective gene or editing the expression of genes that regulate fetal hemoglobin synthesis.

Casgevy
A gene therapy that has been approved by the FDA to treat sickle cell disease (SCD)

- Gene-editing technologies

A strategy that aims to correct defective genes or edit genes that regulate fetal hemoglobin synthesis

b) Activins Luspatercept and sotatercept: Recombinant fusion proteins that inhibit negative regulators of erythropoiesis. luspatercept, an activin receptor ligand trap targeting ineffective erythropoiesis, has been approved as the first pharmacological treatment for transfusion-dependent β-thalassemia

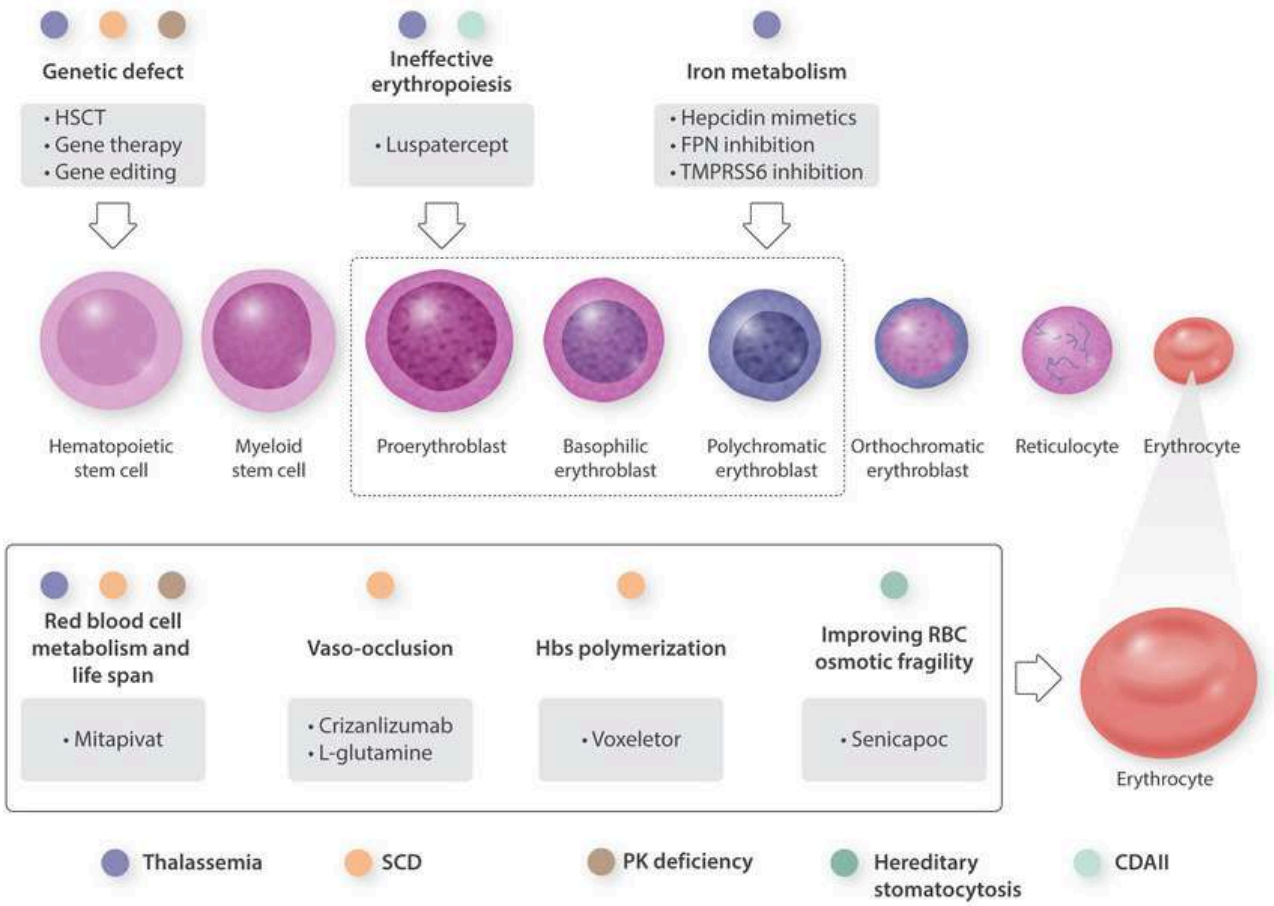
c)Hepcidin antagonists Hepcidin antagonists: Drugs that counteract hepcidin activity, which can reduce iron availability for erythropoiesis.

- reverse iron deficiency anemia (IDA)

d)Hypoxia-inducible factor-prolyl hydroxylase inhibitors

- Upregulate genes that are important for erythropoiesis

FIGURE 1 NOVEL THERAPIES



Novel therapies for rare anemias and their targets. CDAII = congenital dyserythropoietic anemia type II; FPN = ferroportin; HbS = hemoglobin S; HSCT = hematopoietic stem cell transplantation; RBC = red blood cell; SCD = sickle cell disease; TMPRSS6 = transmembrane serine protease 6.

Some innovative drugs for anemia include:

Jesduvroq: An oral hypoxia-inducible factor prolyl hydroxylase inhibitor (HIF-PHI) that treats anemia in adults with chronic kidney disease (CKD).

L-glutamine: A drug approved for sickle cell disease (SCD) that can reduce pain crises in children and adults.

Voxelotor: A drug approved for SCD.

Crizanlizumab: A drug approved for SCD.

Vafseo: A drug approved for anemia in dialysis-dependent adult patients with CKD.

Trimaltol iron: An iron formulation that is effective and safe for treating iron deficiency anemia (IDA).

- Other treatments for anemia include: Allogeneic bone marrow transplantation, Polypharmacotherapy

METHODS TO CORRECT ANAEMIA IN THOSE WHO DENY BLOOD

- Antifibrinolytic agents – Tranexamic acid (TXA) or epsilon-aminocaproic acid (EACA) are effective in reducing bleeding, especially in mucosal sites

- Prothrombin complex concentrates (PCCs, not activated) may be used if the levels of factor II, VII, IX, and/or X (2, 7, 9, and/or 10) are low, or if the patient is receiving an anticoagulant that interferes with these factors (eg, warfarin or a direct factor Xa inhibitor)-major bleeding in patients who are not taking anticoagulants

- Fibrinogen – Plasma-derived or recombinant fibrinogen may be used if the fibrinogen level is low. If these are not available, Cryoprecipitate may be used as a source of fibrinogen, if acceptable to the patient.

- Activated coagulation factors – Activated factors such as recombinant activated factor VII (rF7a) or activated PCC (factor eight inhibitor bypassing agent [FEIBA])-prothrombotic risk

- If the ferritin was <200mg/dL, iron (intravenous or oral) was administered.

TABLE 2 CLASSIFICATION OF BLOOD SUBSTITUTES

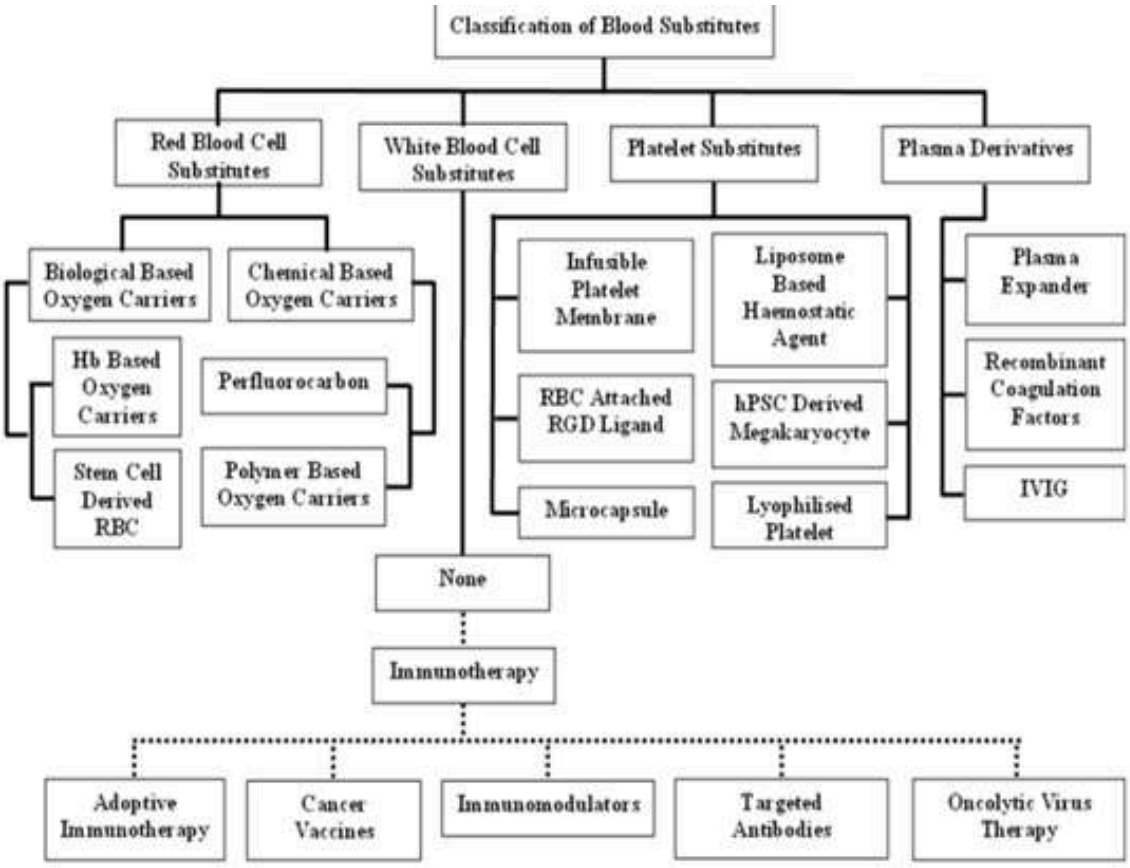
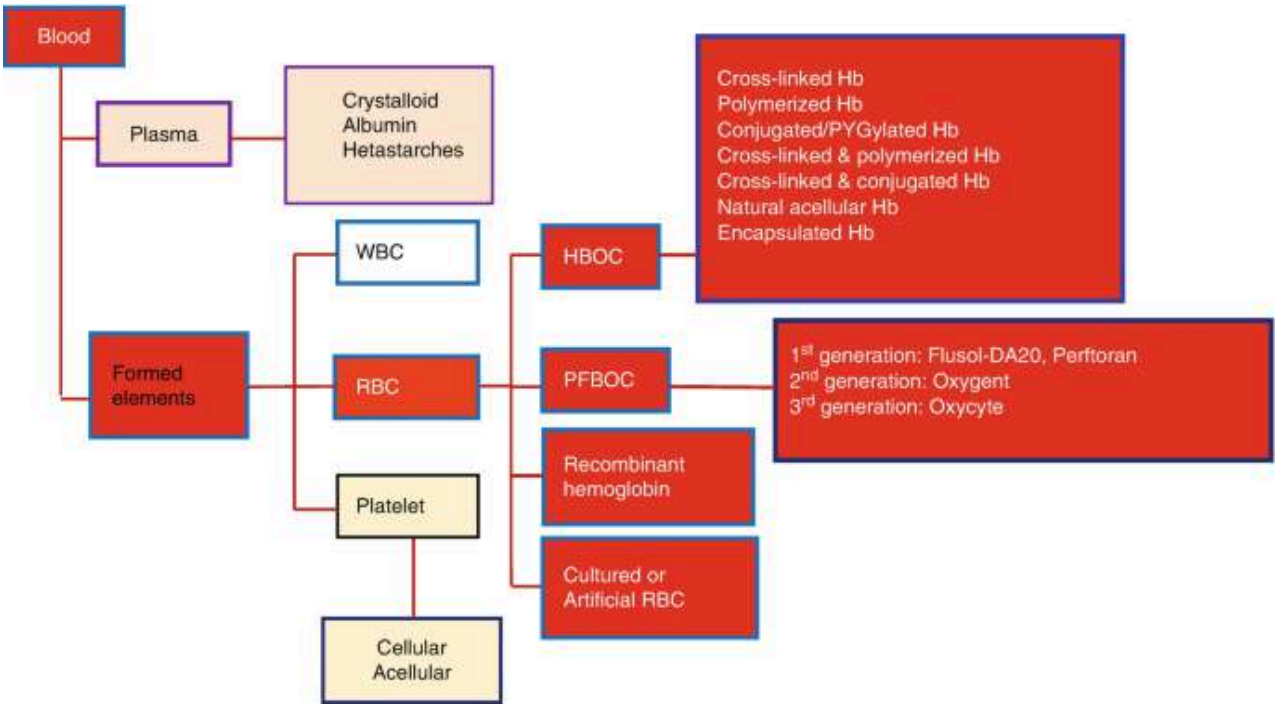


TABLE 3-BLOOD DERIVATIVES AND SUBSTITUTES



FDMSE VISION

FOGSI Theme 2025-Ek Rashtra – Ek Mission, Swastha Nari – Samruddha Vatan.
FOGSI Has come out in 2025 with the vision to Eradicate anaemia globally.
The Food and Drug Committee's strategic vision is to help FOGSI in achieving this goal.

REFERENCES

1.www.who.int

2.https://pubmed.ncbi.nlm.nih.gov

3.Uptodate 2025 -treatment of iron deficiency anaemia in adults

12

PUBLIC HEALTH INITIATIVES FOR PREVENTION OF ANEMIA

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GOVERNMENT OF INDIA INITIATIVES

The Government of India has implemented several initiatives to combat anemia, with a special focus on women and children. Key programs include:

1.National Nutritional Anemia Control Program (NNACP):

Launched in 1970, NNACP was one of India's earliest public health initiatives aimed at addressing the high prevalence of anemia. It primarily targeted vulnerable groups such as pregnant women, lactating mothers, and young children by focusing on prevention and treatment of anemia.(1)

2. National Iron Plus Initiative (NIPI):

Introduced in 2013 as an upgraded version of NNACP, NIPI offers a comprehensive approach to combating iron deficiency anemia across all life stages. It includes iron and folic acid (IFA) supplementation, deworming, and specific interventions for various ages and physiological groups, providing a holistic strategy for anemia prevention and treatment.(2)

3. Rashtriya Bal Swasthya Karyakram (RBSK):

Launched on February 6, 2013, under the National Health Mission (NHM), RBSK focuses on the health and developmental needs of children from birth to 18 years. The program aims to detect and manage conditions early, ensuring better health outcomes.(3)

4. Anemia Mukt Bharat (AMB):

Introduced in 2018 as part of the Poshan Abhiyaan (National Nutrition Mission), AMB aims to reduce anemia prevalence through its innovative 6x6x6 strategy. This includes six interventions, six target groups, and six institutional mechanisms for effective monitoring and implementation. The program aligns with the World Health Organization's Global Nutrition Target 2025, striving to reduce anemia in women of reproductive age by 50%.(4) 5. Weekly Iron and Folic Acid Supplementation (WIFS) Program: Launched in 2012, WIFS addresses iron deficiency anemia in adolescents aged 10–19 years. It provides weekly IFA supplementation and biannual deworming for school-going boys and girls, ensuring a structured approach to tackling adolescent anemia.(5)

6. Intensified National Iron Plus Initiative (I-NIPI):

As an enhanced version of NIPI, I-NIPI focuses on strengthening anemia control efforts in high burden districts. The initiative emphasizes effective coverage, compliance, and implementation to achieve better outcomes.

These programs collectively form a robust framework to address anemia across different age groups and life stages, contributing to improved public health outcomes in India.

FOGSI INITIATIVES

The Federation of Obstetric and Gynaecological Societies of India (FOGSI) was formally established on **January 6, 1950**, during the sixth All India Congress of Obstetrics and Gynaecology in Madras. This formation brought together the obstetric and gynecological societies of Ahmedabad, Bengal, Bombay, Madras, and Punjab, with the Federation headquartered in Bombay. Since its inception, FOGSI has been committed to improving women's health across India, with a strong emphasis on addressing anemia. Over the decades, FOGSI has implemented various impactful initiatives, including:

1. Early Advocacy and Awareness (1950s–1970s):

FOGSI began by promoting maternal health awareness, emphasizing the significance of nutrition and anemia prevention among women of reproductive age.

2. Development of Clinical Practice Guidelines:

FOGSI developed comprehensive guidelines for managing iron deficiency anemia during pregnancy. These guidelines focus on early detection, appropriate supplementation, and personalized treatment strategies to enhance maternal health outcomes.

3. Public Awareness Campaigns:

- **'Badlaav' Campaign:**

Aimed at promoting anemia prevention, this campaign spanned five states, focusing on holistic health education and aligning with the **Anemia Mukt Bharat** (AMB) initiative to improve maternal and child health outcomes.

4. Collaborative Initiatives:

- **'Na Na Anemia Bus Yatra' (2022):**

This mobile outreach program, launched as part of the AMB campaign, visited 20 cities across five states over 40 days. It raised awareness about anemia, its causes, and prevention through educational activities and health check-ups.(6)

- **'Nari Swasthya Janandolan Yatra' (Women's Health Roadshow):**

This dynamic initiative focused on empowering women through education, awareness, and healthcare services. It emphasized improving maternal health, combating anemia, and promoting nutritional well-being through community engagement using specially designed video vans and a red anemia bus

- **‘12 Ka Naara’ Campaign (2024):**

In collaboration with P&G Health India under the leadership of Dr. Jaydeep Tank, this campaign aims to combat iron deficiency anemia by promoting an optimal hemoglobin level of 12. It offers free hemoglobin testing, expert guidance, and community education across 21 cities in 13 states.

5. Educational Webinars: FOGSI has conducted webinars to educate healthcare professionals and the public on managing iron deficiency anemia in pregnancy. These sessions cover clinical and dietary strategies for effective management.

6. Danone Nutricia Academy Collaboration: In partnership with the Danone Nutricia Academy (DNA), FOGSI has focused on addressing critical nutritional challenges among women of reproductive age, pregnant women, and infants. This collaboration aims to advance maternal and child health through education and nutritional support.

These initiatives showcase FOGSI’s unwavering commitment to reducing anemia prevalence in India through education, public engagement, and collaborative partnerships, contributing significantly to the nation’s health priorities.

GLOBAL INTERNATIONAL ORGANIZATIONS INITIATIVES

Anemia remains a significant global health challenge, impacting approximately 1.8 billion people worldwide, particularly women of reproductive age and young children. To address this pressing issue, international organizations have implemented comprehensive strategies and programs aimed at prevention and management. Key initiatives include:

1. World Health Organization (WHO) Initiatives:

- Anaemia Action Alliance (AAA): WHO established the Anaemia Action Alliance to bring together diverse stakeholders including governments, NGOs, healthcare providers, academic institutions, and

private sectors toward a shared goal. The alliance envisions empowering women, adolescent girls, and children through timely and appropriate interventions to prevent and manage anemia effectively.(7)

Global Nutrition Targets:

- As part of the 2012 World Health Assembly (WHA) commitments, WHO aims to reduce anemia prevalence in women of reproductive age by 50% by 2025. These targets are part of a broader effort to combat malnutrition and advance the Sustainable Development Goals (SDGs), particularly SDG 2: Zero Hunger.

2. Food Fortification Initiative (FFI):

The Food Fortification Initiative is a global effort that collaborates with governments, industries, and civil society to combat micronutrient deficiencies, including iron deficiency anemia. Operating in regions such as Africa, the Americas, Asia-Pacific, Europe, and India, FFI focuses on fortifying staple foods like wheat and maize flour with essential vitamins and minerals. This initiative, established in 2002, aims to address "hidden hunger" by ensuring better nutrition and health for vulnerable populations.(8)

Through these initiatives, global efforts continue to reduce the prevalence of anemia, improve nutritional health, and enhance the overall well-being of affected populations worldwide.

REFERENCES :

1. Ministry of Health & Family Welfare. Prophylaxis against nutritional anaemia among mothers and children. Technical Information, MCH No. 1. New Delhi: MoHFW, Government of India; 1970. p. 3

2. Ministry of Health & Family Welfare. Guidelines for control of iron deficiency anaemia. National Iron Plus Initiative. New Delhi: MoHFW, Government of India; 2013. Available from: http://nhm.gov.in/images/pdf/programmes/wifs/guidelines/ Guidelines for Control of Iron Deficiency Anaemia.pdf, accessed on September 23, 2018

3. Adolescent Health Division, Ministry of Health and FamilyWelfare. New Delhi. 2014. Guidelines for implementation of RKSk

4. Paul VK, Singh A, Palit S. 2018. POSHAN Abhiyaan: making nutrition a jan andolan. Proceedings of the Indian National Science Academy 84: 835–41

5. Reproductive, Maternal, Newborn, Child and Adolescent Health: National Health Mission; [Internet] 2013 [cited 2015 Nov 11]. Available from:http://nrhm.gov.in / nrhm components /rmnch-a.html

6. https://www.fogsi.org/yatra/

7.https://www.who.int/teams/nutrition-and-food-safety/anaemia-action-alliance

8. https://www.ffinetwork.org/