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PREVALENCE, ETIOLOGY AND PREVENTION OF IRON DEFICIENCY ANEMIA IN PREGNANCY

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ABSTRACT

Iron deficiency anemia is most the prevalent and also the most neglected nutritional deficiency in the world. It is not just a problem of developing countries or with poor resources but for developed countries as well. The main purpose of this article is to attract the right concern towards prevalence of anemia in pregnancy, Etiology not limited to during pregnancy but during entire adolescence leading to anemia in pregnancy and prevention of anemia in pregnancy by expanding the vision to adolescent age group so as to reduce the risk of nutritional deficiency anemia during pregnancy. Adolescent girls are particularly vulnerable to this condition because of elevated iron request for rapid growth and menstrual blood loss. The most common cause of anemia is poor nutrition which doesn't come from socio-economic factors but from cultural and other conditioning factors as well like infectious diseases leads to malnutrition particularly during adolescents. Malaria, Intestinal parasite, Diarrhoea, Tuberculosis all contribute to malnutrition. The severity and duration of anemia plays an important role during pregnancy as it leads to higher risk of preterm delivery, low birth weight, maternal mortality, etc. Anemia is a global health problem that affects approximately one-third of the world's population and is one of the world's leading cause of disability. The morbidity and mortality in anemia in pregnancy mostly on the basis of inability of woman to react to postpartum blood loss thus leading to life threatning consequences. Iron deficiency anemia has direct relation with malnutrition, as per WHO iron deficiency anemia occurs in areas with chronic malnutrition around 50-80%. But iron deficiency is also very common in developed country as well which is up 20%. Women of reproductive age group are very prone for iron deficiency which is around 30%.

KEYWORDS:– Anemia, Iron Deficiency, Pregnancy, Malnutrition.

INTRODUCTION

Anemia is defined as lack of healthy red blood cells or dysfunctional red blood cells. Red blood cells have hemoglobin, a protein which binds with oxygen and carry it throughout the body. In a routine blood test anemia is reported as low hemoglobin or hematocrit. WHO defined anemia as hemoglobin <11g/dl during pregnancy, but further differentiate on the basis of trimester, Anemia in first trimester if Hb<11g/dl, in second trimester Hb <10.5g/dl, in third trimester Hb <11g/dl. Furthermore, for type and cause of anemia complete blood count needs to be assessed.

During pregnancy as a result of growing fetus and placenta there is increase in demand of maternal iron. Also, during pregnancy there are many factors for iron deficiency including poor diet, decreased absorption of iron due to gastrointestinal disease, short interval between pregnancy. At the beginning of pregnancy approximately 40% of women show low or absent iron stores, and up to 90% of women have iron reserves of < 500 mg, which represent an insufficient amount to support the increased iron needs. An overt iron deficiency anemia frequently develops in pregnancy even in developed countries, indicating that the physiologic adaptations are often insufficient to meet the increased requirements, and iron intake is often below nutritional needs.

Study proves anemia is not just common in pregnancy but in reproductive females as well. So, the focus should be on adolescent girls and their nutrition intake to prevent anemia during pregnancy effectively.

Malnutrition and anemia affect large sections of Indian population, and are particularly high among adolescents. Findings from national family health survey 3 indicate that as many as 56% of females in the 15-19 years of age group are anemic. Out of this 17% females suffer from moderate to severe anemia. More than half of women are anemic in every age group with the prevalence being higher for younger.

Etiology

During pregnancy, there is increased in demands of the growing fetus and placenta, increased erythrocyte mass and, in the third trimester, expanded maternal blood volume. However, during pregnancy there are other risk factors as well for iron deficiency including an

iron-deficient diet, gastrointestinal diseases affecting absorption and a short interpregnancy interval, parasitic diseases, micronutrient deficiencies, and genetically inherited hemoglobinopathies.

The developing fetus is entirely dependent on its mother for nutritional requirements. All iron delivered to the baby comes from either maternal iron stores, absorption of iron from the maternal diet, or possibly turnover of maternal erythrocytes. Each pregnancy requires at least 300 – 500 mg of iron taken from the mother's liver stores. The quantity of iron absorption during the second half of gestation, and principally in the third trimester is around six times higher than the quantity of iron typically absorbed from dietary sources in non-pregnant women. That represents 30% of the 20 mg of iron that is catabolized daily from senescent red blood cells.

Apart from dietary insufficiency inadequate absorption of iron is an important cause of iron deficiency. Iron absorption is increased by the presence of hydrochloric acid in stomach, conversely achlorhydria and copious intake of antacids tend to reduce it. Intestinal disorder like chronic diarrhea interfere with iron absorption. Worm infestation is common predisposing and aggravating factor that may or may not been documented. Hemolysis because of malaria and sickle cell anemia in endemic areas also aggravate iron deficiency.

As stated above anemia is not just common in pregnancy but in reproductive females as well. Its not necessary that iron deficiency anemia is pregnancy induced as 56% of females in age group 15-19 years are anemic. At the beginning of pregnancy, approximately 40% of women show low or absent iron stores, and up to 90% of women have iron reserves of < 500 mg, which represent an insufficient amount to support the increased iron needs. An overt iron deficiency anemia frequently develops in pregnancy even in developed countries, indicating that the physiologic adaptations are often insufficient to meet the increased requirements, and iron intake is often below nutritional needs.

Adolescence – A period of acute stress on erythropoiesis!

Adolescence is the period of growth in height, weight, muscle mass, bones etc. This heightened growth during puberty increases demand for oxygen and hence oxygen carrying capacity and the body respond by increase in Red Blood Cell mass. Hemoglobin and concentration and size of red blood cells also increases and mean corpuscular volume reaches adult values by the time puberty ends. Boys have more androgens and more increase muscle

mass and activity. This stimulate greater increase in release of erythropoietin and thus a higher hemoglobin concentration than girls. Post menarche girls also lose blood every month and further reducing hemoglobin levels. Developing behaviors may result in lack of iron, folic acid and other vitamins in diet further leading to inadequate erythropoiesis and anemia in adolescents.

All these changes put acute stress on erythropoiesis during adolescence and this fact should be considered while evaluating an adolescent for anemia. This would mean an increase in demand for hematinics and other nutrients, hence this justifies iron prophylaxis in adolescents.

Factors influencing nutrition of adolescents

Conditioning factors

Infectious diseases are important factors responsible for malnutrition, particularly in children and adolescents. Diarrhea, intestinal parasites, malaria and tuberculosis all contribute to malnutrition.

Poor environmental sanitation also leads to repeated bouts of infection.

Girls lose a considerable amount of iron (average 1mg daily) during menstruation, therefore they require additional iron rich foods and supplements.

Cultural factors

Food habits, customs, beliefs, traditions and attitudes: Food habits are among the oldest and most deeply entrenched aspects of any culture. The family plays an important role in shaping food habits and these habits are passed on from one generation to the other.

Religion: Religion has a powerful influence on food habits. Hindus do not eat beef, while Muslims do not eat pork. Orthodox Hindus and Jains do not eat meat, eggs, fish and certain vegetables like onions. These taboos prevent people from consuming nutritive iron rich foods.

Social customs: In some communities, men eat first and women eat last and poorly.

Socioeconomic factors

Malnutrition and anemia are largely a by-product of poverty, ignorance, insufficient education, lack of knowledge regarding nutritive values of food, large family size, etc. these

factors largely determine nutritional states of an individual. Malnutrition because of lack of food is quite uncommon now.

Causes of iron deficiency anemia

1. **Increased blood loss**

1. **Uterine –** Excessive menstruation in reproductive years, repeated miscarriage, at onset of menarche, post-menopausal uterine bleeding.
2. **Gastrointestinal –** Peptic ulcer, hemorrhoids, hookworm infestation, cancer of stomach and large bowel, esophageal varices, hiatus hernia, chronic aspirin ingestion, ulcerative colitis, diverticulosis.
3. **Renal tract –** Hematuria, hemoglobinuria
4. **Nose –** Repeated epistaxis
5. **Lungs –** Hemoptysis.

2. **Increased requirements**

1. Spurts of growth in infancy, childhood and adolescence.
2. Prematurity
3. Pregnancy and lactation.

3. **Inadequate dietary intake**

1. Poor economic status.
2. Anorexia e.g. In pregnancy
3. Elderly individuals due to poor dentition, apathy and financial constraints.

4. **Decreased absorption**

1. Partial or total gastrectomy
2. Achlorhydria
3. Intestinal malabsorption such as in coeliac disease.

Effects of anemia on mother and fetus

Maternal iron deficiency anemia during pregnancy and the perinatal period has devastating effect on both mother and child. Iron deficiency anemia is the most common cause of maternal mortality. Severe anemia leads to cardiac failure, even mild to moderate anemia for long time during pregnancy leads to depletion of immune system and increase susceptibility to infection. Pre-eclampsia and antepartum hemorrhage are also commonly seen in anemic mother. If the anemia is untreated during pregnancy, at the time of labor there is also higher

risk of uterine inertia, maternal exhaustion, postpartum hemorrhage, puerperal sepsis and even thromboembolic complications which leads to sub involution of uterus.

Postpartum, iron is lost as lactoferrin in breast milk. Those losses are balanced by the absence of menstruation in the lactating female. untreated iron deficiency in pregnant females will be passed to the infant.

In addition to the direct effects of anemia, reduced fetal brain maturation, pediatric cognitive defects, and maternal depression are associated with iron deficiency anemia in fetus. Other complications of iron deficiency anemia to fetus are low birth weight, perinatal mortality and intra uterine growth retardation.

Prevention

Weekly iron and folic acid supplementation

Ministry of health and family welfare (GOI) has launched weekly iron and folic supplementation programme to meet the challenge of high prevalence and incidence of anemia amongst adolescent girls. Weekly iron and folic acid supplementation is evidence based programmatic response to the prevailing anemia situation amongst adolescent girls through supervised weekly IFA supplementation and bi-annual helminthic control. The goal is to break the intergenerational cycle of anemia, the short-term benefits is of nutritionally improved human capital.

WHO recommends 60 mg of elemental iron and 400 microgram of folic acid per day for 6 months where anemia is <40% prevalent. But at areas where anemia is prevalent in >40% in addition to 6 months, 3 months postpartum is also advised.

Iron preparations – The most easily available and cheap form is ferrous sulphate. Other are ferrous fumarate, ferrous gluconate, ferrous succinate which are costlier than ferrous sulphate but have less epigastric discomfort, nausea, vomiting, constipation. The absorption of iron reduces when taken with meal. So it has to be taken empty stomach, but as it causes gastric discomfort, nausea and vomiting the right way is to start with smaller doses and gradually increase the dose. This reduces adverse effects and also increases compliance. The other form of iron which also has comparatively lower gastrointestinal adverse effects are Carbonyl iron and iron polymaltose, these are comparatively less toxic form of iron. These are mostly used in treating iron deficiency anemia in children as it eliminates iron poisoning. the excessive

use or higher dose of ferrous sulphate leads to iron poisoning. The lethal dose of ferrous sulphate is 200mg/kg body weight, whereas lethal dose of carbonyl iron is 50000mg/kg body weight. After starting iron and folic acid therapy earlier in pregnancy correctly the improvements can be seen earlier as well, hemoglobin rises in 2 weeks when taken correctly and with good absorption hemoglobin rises with approximately 0.8g/dl per week. In cases of defective absorption or who do not tolerate oral iron therapy, in patients of inflammatory bowel disease parenteral iron therapy is quite useful.

Balanced diet – A balanced diet is one that provides all nutrients in required amounts and proportions for maintaining health and general well-being and also makes small proportions for extra nutrients to withstand short duration of illness. It can be achieved through a blend of basic food groups i.e., carbohydrates, fats, vitamins and minerals. As these are present in different types of food items pulses, chapati or rice, green vegetables and milk. It is important to eat these food items in the right mix every day.

Recommended dietary allowance of nutrients in adolescents in 24 hours

	10 – 12 years	**13 - 15 years**	**16 – 18 years**
Energy (kcal)	2000	2100	2100
Protein (grams)	57	65	63
Calcium (mg)	600	600	500
Iron(mg)	19	28	30

CONCLUSION

Iron deficiency anemia is one of the most prevalent disease of the world with life threatening complications, but is easily curable and preventable. The steps to be taken early at adolescents which includes proper counseling for nutrition intake, if required weekly iron and folic acid supplementation, continuous monitoring of growth. Early detection of anemia during pregnancy, and correct it with iron and folic acid supplements, proper intake of daily nutrients through improving food habits. Early diagnosis of other illness leading to defective absorption of iron and correcting them, if required using parenteral iron supplementation are the keys to reduce morbidity and mortality among maternal and child caused by iron deficiency anemia.

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