Ek Rashtra - Ek Mission
Swastha Naari - Samruddha Vatan
Har Ghar FOGSIAN

FOGSI focus:
Stronger **Women,**
Healthier **Generations**

Supradyn

BAYER

Helping mothers and babies **grow stronger together**

- OD dosing
- Titanium dioxide-free

Boosting **her inner strength**

- OD dosing

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*This is only a brand name (Naturals) and doesn't represent its true nature.
B12, Cyanocobalamin; B6, Pyridoxine; Ca, Calcium; Cu, Copper; IFA, Iron folic acid; Mg, Magnesium; OD, Once daily; Vit, Vitamin; Zn, Zinc.

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Presidential Address

It gives me immense pleasure to pen the Presidential Message for this valuable book, **"Stronger Women, Healthier Generations."** The title itself beautifully reflects the essence of women's health—that the well-being of today's woman lays the foundation for healthier families, communities, and generations to come.

This book thoughtfully addresses every critical stage of a woman's life. From adolescence and anemia, to preconceptional nutrition, to the vital journey of pregnancy and lactation, and finally the challenges of peri-menopausal and menopausal health—each chapter provides scientific, evidence-based knowledge and practical insights.

I am particularly proud to see our flagship initiative, ***"Sampoorna – Swastha Janm Abhiyan,"*** highlighted, as it emphasizes the importance of preconceptional care. Every pregnancy should be a planned pregnancy, with women entering motherhood healthy in body, mind, and spirit. By ensuring hemoglobin, nutrition, and vital parameters are optimized even before conception, we not only reduce maternal and neonatal mortality but also gift every child a stronger beginning.

The chapters contributed by esteemed colleagues bring together clinical wisdom, public health vision, and preventive strategies. This collective work will serve as a ready reference for gynecologists and healthcare providers, guiding them to empower women with better health choices at every stage of life.

As FOGSI President, I dedicate this book to every gynecologist and healthcare worker who tirelessly strives to build a healthier nation through healthier women. Let us remember—when women are strong, the generations they nurture flourish.

Warm regards,

Dr. Sunita Tandulwadkar
President, FOGSI 2025

CHAPTER 1: Anemia in Adolescence

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. Anemia 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

The incidence of anemia in Indian adolescent girls has increased over the years. It is estimated that it is present in around 56% of adolescent girls, which means that at any point in time, 64 million girls are suffering from anemia though anemia occurs in adolescent boys also it is much more in girl.

The adolescent population in India comprises 243 million, accounting for 21.4% of the total population. This is the vulnerable period for the development of anemia, especially in adolescent girls.

64 Million Girls are suffering from **Anemia**

Adverse effects of anemia in adolescent

As adolescence is the formative years for development anemia at this stage has some long-term consequence such as:

- Stunted growth
- Poor school performance, reduced attention, span, and memory loss, increased school dropout rate
- Reduces the immunity and increases the infection rate

- Delay in the onset of menarche and menstrual irregularities of already attained
- If anemia 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 implications and poor capital formation of country

Risk factors for adolescent anemia

- Underweight and malnourishment
- Low dietary intake and increase demand due to growth spurt
- Iron requirement peaks in adolescence are 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 0.9 mg / 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 anemia in girls one study has reported that one third of girls had worm infestation and prevalence of anemia 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 level of the hemoglobin for diagnosis of anemia

Age/ sex	Hb gram/ dl
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

Table 1: Hemoglobin levels across age groups

If the level falls below those above then the person is diagnosed as having anemia.

Classification of anemia according to WHO

Grade	Concentration
Mild anemia	11.9 gm to 10 gm Hb/100 ml blood
Moderate anemia	9.9 to 7 gm Hb/ 100 ml blood
Severe anemia	<7 gm Hb/ 100 ml blood
Anemia in non-pregnant women	<12 gm Hb / 100 ml blood (above 15 years of age)
Anemia in pregnant women	<11 gm Hb/ 100 ml blood

Table 2: Classification of anemia

In India various studies conducted in different regions shows the prevalence of anemia 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%

Table 3: Prevelance of anemia in India

Classification of anemia according to WHO

So, at a glance almost >50% of Indian adolescent girls have anemia.

This because about three fourth of adolescent female do not meet the dietary requirement due to gender this discrimination and partiality towards girl children. Anemia is mainly nutritional disorder mainly caused by iron deficiency.

Causes of anemia

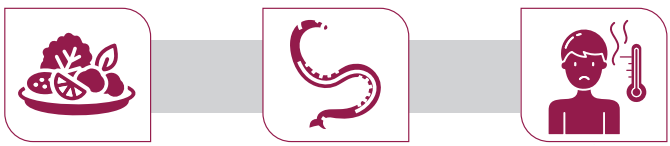
1) *Nutritional anemia widely prevalent*

Iron deficiency - commonest

Folic acid and vitamin C deficiency

Vitamin B12

2) *Non-nutritional causes*



Increased demand during adolescence

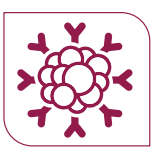
Hookworm infestation

Chronic infection example malaria exclusive

Blood loss - Menstrual bleeding

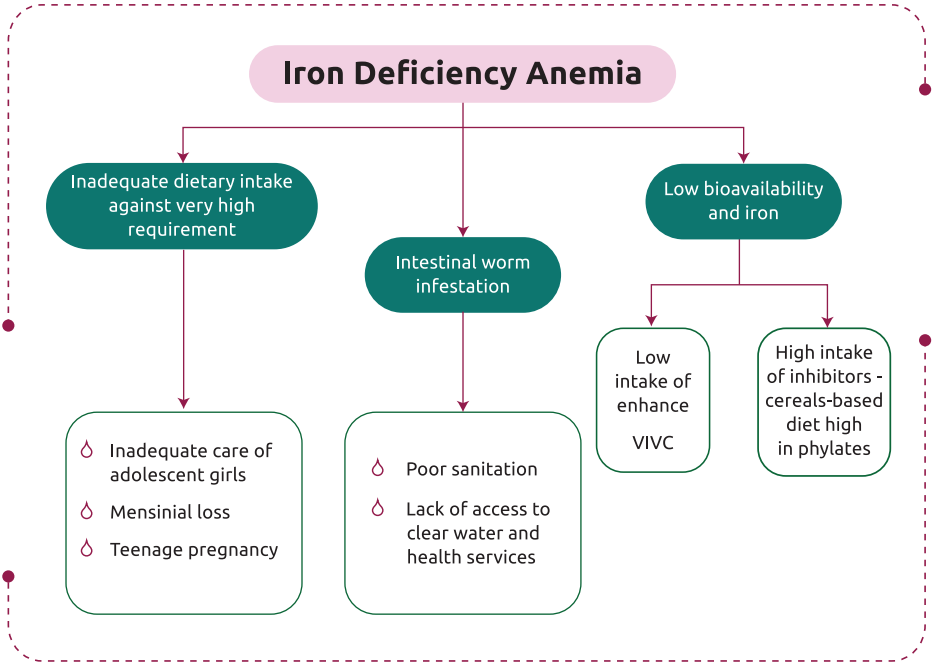
Teenage marriage and early pregnancy

Genetic disorders



Malignancy

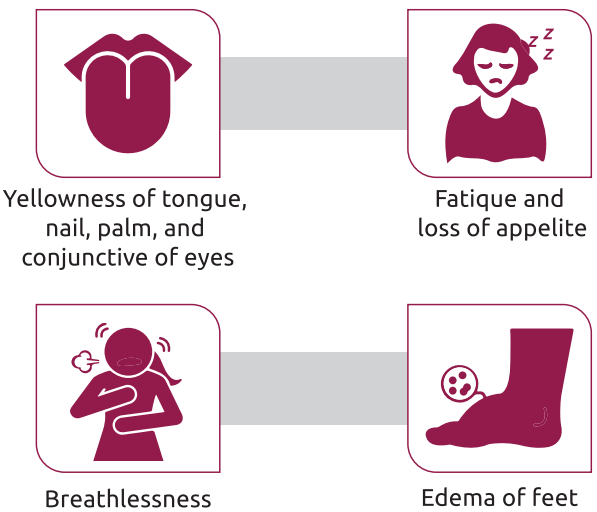
Iron deficiency anemia (IDA) – Commonest form of nutritional anemia



Symptoms of anemia

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

In moderate-to-severe anemia



Treatment of anemia

Primary prevention and correction of anemia 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

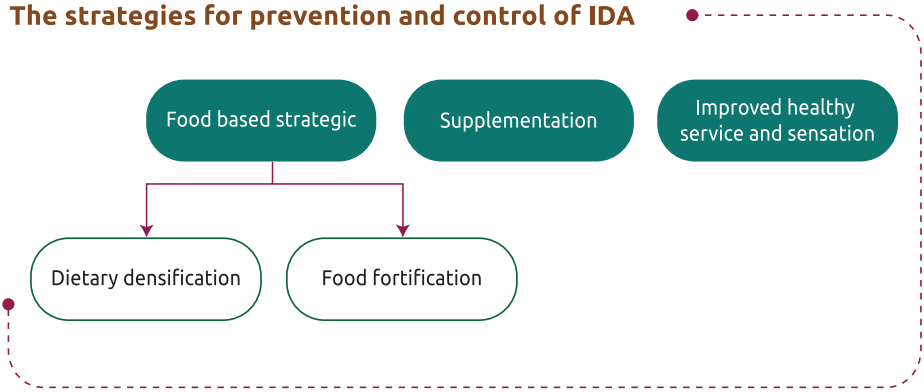
To overcome the problem of adolescent anemia the Government of India has launched National program for control of adolescent anemia in conjunction with unitary National children's fund.

Adolescent anemia control program (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 endorsements

The strategies for prevention and control of IDA



Prevention of anemia in adolescent girls

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

Treatment of anemia 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 adolescents 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

Green vegetables and fruits

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

Liver, egg, fish, meat

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

Anemia free India

CHAPTER 2: Preconception Nutrition

Dr. Shweta Khandelwal
Senior Advisor, Jhpiego
shweta.khandelwal@jhpiego.org

Aamir Siddiqui
Program Consultant, Jhpiego
aamir97siddiqui@gmail.com

Background

Considerable strides have been made in improving maternal and child health outcomes through evidence-based interventions in promoting health, strengthening human resource, finance and infrastructure in the past decades. However, despite this, the global targets set by the Sustainable Development Goals (SDGs) — reducing maternal mortality to 70 per 100,000 live births, under-five mortality to 25 per 1,000 live births, and neonatal mortality to 12 per 1,000 live births — are still out of reach, with nearly 95% of these deaths happening in low and lower-middle-income countries[1]. UN report shows that global progress of maternal and child health has flatlined due to decreasing investment, with most deaths preventable[2]. Globally, 1 in 4 pregnancies are unplanned, and in India, 1 in 7 pregnancies occur without prior planning.[3] These unplanned pregnancies are more likely to result in adverse outcomes such as preterm birth, low birth weight, and congenital anomalies. To further reduce these adverse outcomes, there is need to invest in preconception care which is crucial to improve the maternal and child health outcomes. Therefore, in recent years, we have seen a shift from strategies to reduce mortality to improving quality of maternal and child healthcare and thereby improve quality of life and create healthier communities. For the health and development of the unborn child, the period prior to pregnancy is vital but remains a low emphasis phase within the continuum of care in the RMNCH+A (Reproductive, Maternal, Newborn, Child, and Adolescent Health) spectrum.

What is pre-pregnancy care and preconception nutrition?

World Health Organization (WHO) defines preconception care/pre-pregnancy care as the provision of biomedical, behavioral and social health interventions to women and couples before 3 months of conception occurs which is also endorsed by the leading organisation like FOGSI.[4] It encompasses health education, medical management, lifestyle modifications and others to prevent adverse pregnancy outcomes, the key components of preconception care are shown in Figure 1.

A key part of this is preconception nutrition—what a woman eats, her overall diet quality, and whether her weight is healthy for her height can all influence not just her own health during pregnancy but also the health and development of her future baby. This care isn't just for women actively planning a pregnancy; it's meant for adolescents, all women of reproductive age, and those between pregnancies, recognising that many pregnancies are unplanned. The overarching goal is to ensure that women enter pregnancy in optimal health, which not only improves pregnancy outcomes but also enhances the health of future generations.

Figure 1: Key components of preconception care (Adapted from Good Clinical Practice Recommendations on Preconception Care-India. FOGSI 2016 & FOGSI GCPR on Preconception Care & Genetics. FOGSI 2020.)

Why preconception care and nutrition matters?

A woman's nutritional status is shaped by her nutrient intake, metabolism, and utilization throughout her life. Many factors influencing her nutritional status during the preconception period originate at or even before her birth and are strongly impacted by early-life nutrition and exposures, which can have long-lasting effects that are challenging to reverse (e.g., stunting or short maternal stature).

Adolescents and women can bolster the non-reproductive implications of prioritizing their nutrition and health by improving a few aspects regarding their nutritional status. Such aspects, specifically during adolescence or the span between pregnancy, are of utmost importance. This makes it much easier for them to make valuable contributions to society.[5] Preconception nutrition is aimed at enhancing the health of couples who are in their childbearing stage of life.

There are measures, policies and standards in place which include the consumption of folic acid, taking prenatal vitamins, stopping smoking, and appropriate weight target maintenance which all collectively lead to better aspects regarding child birth.[6]

Evidence makes it very clear that women who with good nutritional status are more likely to have a healthier, more fulfilling and a more productive life. Also, if they become pregnant, there are good chances they will have a healthy pregnancy as well as deliver a healthy baby.[7]

A good nutrition is an essential component of attaining a healthy pregnancy and birth outcomes. During the preconception period, a women should consume a well-balanced and diverse diet and needed supplementation. Refer to the Table 1 for micronutrients and fiber supplementation and their functions.

Vitamin/ Mineral	Function	Recommended Dose	Resources	Prevents
Folic Acid	◊ Involvement in the DNA replication ◊ Methylation cycle	400 micrograms (0.4 mg) daily	Leafy dark green vegetables (i.e., spinach), citrus fruits, nuts, legumes, fortified cereals	Neural tube birth defects
Calcium	◊ Building strong bones and teeth ◊ Clotting blood ◊ Sending and receiving nerve signals ◊ Contracting and relaxing muscles ◊ Keeping a normal heartbeat	Age 14-18 years: 1300 mg/day Age 19-50 years: 1000 mg/day	Skimmed milk, low-fat-yogurt, rice and cheese	Pre-eclampsia
Zinc	Structural, regulatory and catalytic functions as a cofactor for numerous metalloenzymes	15 mg/day	Legumes like chickpeas, lentils, beans, red meat, shellfish	Helps immunity and growth
Iron	Hematopoiesis; nucleic acid metabolism; carrier of oxygen to the tissues by red blood cell hemoglobin; transport medium for electrons within cells; integrated part of enzyme systems	30 mg/day	Egg, chicken, fish, green leafy vegetables, rice and fortified cereals	Anemia
Fiber	◊ Slows the rate at which sugar is absorbed into the bloodstream ◊ Makes intestine move faster ◊ Cleans colon, acts like a scrub brush ◊ Helps to have soft, regular bowel movements, reducing constipation	Adequate intake of total fiber for women under 50 years is 25 g/day	Oats, barley, ladyfinger, carrots, sweet corn, pea, beans, pulses, potatoes with skin	Slows gastric emptying time and results n reduction of postprandial serum glucose and insulin levels

Table 1: Micronutrients and fiber supplementation

What evidence says?

Global

A systematic review by *Withanage et al.* examined the effectiveness of pre-pregnancy care interventions delivered in primary care settings.

The interventions were grouped into four categories:

- Brief education
- Intensive education
- Supplementary medication
- Dietary modification

The findings showed that these interventions improved health knowledge, reduced substance use and alcohol and tobacco exposed pregnancies, improved folate intake, physical activity and dietary habits leading to reductions in pre-eclampsia and low birth weight outcomes.[8]

Pre-pregnancy care can reduce the incidence of various neonatal and birth disorders by addressing modifiable risk factors and providing targeted interventions, resulting in healthier pregnancies and better long-term health outcomes for children.[9] Most fetal organ development begins shortly after conception, well in advance of the woman's first prenatal visit. Early risk assessment and interventions, such as pre-pregnancy care, are essential for women of reproductive age, as they help improve mother and child health outcomes. According to a systematic review and meta-analysis by *Dean SV*, promoting health before pregnancy has been reported to have several beneficial effects, such as 39% increase in seeking antenatal care and a 17% reduction in neonatal mortality.[10]

The Women First trial, a multi-country randomized controlled trial, offers the best evidence for comprehensive maternal nutrition supplementation starting before pregnancy. Carried out in four sites, it offers concrete advancement in understanding how maternal nutrition can augment fetal growth, especially in low-resource settings. The findings show that initiation of nutritional intervention either before pregnancy or in the early phases of the first trimester of pregnancy leads to increases in average birth size and meaningful improvements in stunting, underweight, wasting, and small-for-gestational-age (SGA) births.[11]

According to *Zohra, et al.* 's systematic review, titled &; Pre-pregnancy care: Deliveries and Packages of Care,&; the following are important pre-pregnancy care interventions and five strategic-level interventions: completing secondary education for adolescent girls and preventing teenage pregnancies, providing nutritional counselling and family planning, and running programs for nutritional optimization and weight loss. Multicomponent youth development programs that address preventing infections along with screening and managing chronic diseases, including mental health disorders, were also considered significant in the review.[11]

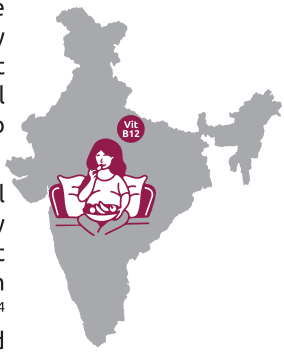
South Asia

According to the 2025 Lancet systematic review, preconception nutrition has a key role in solving the long-term maternal and child health issues in South Asia. Undernutrition in reproductive-age women, coupled with high incidents of low birth weight, small-for-gestational-age, and preterm births, continue to have a massive bearing on the scenario in the south Asian region, which has not been resolved by interventions applied during pregnancy. The Lancet review found that preconception micronutrient supplementation had little effect on birth size, whereas food supplementation, when commenced at least 90 days before conception, produced good results. Also, multi-sectoral interventions appear to be the best interventions when they combine nutrition, health, psychosocial, and WASH components to address determinants at individual, household, and community levels.

However, the review also noted that such intensive delivery mechanisms, which often rely on project staff, limit their ability to scale up. Due to this, there is a big need for conducting more robust trials in the context for identifying scalable preconception interventions for real-life public health systems across South Asia.[13].

India

Investing in the health and nutrition of girls and women before they become pregnant can lead to significant benefits not only for their own well-being but also for the healthy development of their future children. Recent studies, such as the WINGS trial conducted in Delhi, India, have provided strong evidence to support this approach.



The WINGS trial, a package of health, nutrition, psychosocial care, and WASH interventions delivered during pre-pregnancy and pregnancy periods reduced the risk of Low-Birth-Weight Baby (Weight less than 2500 gram at birth) by 24%, more than half of which was attributed to pre-pregnancy interventions.[14] Similarly, another Pune-based study, the PRIYA trial examined the impact of vitamin B12 supplementation before pregnancy on the neurodevelopment of children.

The study found that children of mothers who took vitamin B12 before pregnancy showed better cognitive and language development compared to those whose mothers received a placebo. The study highlights the importance of vitamin B12 supplementation before pregnancy to enhance child development, suggesting that commonly consumed vitamin-fortified foods could be a practical way to improve the health of both women of reproductive age and their future children.[15] A qualitative study done in Karnataka found that while the concept of pre-pregnancy care is generally supported by healthcare officials it is not yet a well-integrated part of the existing healthcare system for mothers and children. This is due to various factors, including lack of awareness among women, limited resources, and inadequate infrastructure. The study emphasizes the need for targeted interventions to promote pre-pregnancy care and improve health outcomes for mothers and children in the region.[16]

National action frameworks like the Indian Newborn Action Plan (INAP) and guidelines of the Indian Academy of Pediatrics (IAP) have recognized the preconceptional need for intervening to modify risk factors. INAP is a comprehensive initiative aimed at reducing newborn mortality and improving maternal health. INAP emphasizes the importance of preconception care as part of a continuum of care approach that begins before pregnancy and continues through childbirth and the postnatal period.[17]

The Indian Academy of Pediatrics (IAP) has issued recent guidelines on preconception care across ten domains—eumetabolic health, nutrition and healthy lifestyle, substance abuse avoidance, genetic screening, reproductive health, immunization, body image/cosmetics/dental health, relationship management, and mental well-being/support systems—serve as a comprehensive ready reckoner for fostering positive changes in community health practices. These guidelines are designed to address multifaceted aspects of adolescent well-being and ensure a holistic approach to improving health outcomes.[18] Professional associations such as the Federation of Obstetric and Gynaecological Societies of India (FOGSI) have undertaken focused campaigns, namely Know Your Numbers and Sampoorna, which aim to screen and optimize women's health vitals, including weight, hemoglobin levels, blood sugar with HbA1C, blood pressure, and thyroid function. Sampoorna puts similar emphasis on preconception folic acid supplementation and maintaining a healthy body mass index (BMI).[19,20] Of special note are UNICEF's Five Essential Nutrition Actions, which seek to promote nutritional care of women before, between, and beyond pregnancies. These include screening for health and nutrition factors (anthropometry and anemia, diabetes, psychosocial problems), provision of essential micronutrients (iron, folic acid, fortification of food items), dietary and lifestyle counseling (physical activity, diet, and psychosocial well- being), infection prevention (deworming and use of bed nets in endemic areas), and care for women at nutritional risk (targeted supplementation, tailored interventions, medicalnutrition therapy, and linkages to social protection). This extensive list of necessary components for services to be implemented within existing health and nutrition delivery systems also resulted in the development of the Preconception Care Algorithm which translates those technical actions into implementable steps.[21] However, despite an enriching array of pilots, tools, and technical guidelines, preconception care remains neither institutionalized nor systematically implemented in the Indian setting. Currently, there exists no nationally developed package, budget line, or service delivery mandate for PCC under RMNCH+A or POSHAN Abhiyaan. Frontline workers remain untrained and unmotivated to identify women in need of management during the preconception stage, and indicators vital to PCC such as preconception anemia, folic acid consumption, and even BMI are seldom recorded in routine data systems. The community, through itself, offers low awareness, and the majority of health-seeking starts only after registration of pregnancy, which, unfortunately, means that many of the key developmental windows remain closed. The concern for accountability is further compounded by the absence of a unified monitoring framework and inter-sectoral coordination.

Conclusion

The foundation of good health in pregnancy and life for the mother and child rests on preconception nutrition. This important window of opportunity lies before conception and is a chance to improve women's health for lasting effects across generations. Unfortunately, it has never featured much in public health. Placing preconception nutrition high on the agenda hence will require tangible action beyond awareness campaigns: promotion of balanced diets and lifestyles detrimental to health should be dissuaded and the provision of quality nutrition services at the community level should be improved. Such a paradigm shift cannot be initiated by any one stakeholder.

Instead, it calls for a potent multi-sectoral partnership that sits the public sector, private players, and civil society side by side in building an enabling environment. The voice of the community must be heard along the way, supporting policies must be in place, and interdisciplinary collaboration from health, education, and nutrition systems is needed. Through such integration, preconception nutrition can stop being considered just an afterthought and instead become that key aspect of a healthy beginning where every woman comes into pregnancy healthier and every child is given a just and equal opportunity.

Acknowledgment

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Preconceptional Care to Optimise Maternal and Neonatal Outcome
Ek Rashtra • Ek Mission
Swastha Nari • Samruddha Vatan
Har Ghar FOGSIAN
Sampoorna
Swastha Janm Abhiyan
Empowering Women Through Pre-conceptional Care
By FOGSI, India's largest organization promoting women's health and reproductive rights
Dr Sunita Tandulwadkar
President FOGSI - 2025

SECTIONS

SECTION 1
Background and Rationale

Background

- Maternal health is a cornerstone of public health.
- Unfortunately in India, unplanned pregnancies remain common in both rural and urban settings. Therefore, many **women embark on pregnancy without adequate physical or nutritional preparation.**
- Key factors like body mass index (BMI), blood pressure, hemoglobin levels, thyroid function, and blood sugar levels are crucial in determining pregnancy outcomes.
- **Failing to address these factors before conception can lead to complications** such as anemia, gestational diabetes, hypertension, preterm labor, low birth weight, **and severe pregnancy-related issues.**

This highlights the urgent need for pre-conceptional care to optimize women's health before pregnancy.

- While India, has made strides in reducing maternal mortality rates, achieving a Maternal Mortality Ratio (MMR) of 97to 103 per 100,000 live births between 2018-2020 in many states, it still falls short of the United Nations' Sustainable Development Goal to reduce global maternal mortality to 70 per 100,000 live births by 2030.
- Numerous successful programs, run by the government and NGOs—with or without FOGSI partnership—have contributed to bringing the mortality rate down to double digits in most states - but existing efforts have reached saturation and are only going to take us so far.

Rationale

- To push this progress further, we need to think beyond current practices and explore innovative approaches.
- Pregnancy is not merely a nine-month journey; it begins long before conception.
- The pre-conception period is a critical window to optimize a woman's health and reduce the risk of adverse pregnancy outcomes.
- Women who are physically and mentally prepared before conception are more likely to experience healthy pregnancies and childbirths.
- Targeting women during this period is essential for reducing pregnancy-related complications.
- The Federation of Obstetricians and Gynecologists of India (FOGSI) is a 74-year-old professional organization with:
  - 277 member societies
  - Over 46,000 individual members across the country
  - One of the largest membership-based organizations of specialized professionals
- FOGSI is uniquely positioned to tackle these challenges

SECTION 2

*Our Vision *Objectives

Our Vision

Sampoorna aims to establish pre-conceptional care as a national priority, optimizing pregnancy outcomes and optimizing pregnancy outcomes and ensuring the birth of healthy babies to healthy mothers.

Objectives

Raising Awareness:

Organise awareness campaigns, camps, and drives to educate women about the need to optimize critical health parameters –BMI, blood pressure, hemoglobin levels, thyroid function, and blood sugar levels—before pregnancy. Emphasize that the nine-month journey must be preplanned and cannot be left to chance.

Improving Health Literacy:

Provide clear and accurate information about the importance of pre conceptional care, including the role of folic acid supplementation in preventing neural tube defects in newborns.

Regular Health Checkups:

Educate women about the importance of regular health checkups to ensure their physical readiness for pregnancy. These checkups will help monitor and manage critical health parameters.

Ensuring Access to Continuous Health And Fitness Updates:

Empower women to stay informed about their health and fitness,regardless of their educational, economic, or social background. regardless of their educational, economic, or social background. Ensure that both educated women and those in rural areas have access to accurate and actionable information.

SECTION 3

*Approach and Strategy *Expected Outcomes

Approach and Strategy

Organizing Camps and Awareness Drives : Sampoorna will adopt a proactive approach by organizing health camps and awareness drives across communities, particularly in underserved areas with high maternal mortality rates. These initiatives will:

- Provide free health screenings to assess critical health parameters such as BMI, blood pressure, hemoglobin, blood sugar, and thyroid levels.
- Collaborate with local health workers, communities, and influencers to maximize outreach and engagement
- Distribute educational materials highlighting the importance of folic acid supplementation.

Public Awareness Campaigns : Launch a large-scale, nationwide public awareness campaign to educate the public about the importance of planning pregnancies. This campaign will utilize a mix of traditional media (radio, TV) and digital platforms (social media, mobile apps) to:

- Spread vital information about pre-conceptional care, encouraging women to plan their pregnancies and avoid unplanned ones.
- Educate women on the importance of optimizing their health before conceiving.
- Highlight the benefits of visiting healthcare facilities for pre-pregnancy checkups.
- Provide easily accessible resources for women to understand their health status and take steps to improve it

Training for Gynecologists

- Develop comprehensive training programs for gynecologists across the country to emphasize the importance of pre-conceptional care.
- These trained gynecologists will serve as master trainers, creating a network of professionals who can further disseminate this critical message.
- This will ensure that every patient visiting a gynecologist is advised on the importance of pre-conceptional health checkups and folic acid supplementation.

Collaboration with Other Healthcare Providers

- A key component of the Sampoorna initiative will involve collaborating with other healthcare professionals, including primary health care centers and ASHA workers, to integrate pre-conceptional care into routine health services.
- Healthcare providers will be trained to advise women on pre conceptional health during regular visits, ensuring that every woman has access to critical health information before conceiving.

Expected Outcomes

By focusing on pre-conceptional care, the Sampoorna initiative will have a profound impact on maternal and neonatal health. The expected outcomes include:

Improved Health Literacy : By engaging both healthcare professionals and the public, we aim to increase overall awareness and knowledge about the importance of pre-conceptional care, particularly in rural and under served areas.

Promotion of Planned Pregnancies : By encouraging couples to make informed decisions about when to conceive Sampoorna will contribute to better family planning outcomes, reducing the number of unplanned pregnancies.

Awareness of Family Planning Methods : Sampoorna will empower couples to make informed decisions about family planning, contributing to a reduction in unplanned pregnancies.

Empowerment of Women and Future Generations : Empower women to take control of their health, leading to healthier pregnancies and a healthier future generation.

Reduction in Maternal and Neonatal Mortality : Through early intervention and regular health checkups, we aim to reduce the risks of pregnancy related complications and congenital abnormalities which may help in lowering maternal and neonatal mortality rates.

SECTION 4

*Why FOGSI? *Conclusion

Why FOGSI?

- FOGSI is one of the most influential associations of obstetricians and gynecologists globally, with a workforce of 46,000 members.
- The primary health goal of FOGSI is to improve maternal, neonatal, and women's health.
- FOGSI has a proven track record of successful collaboration with the government, national and international stakeholders, and NGOs in addressing maternal and neonatal health issues.
- FOGSI is committed to supporting the government's efforts to reduce maternal mortality in India in every possible way.
- This collaboration will provide the necessary expertise and nationwide reach to promote essential health interventions

Conclusion

- Sampoorna is a vital initiative dedicated to raising awareness about the importance of pre-conceptional care in enhancing pregnancy outcomes.
- By organizing health camps, awareness drives, and providing women with accurate information, we can empower women to prioritize their health and seek regular healthcare services.
- Ensuring women are physically prepared before conception not only promotes healthier pregnancies but also positively impacts their overall well-being and the future of the next generation.
- We aim to create a ripple effect of health awareness that benefits women, their families, and the generations to come.

CHAPTER 3: Pregnancy and Lactation
A) Step Up Beyond IFA in Clinical Practice: Iron-Ascorbate and the Case for Comprehensive Micronutrient Care

Dr. Poonam Goyal
MD, FICOG, FICMCH, CIMP
Chairperson - Safe Motherhood Committee - FOGSI
ICOG Governing Council

Dr. Ashwini Yelikar Kale
Consultant and Director
Asha Kiran hospital
Pune, Maharashtra
Joint Secretary FOGSI

Introduction

Pregnancy is a unique metabolic state a phase of immense physiologic transformation where maternal demands escalate not only in volume but in specificity. The health of the mother and the optimal development of the fetus are deeply dependent on the quality, bioavailability, and synergy of micronutrients. In countries like India, with high baseline rates of iron deficiency anemia (IDA) and widespread subclinical nutritional deficiencies, the traditional approach of isolated supplementation is no longer seems sufficient.

In recent times; antenatal care is transitioning from deficiency correction to nutrient optimization, moving from the mere prevention of anemia to the holistic nourishment of the fetal brain, immune system, and organogenesis. It is pertinent to explore and understand the role of iron; which iron preparation to be used and when, like oral iron or parenteral.

All oral iron preparations have different effects and some come in combinations also. In the modern lifestyle and dietary habits, the emerging need for a multiple. micronutrient supplementation (MMS) strategy cannot be overlooked. This shift has been validated by recent WHO and FIGO recommendations. Oral iron ascorbate preparation is a good option specially in combination with folic acid. Indian diets often lack green leafy vegetables, compounding folate deficiency.[5] Micronutrient intake makes it a good option for the pregnant mothers.

Role of iron in pregnancy

It is Central to Maternal and Fetal Physiology and plays a foundational role in pregnancy.

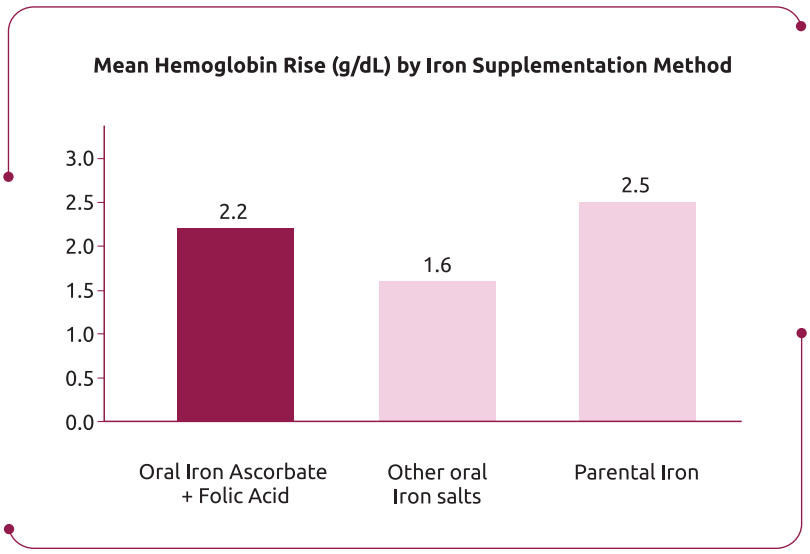
Iron deficiency can result in:

Maternal fatigue, immune suppression, increased infection risk, Impaired placental growth, oxygen transport and preterm birth

In fetus there can be low birth weight, fetal growth restriction, premature rupture of membranes

During pregnancy, iron requirements rise to 1,000–1,200 mg total, most of which must be absorbed and stored from the second trimester onward.[1]

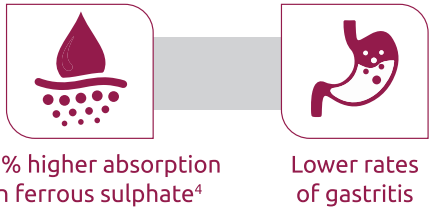
Why Iron Ascorbate? A superior salt



Iron ascorbate is a chelated compound (Figure 1) where ferrous iron is bound to ascorbic acid (vitamin C). This bond significantly improves bioavailability via:

- Solubilization of iron at intestinal pH[2]
- Reduction of ferric (Fe^{2+}) to ferrous (Fe^{2+}) form[3]
- Prevention of interaction with dietary inhibitors like phytates and tannins

In Indian trials, iron ascorbate showed that there is:



25–30% higher absorption than ferrous sulphate[4]

Lower rates of gastritis

No metallic taste

No constipation

Higher adherence (up to 85%) compared to traditional salts.

Parenteral iron is also a good option whenever we need a quick rise in hemoglobin but the need of well-equipped centres and the cost and adverse reaction though very rare but still are a cause of concern (Figure 2).

Iron ascorbate becomes a pragmatic alternative in these settings:

Parameter	Oral Iron Ascorbate	Parenteral Iron
Administration	Oral, home-based	Hospital setup required
Accessibility	High	Low in rural India
Cost	Low	High
Tolerability	Good	Moderate (hypersensitivity)
Monitoring	Minimal	Requires supervision

The imperative role of folic acid

Role of Folic acid in pregnancy:

DNA synthesis and cellular replication

Neural tube formation (NTDs)

Erythropoiesis, especially in synergy with vitamin B12

Therefore, deficiency will lead to megaloblastic anemia, fetal anomalies, and increased miscarriage risk.

Iron + folic acid combination

It is more than the sum of ingredients and together, they form the WHO-recommended IFA regimen: 60 mg elemental iron plus 400 µg folic acid in once daily dose from the first trimester until delivery.

According to FOGSI guidelines,

- All pregnant individuals should receive 60–100 mg of elemental iron daily as prophylaxis. For those diagnosed with mild to moderate anemia before 30–32 weeks of gestation, treatment with 100 mg of oral iron twice daily is recommended.[1]
- Once hemoglobin levels are normalized, prophylactic supplementation (60–100 mg/day) should be continued during the postpartum period for 6 months to prevent recurrence.[1]

(Reference: 1. Mintsopoulos V, Tannenbaum E, Malinowski AK, Shehata N, Walker M. Identification and treatment of iron-deficiency anemia in pregnancy and postpartum: A systematic review and quality appraisal of guidelines using AGREE II. *Int J Gynecol Obstet.* 2024; 164: 460-475.)

- Pregnant women with folate deficiency are generally recommended to take folic acid in doses ranging from 500 micrograms to 5 milligrams, administered three times daily.[2]

(Reference: 2. Baddam, Sujatha & Kashif, & Khan, M & Ishwarlal,. (2025). In: StatPearls. Stat-Pearls Publishing; 2025. Accessed August 5th, 2025. https://www.ncbi.nlm.nih.gov/books/NBK535377/)

The synergy ensures

Restoration of both iron stores and active red cell production

Dual prevention of iron deficiency and NTDs

Reduction in maternal mortality by up to 40% in high-burden regions[6]

Is IFA alone enough

While IFA is the bedrock, modern data show that many pregnant women have overlapping deficiencies in:

A single-nutrient approach may be insufficient to address cognitive development and immune readiness, of fetal metabolic programming.[7]

The emerging role of multiple micronutrient supplementation (MMS)

Recent landmark reviews and WHO policy briefs advocate a paradigm shift from IFA to MMS, especially in LMICs (Low- and Middle-Income Countries):

"Where feasible, MMS with IFA base should be considered to address broader nutritional needs and reduce the risk of low birth weight, small-for-gestational-age infants, and stillbirth." — WHO, 2023[8]

Expanded roles of key micronutrients

Zinc

- It is essential for DNA repair, immune cell growth, fetal neurodevelopment
- Deficiency linked to preterm labour, PROM, and IUGR
- Supplementation improves fetal weight and head circumference[9]

Vitamin B12

- Works with folate in methylation and myelination
- Deficiency results in developmental delay, maternal depression, and anemia
- Common among Indian vegetarians[10]

Copper

- Required for iron transport, connective tissue synthesis, and fetal heart development
- Copper deficiency aggravates anemia and fetal oxidative stress[11]

Vitamin B6

- Regulates neurotransmitters, enhances hemoglobin synthesis
- Helps alleviate nausea/vomiting (first-trimester hyperemesis)
- Deficiency linked to gestational hypertension and immune compromise[12]

MMS vs. IFA: A comparative overview (Table 3)

Parameter	IFA alone	IFA + MMS (Zn, Cu, B12, B6)
Anemia Correction	✓ Yes	✓✓ Enhanced
NTD Prevention	✓ Yes	✓ Yes
Neurodevelopment Support	✗ No	✓✓ Strong
FGR Risk Reduction	✗ No	✓ Yes
Maternal Immune Strength	✗ No	✓ Yes
Preterm reduction	✗ No	✓ Yes
Fetal Brain Growth	✓ Yes	✓ (if single-pill)
Compliance (FDCs)	✓ Yes	✓ Yes

Global endorsements and updated guidelines

UNICEF, 2022 — Advocates universal access to cost-effective MMS via ANC platforms

WHO, 2023 — MMS recommended in areas with multiple deficiencies and poor dietary quality

FIGO, 2024 — Calls for flexible protocols allowing IFA or MMS based on regional dietary surveys

FOGSI — Encourages broader micronutrient coverage in the private sector, particularly in IVF, elderly gravida, and twin pregnancies[13]

Practical considerations for clinicians

- Start supplementation early in first trimester or even preconceptionally
- Use FDCs with iron ascorbate, folic acid, and micronutrients for better compliance
- Tailor based on patient's diet, parity, socioeconomic background, and access to fortified foods

Conclusion

Micronutrient management in pregnancy is no longer confined to correcting hemoglobin values — it is about optimizing maternal vitality and fetal potential.

Oral iron is a good option if started timely and ascorbate has greater absorption due to vit C. The Iron Ascorbate + Folic Acid combination continues to be a scientifically validated, well-absorbed, and safe first-line tool. This combo can be used for non-pregnant and pregnant and lactating women as folic acid important for the methylation process and keeps in check hyperhomocystinaemia. However, its impact multiplies when coupled with Zinc, Copper, Vitamin B12, and B6 — nutrients that enhance immunity, neurodevelopment, and overall fetal resilience. As India steps into the era of precision antenatal nutrition, obstetricians must lead this evolution — from anemia prevention to micronutrient-enabled motherhood.

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CHAPTER 3
B: Role of Calcium, Vitamin D, and Magnesium in Pregnancy and Lactation

Dr. Ashwini Yelikar Kale
Consultant and Director
Asha Kiran hospital
Pune, Maharashtra
Joint Secretary FOGSI

Dr. Ashish Kale
Director and IVF Consultant
Asha Kiran hospital, Pune
Director, Lead – Apollo Hospitals, Pune
Committee Chairperson
Family Welfare Committee – FOGSI

Introduction

Pregnancy and lactation are critical periods in a woman's life marked by increased nutritional requirements to support fetal growth, maternal health, and postpartum recovery. Among essential micronutrients, calcium, vitamin D, and magnesium play a pivotal role in maternal and fetal musculoskeletal health. These nutrients are interdependent in their metabolism and biological effects. Inadequate intake or poor bioavailability can predispose to complications such as osteopenia, pre-eclampsia, low birth weight, and impaired fetal bone development. This chapter explores the synergistic role of calcium, vitamin D (both D2 and D3 forms), and magnesium in pregnancy and lactation, their physiological implications, supplementation guidelines, and clinical outcomes.

Calcium in pregnancy and lactation

Calcium is essential for fetal skeletal development, maternal bone integrity, neuromuscular function, and vascular stability. During pregnancy, approximately 30 g of calcium is transferred to the fetus, primarily in the third trimester. Lactation further increases maternal calcium demand, as breast milk contains about 200 mg of calcium per liter. If dietary intake is insufficient, the maternal skeleton becomes the primary source, leading to transient bone demineralization. Long-term deficiency may predispose women to osteoporosis later in life.

Sources of calcium include dairy products, fortified plant-based alternatives, leafy greens, and supplements. The RDA for calcium during pregnancy and lactation is 1000–1300 mg/day depending on age.

Vitamin D: Forms, sources, and role

Vitamin D plays a crucial role in calcium absorption from the gastrointestinal tract and bone mineralization. It exists in two major forms: vitamin D2 (ergocalciferol) derived from plant sources and vitamin D3 (cholecalciferol) derived from animal sources and synthesized in human skin upon UVB exposure. Both forms are effective for maintaining serum 25(OH)D levels when used in equivalent doses for prevention

Vitamin D deficiency during pregnancy is linked to pre-eclampsia, gestational diabetes, low birth weight, and impaired fetal skeletal development. The RDA for vitamin D during pregnancy and lactation is 600 IU/day, although some guidelines recommend higher doses in deficient individuals.

Magnesium: A key cofactor

Magnesium is essential for over 300 enzymatic reactions in the body, including those involved in vitamin D activation. It plays a significant role in neuromuscular transmission, protein synthesis, and the regulation of blood pressure. In pregnancy, magnesium deficiency is associated with increased risk of pre-eclampsia, preterm labor, and fetal growth restriction.

Importantly, magnesium facilitates the activation of vitamin D by participating in hydroxylation steps in the liver and kidney. Its inclusion in calcium-vitamin D supplementation regimens may improve efficacy and tolerance, potentially mitigating side effects such as constipation seen with calcium-only supplements.

Interrelationship between calcium, vitamin D, and magnesium

These three nutrients exhibit a synergistic relationship. Vitamin D enhances intestinal calcium absorption, while magnesium is required for converting vitamin D to its active form (1,25-dihydroxyvitamin D). Without adequate magnesium, vitamin D metabolism is impaired, and calcium absorption is suboptimal. Therefore, a combined supplement of calcium, vitamin D, and magnesium can promote optimal musculoskeletal health in pregnant and lactating women.

Clinical evidence and supplementation strategies

Several clinical studies support the benefits of combined calcium, vitamin D, and magnesium supplementation during pregnancy:

- A randomized controlled trial showed that women receiving combined supplements had lower incidence of pre-eclampsia and improved birth weight outcomes
- Supplementation reduced maternal bone resorption and increased serum 25(OH)D and calcium levels
- Magnesium inclusion improved gastrointestinal tolerance

Benefit	Calcium	Vitamin D	Magnesium
Bone health	✓	✓	✓
Prevention of pre-eclampsia	✓	✓	✓
Enhances calcium absorption	—	✓	✓
FGR Risk Reduction	✓	✓	✓
Fetal skeletal development	✓	✓	✓
Reduces constipation	—	—	✓
Supports neuromuscular health	✓	✓	✓

Supplementation guidelines and considerations

- Calcium: 1000–1300 mg/day from dietary and supplemental sources
- Vitamin D: 600–2000 IU/day, preferably in individuals with low serum 25(OH)D levels
- Magnesium: 350–400 mg/day

Combined formulations are available and may improve compliance and tolerance. However, high doses of calcium may interfere with iron absorption and should be spaced appropriately. Serum levels of 25(OH)D and magnesium should be monitored in high-risk women.

Conclusion

Adequate intake of calcium, vitamin D, and magnesium is vital for ensuring optimal maternal and fetal health during pregnancy and lactation. Their synergistic effects support bone development, prevent complications, and promote long-term skeletal health. Combined supplementation is evidence-based, well-tolerated, and should be considered a cornerstone of maternal nutrition in obstetric practice.

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CHAPTER 4:
Addressing Anemia in Peri-menopausal & Menopausal Women

Dr. Prabhdeep Kaur
MBBS, DGO, DNB
Bhilai, Chhattisgarh

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 peri-menopausal 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 peri-menopausal 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 peri-menopausal 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).

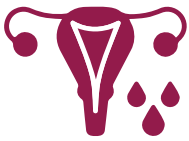
The main findings regarding anemia prevalence among reproductive-age women in India are (*Nowaj Sharif, et al.* 2023):

- **High prevalence across social groups:** Anemia prevalence is high across all social groups
- **Increase over time:** The prevalence of anemia has slightly increased from 2005-06 to 2019-21.
- **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
- **Economic status:** Economic status is a significant determinant, with poorer women having higher anemia prevalence. Poor women have worse condition
- **Education:** Higher education levels are associated with lower anemia prevalence across all social groups

- **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
- **Age and childbearing:** Anemia prevalence decreases with age but increases with the number of children ever born
- **Nutritional factors:** Regular intake of pulses and improved sources of drinking water are associated with lower anemia prevalence

Causes of anemia in peri-menopausal and menopausal women

- **Menstrual blood loss:** One of the primary causes of anemia in peri-menopausal 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)



- **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)

- **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 anemia of chronic inflammatory processes is common in everyday clinical practice

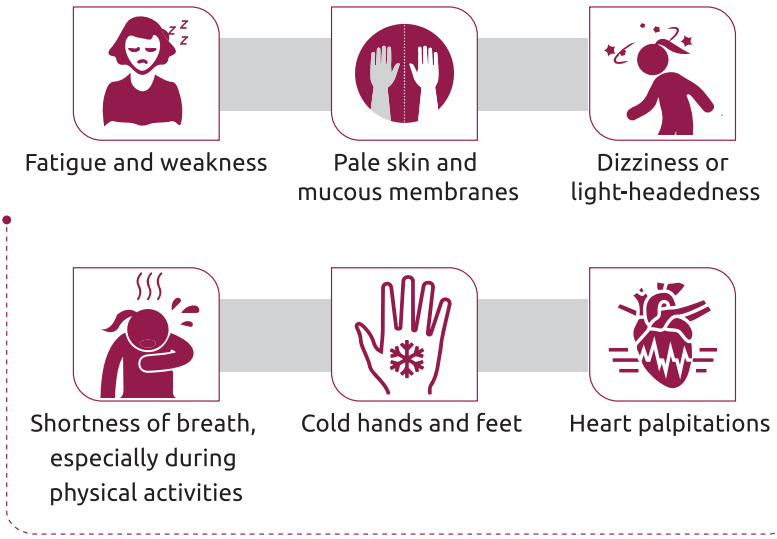
  However, despite the fact that it deteriorates the quality of life of the patient and can negatively affect survival, it is often neglected and not fully assessed by doctors because it is associated with other, usually serious, diseases upon which all therapeutic objectives are focused (*Michał Wiciński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

- **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 Yang et al.*, 2021)

Symptoms of anemia

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

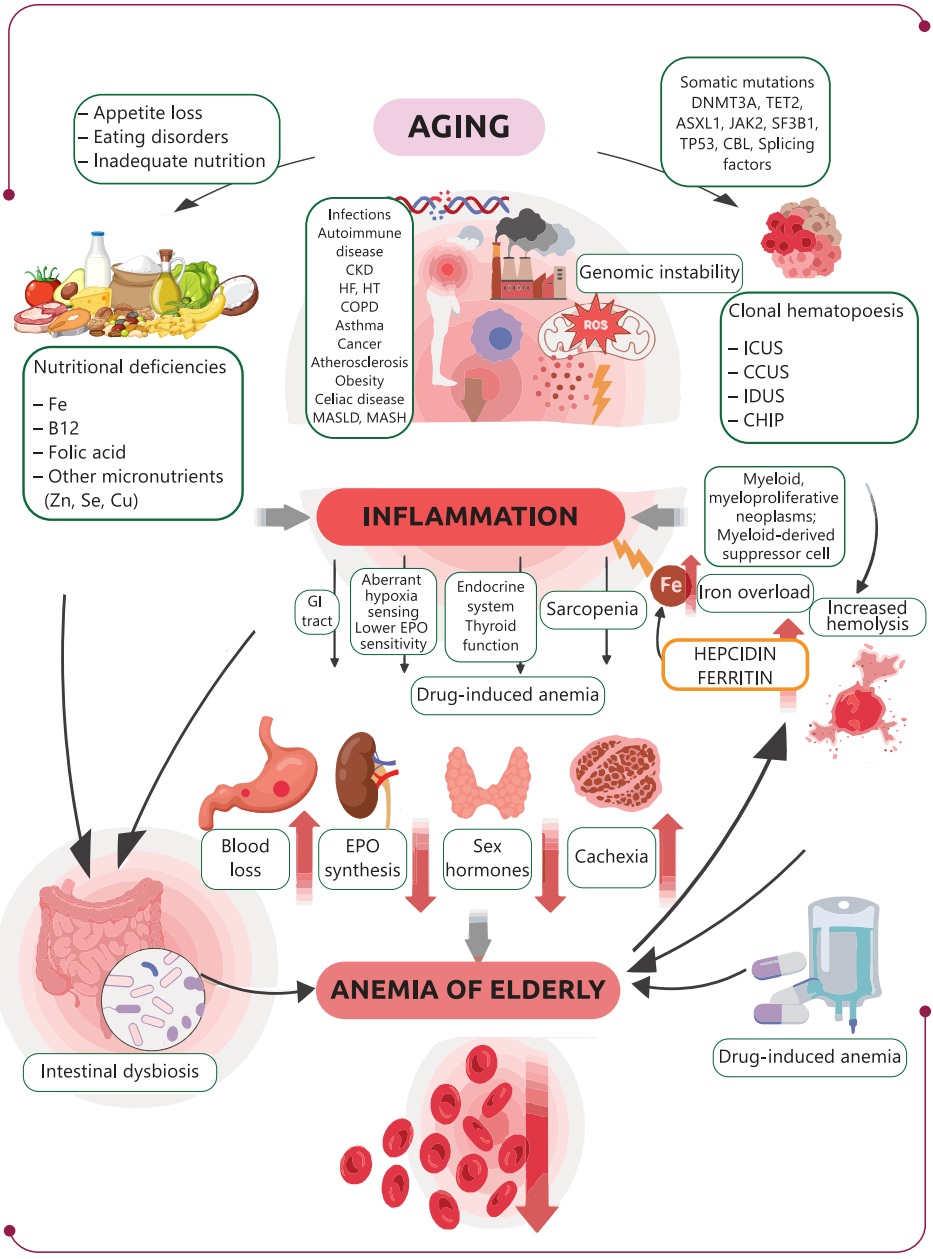
Common symptoms include:

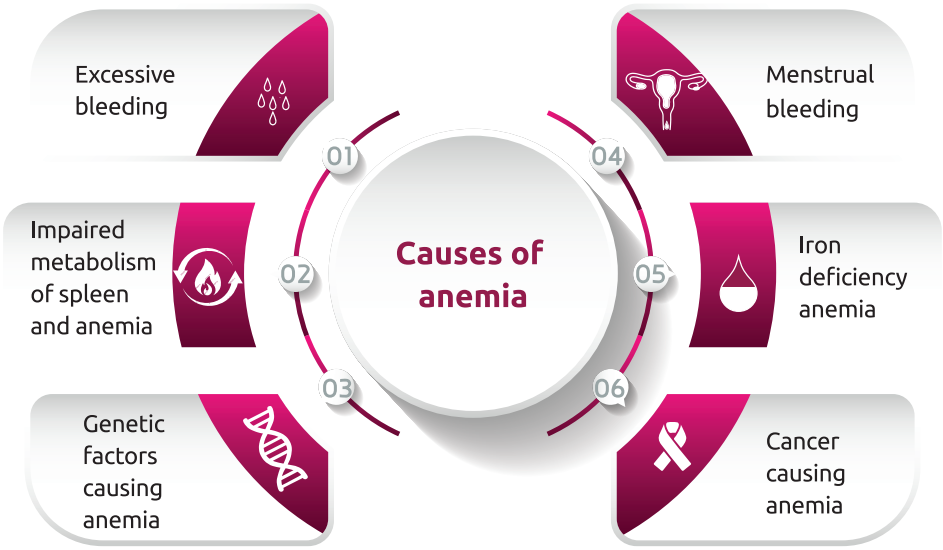


It is essential for women experiencing these symptoms, particularly during perimenopause and menopause, to consult healthcare providers, as these symptoms may overlap with other menopausal symptoms such as fatigue, sleep disturbances, and mood changes.

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).

Types of anemia





Management

- **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
- **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)
- **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 andoverall health
- **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 peri-menopausal 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.

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B12, Cyanocobalamin; B6, Pyridoxine; Ca, Calcium; Cu, Copper; IFA, Iron folic acid; Mg, Magnesium; OD, Once daily; Vit, Vitamin; Zn, Zinc.

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