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## Anemia 'a Silent Killer' among Pregnant Women in India

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### ABSTRACT

Anemia is the most common nutritional deficiency in the world and about 65-75 percent pregnant women are suffering as per WHO estimate and about 20-40 percent maternal deaths in India are due to anemia and anemia is defined if the Haemoglobin levels are below 12g/dl in females. Inadequate dietary Iron intake, Folate intake due to low vegetable consumption, low B12 intake and poor availability of dietary iron from the fibre, phytate rich diets are the major factors responsible for high prevalence of anemia. Anemia also caused by sickle cell anemia and bone marrow and stem cell problems. Mandatory monthly screening, skilled management of blood transfusion and parental iron therapy is the hallmark for prevention and management of anemia in pregnancy. India, first developing country to take up a National Programme to prevent anemia among pregnant women and children by way of The National Anemia Prophylaxis Programme (1972) of Iron and Folic Acid distribution to all pregnant women in India. The Tenth Five Year Plan implemented multipronged strategy like fortification of food item with iron, oral iron folate prophylactic therapy, screening of all pregnant women, parental iron therapy etc. Anemia in pregnancy is associated with advance consequences both for the mother and the fetus.

**Keywords:** Anemia, Pregnancy, Iron Deficiency, Folate Deficiency.

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### INTRODUCTION

Anemia is the most common nutritional deficiency disorder in the world. WHO has estimated that prevalence of anemia in developed and developing countries in pregnant women is 14 per cent in developed and 51 per cent in developing countries and 65-75 percent in India<sup>1</sup>. About one third of the global population (over 2 billion) are anaemic<sup>2</sup>. Prevalence of anemia in all the groups is higher in India as compared to other developing countries<sup>1</sup>. Prevalence of anemia in South Asian countries is among the highest in the world. WHO estimates that even among the South Asian countries, India has the highest prevalence of anemia<sup>2</sup>.

Prevalence of anemia in all the groups is higher in India as compared to other developing countries . In India, anemia affects an estimated 50% of the population. The problem becomes more severe as more women are affected with it as compared to men . It is estimated that about 20%-40% of maternal deaths in India are due to anemia and One in every two Indian women (56%) suffers from some form of anemia<sup>3</sup>.

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According to National consultation on control of nutritional anemia in India and, anemia is defined as the hemoglobin of less than 12 g/dl in females. Mild anemia - hemoglobin level of 10-11.9 g/dl, moderate anemia- hemoglobin level of 7-9.9 g/dl and severe anemia - hemoglobin level of less than 7g/dl among females. (Data from National Nutrition Monitoring Bureau (NNMB), Indian Council of Medical Research (ICMR) <sup>4</sup>.

Anemia among women in Southern Indian state cuts across social class, place of residence, and other factors that normally discriminate health status. Rich or poor, fat or thin, urban or rural—the prevalence of anemia is high among women in all these groups and differences are only relative. More than 40% of women in the highest socioeconomic group are anemic, as are 62% of urban poor and 54% of rural poor women. the poorest rural and urban women both had the greatest risk of anemia and had similar probabilities of being anemic <sup>5</sup>,

One reason that urban poor women may have higher risk of anemia than rural poor women is their lack of access to their own income or resources because of lower rates of extra-household employment and reduced economic power within the household <sup>6</sup>.

Prevalence of anemia is higher among pregnant women and preschool children. Even among higher income educated segments of population about 50 per cent of children, adolescent girls and pregnant women are anemic. Inadequate dietary iron, folate intake due to low vegetable consumption, perhaps low B12 intake and poor bioavailability of dietary iron from the fibre, phytate rich Indian diets are the major factors responsible for high prevalence of anemia. Increased requirement of iron during growth and pregnancy and chronic blood loss contribute to higher prevalence in specific groups<sup>7</sup>. In India, anemia is directly or indirectly responsible for 40 per cent of maternal deaths. There is 8 to 10-fold increase in MMR when the Hb falls below 5 g/dl. Early detection and effective management of anemia in pregnancy can contribute substantially to reduction in maternal mortality<sup>8</sup>. Maternal anemia is associated with poor intrauterine growth and increased risk of preterm births and low birth weight rates. Thus maternal anemia contributes to intergenerational cycle of poor growth in the offspring. Early detection and effective management of anemia in pregnancy can lead to substantial reduction in under nutrition in childhood, adolescence and improvement in adult height<sup>9</sup>.

## Responsible Factors for high prevalence of anemia

Studies carried out in India and elsewhere have shown that iron deficiency is the major cause of anemia followed by folate deficiency. In recent years, the contribution of B12 deficiency has been highlighted. In India, the prevalence of anemia is high because of (i) low dietary intake, poor iron (less than 20 mg /day) and folic acid intake (less than 70 mg/day); (ii) poor bioavailability of iron (3-4% only) in phytate and fiber rich Indian diet; and (iii) chronic blood loss due to infection such as malaria and hookworm infestations. Poor iron stores at birth<sup>16</sup>, low iron content of breast milk and low dietary iron intake through infancy and childhood results in high prevalence of anemia in childhood<sup>10</sup>.

Anemia gets aggravated by increased requirements during adolescence and during pregnancy. Assuming that the absorption of iron is 8 per cent in pregnant women, their average dietary intake will meet only 30- 45 per cent of the requirement. The low diet intake of iron, folic acid and food stuffs that promote iron absorption, coupled with poor bioavailability of iron are the major factor responsible for very high prevalence of anemia in the country<sup>11</sup>.

Anemia and iron deficiency in the mother are not associated with significant degree of anemia in the children during neonatal period. However, iron stores in these neonates are low, iron content in breast milk in anemic women is low and because of these factors substantial proportion of infants become anemic by six months<sup>16</sup>. Thus maternal iron deficiency and anemia render the offspring vulnerable for developing iron deficiency and anemia right from infancy<sup>12</sup>. Poor iron content of complementary food and family food consumed by the young child results in further increase in prevalence of anemia in childhood. With the onset of menstruation and associated blood loss, there is a further rise in prevalence and severity of anemia in adolescent girls <sup>13</sup>.

## Maternal consequences of anemia <sup>14-17</sup>

### Mild anemia

Women with chronic mild anemia may go through pregnancy and labour without any adverse consequences, because they are well compensated.

### Moderate anemia

Women with moderate anemia have substantial reduction in work capacity and may find it difficult to cope with household chores and child care. Available data from India and elsewhere indicate that maternal morbidity rates are higher in

women with Hb below 8gm/dl<sup>21</sup>. They are more susceptible to infections and recovery from infections may be prolonged. Premature births are more common in women with moderate anemia. They deliver infants with lower birth weight and perinatal mortality is higher in these babies.

### Severe anemia

Three distinct stages of severe anemia have been recognized - compensated, decompensated, and that associated with circulatory failure. Cardiac decompensation usually occurs when Hb falls below 5.0 g/dl. The cardiac output is raised even at rest, the stroke volume is larger and the heart rate is increased. Untreated, it leads to pulmonary edema and death. When Hb is <5 g/dl and packed cell volume (PCV) below 14,

### Anemia Caused by Decreased or Faulty Red Blood Cell Production

1. Sickle cell anemia
2. Iron-deficiency anemia
3. Vitamin deficiency
4. Bone marrow and stem cell problems
5. Other health conditions

Iron-deficiency anemia occurs because of a lack of the mineral iron in the body caused by an iron-poor diet, especially in infants, children, teens, vegans, and vegetarians

### The metabolic demands of pregnancy and breast feeding that deplete a woman's iron stores

1. Menstruation
2. Frequent blood donation
3. Endurance training
4. Digestive conditions such as Crohn's disease or surgical removal of part of the stomach or small intestine
5. Certain drugs, foods, and caffeinated drinks
6. Vitamin-deficiency anemia - B12 and folate are deficient. These two vitamins are needed to make red blood cells. Conditions leading to anemia caused by vitamin deficiency include:
  - (a) Megaloblastic anemia: Vitamin B12 or folate or both are deficient
  - (b) Pernicious anemia: Poor vitamin B12 absorption caused by conditions such as Crohn's disease, an intestinal parasite infection, surgical removal of part of the stomach or intestine, or infection with HIV
7. Dietary deficiency: Eating little or no meat may cause a lack of vitamin B12, while overcooking or eating too few vegetables may cause a folate deficiency.
8. During early pregnancy, sufficient folic acid can help prevent the fetus from developing neural tube defects such as spina bifida.
9. Anemia resulting from bone marrow or stem cell problems include:

(a). Aplastic anemia occurs when there's a marked reduction in the number of stem cells or absence of these cells. Aplastic anemia can be inherited, can occur without apparent cause, or can occur when the bone marrow is injured by medications, radiation, chemotherapy, or infection.

(b). Thalassemia occurs when the red cells can't mature and grow properly. Thalassemia is an inherited condition that typically affects people of Mediterranean, African, Middle Eastern, and Southeast Asian descent. This condition can range in severity from mild to life-threatening; the most severe form is called Cooley's anemia.

10. Other Conditions causing the anemia include the following:

- (a) Advanced kidney disease
  - (b) Hypothyroidism
11. Other chronic diseases, such as cancer, infection, lupus, diabetes, and rheumatoid arthritis
  12. Old age
  13. Anemia Caused by Destruction of Red Blood Cells:
    14. Inherited conditions, such as sickle cell anemia and thalassemia
    15. Stresses such as infections, drugs, snake or spider venom, or certain foods
    16. During early pregnancy, sufficient folic acid can help prevent the fetus from developing neural tube defects such as spina bifida.

### Immune status of anemic pregnant women

In pregnancy, profound changes occur in several laboratory parameters used for the assessment of immune status. Studies undertaken by the National Institute of Nutrition, Hyderabad, showed that there was a fall in T and B cell count with fall in hemoglobin levels below 11 g/dl. The fall in T and B cells was statistically significant in women with hemoglobin levels below 8 g/dl. Immunoglobulin levels showed a progressive rise with decreasing Hb levels.

### Effect of maternal hemoglobin level on birth weight and perinatal mortality.

Available data from India indicate that maternal morbidity rates are higher in women with Hb below 8.0 g/dl. Maternal mortality rates show a steep increase when maternal Hb levels fall below 5.0 g/dl. Anemia directly causes 20 per cent of maternal deaths in India and indirectly accounts for another 20 per cent of maternal deaths.

### Factors responsible for the adverse obstetric outcome

However, prevalence of several maternal risk factors which are associated with low birth weight, increased perinatal, maternal morbidity and mortality,

such as twins, PIH and APH are higher among anemic women. Anemic women should, therefore, be treated as a high risk Obstetric group. Immune depression due to anemia and consequent increased morbidity due to infection, especially urinary tract infection, might be one of the factors responsible for low birth weight babies in anemic women.

Poverty, ignorance, non availability and/or failure to utilize available medical facilities have been shown to be associated with maternal anemia on the one hand and maternal and perinatal morbidity and mortality on the other, though the association is not causal. Health education to improve the utilization of available facilities and improvement in the health care delivery system to cater to the needy, right at their doorsteps might thus go a long way in reducing adverse obstetric outcome associated with maternal anemia<sup>18</sup>.

### **Prevention and management of anemia in pregnancy**

Mandatory monthly screening for anemia became the 'routine' in all antenatal clinics. Skilled management of severe grades of anemia detected late in pregnancy, through blood transfusion and parenteral iron therapy became the hallmark of good obstetric practice and resulted in maternal and perinatal salvage rates in hospitals<sup>13</sup>.

### **Programmes for prevention and management of anemia**

India was the first developing country to take up a National Programme to prevent anemia among pregnant women and children. The National Anemia Prophylaxis Programme of iron and folic acid distribution to all pregnant women in India through the primary health care system was evolved and implemented from 1972, so that the vast majority of pregnant women who never seek health care, could benefit from this outreach programme. It was hoped that this programme will bring about a reduction both in the prevalence and severity of anemia in pregnancy. There were two major components of the anemia prophylaxis programme – pre-school children were to receive 20 mg elemental iron and 100 mg folic acid and pregnant women to receive 60 mg elemental iron and 500 µg of folic acid<sup>16</sup>.

Therefore an attempt was made to identify all pregnant women and give them 100 tablets containing 60 mg of iron and 500 µg of folic acid. However all the national surveys indicated that coverage under all these programmes was very low and there has not been any change either in the prevalence of anemia or the adverse consequences associated with anemia. The Programme was revised and renamed as National Anemia Control Programme

(NACP). The Programme envisaged that all pregnant women will be screened for anemia. Non anemic women would get iron (100 mg) and folate (500 µg) and those with anemia should get two tablets daily.

### **Tenth Plan strategy for combating anemia in pregnant women<sup>19</sup>**

The Tenth Five Year Plan suggested multipronged strategies for the control of anemia in pregnancy. These include:

- (i) fortification of common food items like salt with iron to increase the dietary intake of iron and improve the hemoglobin status of the entire population, including girls and women prior to pregnancy; nutrition education for dietary diversification to improve the iron and folate intake
- (ii) screening of all pregnant women for anemia using a reliable method of hemoglobin estimation;
- (iii) oral iron folate prophylactic therapy for all non-anemic pregnant women (with hemoglobin more than 11 g/dl);
- (iv) iron folate oral medication at the maximum tolerable dose throughout pregnancy for women with hemoglobin level between 8 and 11 g/dl;
- (v) parenteral iron therapy for women with hemoglobin level between 5 and 8 g/dl if they do not have any obstetric or systemic complication;
- (vi) hospital admission and intensive personalized care for women with hemoglobin less than 5 g/dl;
- (vii) screening and effective management of obstetric and systemic problems in all anemic pregnant women; and
- (viii) improvement in health care delivery systems and health education to the community to promote utilization of available care.

### **Parenteral therapy for moderate anemia in pregnancy<sup>20</sup>**

Ample data exist in India to show that supervised oral administration of up to 240 mg iron has not been able to raise the Hb levels above 11 g/dl in pregnant women if their initial Hb levels was between 5.0 and 7.9 g/dl<sup>30,31</sup>. Therefore, obstetricians have used intramuscular (IM) iron therapy for correction of anemia. Unless this practice is taken up in all the primary care institutions, majority of women with moderate anemia will not be able to access IM therapy.

### **CONCLUSION**

Anemia in pregnancy is associated with adverse consequences both for the mother and the fetus. Studies have shown that the adverse consequences of maternal anemia may affect not only the neonate and infant but also increase the risk of non communicable diseases when the child grows into an adult and the

risk of low birth weight in the next generation. Technology for detection of anemia and its effective treatment are available and affordable and it is possible to effectively implement these even in primary health care settings and these are very cost effective interventions.

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