Original Research Paper

Clinical Research

ANEMIA IN PREGNANCY AND ITS CONSEQUENCES, AND EFFECT OF MATERNAL EDUCATION.

Dr. Sumeet Goswami*	Department of pathology, L.N.Medical college and research center. *Corresponding Author
Dr. S.G. Gupta	Department of pathology, L.N.Medical college and research center.

ABSTRACT Anemia is not only the most common nutritional deficiency disorder in the world but also the most common nutritional deficiency in pregnancy. India has the highest prevalence of anemia in pregnancy. Although physiological anemia (Normocytic normochromic) due to hemodilution is a natural phenomenon seen in pregnancy but iron deficiency (Microcytic hypochromic) is by far the most important cause worldwide. It has multiple deleterious effects on mother as well as her child. In our study we drew inferences on types of anemia and its causes in pregnancy and their outcome. The complete blood hemogram, Red cell indices and Peripheral smear are routinely available investigations which are valuable in determining the type of anemia, its aetiology, and need of special investigations. Timely applied these parameters can help in early detection and prompt treatment of the condition. Maternal education can bring down the incidence of anemia and low birth weight in fetus.

KEYWORDS : Anemia, Microcytic hypochromic, hemodilution, RBC indices.

INTRODUCTION
Anemia is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs, which vary by age, sex, altitude, smoking, and pregnancy status.[1]

Anemia of pregnancy and puerperium, is defined as hemoglobin concentration of less than the mean minimum acceptable hemoglobin level during pregnancy by WHO criteria is taken to be 11g/dL in the first half of pregnancy and 10.5 g/dL in the second half of pregnancy.[2]

This is a condition in which there is decline in the circulating red blood cell mass, which reduces the capacity to carry oxygen to the vital organs of the mother and fetus.[3]

In India WHO has estimated the prevalence as 65-75%. India has the highest prevalence of anemia. India contributes to about 80% of the maternal deaths due to anemia in South Asia.[4]

The causes of anemia are multiple, but iron deficiency is by far the most important nutritional anemia worldwide.[5] According to the FOGSI – WHO study (2005), anemia is responsible for 64.4% of maternal deaths in India.[6]

The severity of anemia is directly proportional to the increased number of complications in either the mothers or the fetus. The most common being Intrauterine growth retardation, Intrauterine death, congenital malformations, prematurity & neonatal deaths.

Maternal complications range from cardiac failure, pre-eclampsia, accidental hemorrhage, post partum hemorrhage to peuperal sepsis.[7]

Severity of anemia-WHO grading [8]
Moderate 7-10.9gm/dl
Severe 4-6.9gm/dl
Very severe <4gm/dl

Types of Anemia: [9]
Basic criteria of anemia is low hemoglobin values, apart from that anemia is typed according to
1. Picture of blood cells on Peripheral smear.
2. Hematological indices – Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), and Mean Corpuscular Hemoglobin Concentration (MCHC).
3. Other blood values - serum iron, Total iron Binding Capacity (TIBC), serum ferritin, RDW, etc…

According to picture of blood cells of peripheral smear as a result of deficiency state anemia is typed in four main forms.

1. Microcytic hypochromic-low MCV, MCH & MCHC.
2. Megaloblastic (Macrocytic)-raised MCV & MCH.
3. Dimorphic (both Microcytic and Macrocytic population)

4. Normocytic normochromic anemia. Low Hb, MCV, MCH & MCHC are normal.

Methods: Total 400 cases were taken for our study. These cases were in different trimester and of different age groups. Blood sample was collected and inferences were drawn from hemogram, and peripheral blood smears.

special investigations like micronutrient assay (S.iron, S.folic acid & vit B12), ferritin and TIBC were also done where relevant.

TABLE – 1

Distribution of Anemia on basis of morphology

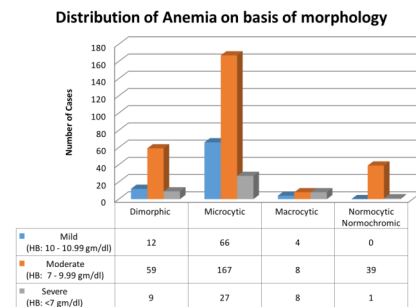|	Dimorphic	Microcytic	Macrocytic	Normocytic Normochromic
Mild (HB: 10 - 10.99 gm/dl)	12	66	4	0
Moderate (HB: 7 - 9.99 gm/dl)	59	167	8	39
Severe (HB: <7 gm/dl)	9	27	8	1

Table 1 is the data for type of anemia seen according to the peripheral blood smear study.

In our study maximum number of cases were seen in Microcytic hypochromic anemia (total 260 cases). Constituting 65% of total cases.

With 80 cases Dimorphic anemia comes in second place (20%), followed by Normocytic normochromic anemia (10%).Macrocytic anemia was least numbered only 20 cases (5%).

TABLE – 2

Distribution of Patients as per Education and severity of Anemia

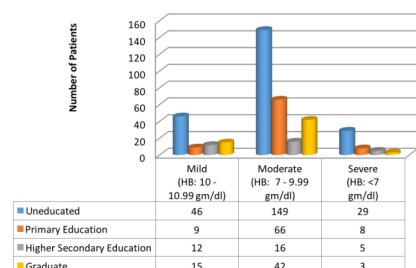|	Mild (HB: 10 - 10.99 gm/dl)	Moderate (HB: 7 - 9.99 gm/dl)	Severe (HB: <7 gm/dl)
Uneducated	46	149	29
Primary Education	9	66	8
Higher Secondary Education	12	16	5
Graduate	15	42	3

Table 2 shows distribution of anemic patients on basis of education they had. Their education was classified in 4 categories according to Indian education system:

The study showed that majority of the anemic women were uneducated. More than half of the anemic patients fall under this category-224 cases (about 56%). Patient who had primary education were next in line with 83 cases (20.75%).

TABLE – 3

Total number of low birth weight according to severity of anemia

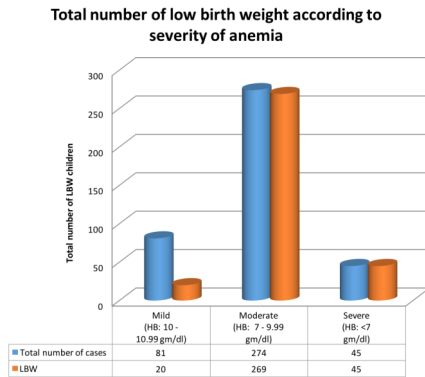|	Mild (HB: 10 - 10.99 gm/dl)	Moderate (HB: 7 - 9.99 gm/dl)	Severe (HB: <7 gm/dl)
Total number of cases	81	274	45
LBW	20	269	45

Table 3 shows outcome of pregnancy of anemic patients in terms of birth weight of child.

Out of 400 deliveries 334 were less than 2.5kg (Low birth weight). Rest 66 deliveries were of normal birth weight.

All Children born of severe anemic mothers were low birth weight (100%). Children born of moderately anemic mother were mostly born of low birth weight (98.18%).

Children born of mild anemic patients were mostly normal, only 24.69% babies were low birth weight.

RESULTS

In our study majority of the cases of anemia were of Microcytic hypochromic anemia, accounting for 65% of all cases. Predominantly nutritional deficiency of iron was the cause (diagnosed by low levels of serum iron and ferritin and high values of total iron binding capacity) because of high demand of iron requirement during pregnancy which fails to meet because of low Iron stores of already iron deficient mother. Iron deficient Indian diet furthermore deteriorates this condition.

Education of women plays an important factor in preventing anemia in pregnancy. In our study we found that most of anemic patients were either uneducated (56%), or had very little education (20.75%). Women who completed graduation or at least had completed their higher education were comparatively less anemic. (Table 2). Less than 12 years of education imposes 2-fold or more risk for anemia.[10]

Women who are illiterate or only had little education were unaware of the complications that were associated with anemia and were ignorant towards their nutritional deficiency due to lack of education.

The prevalence of anemia was least seen in well educated patients thus, confirming that one of the major cause of anemia in pregnancy in India is lack of education.

A positive correlation between Hb level and birth weight was seen in anemic patients (table 3). Anemia would cause the low nutrients and decreased oxygen carried capacity, which cause the placenta oxygen and nutrients cannot meet the need of fetal growth and development, lead to fetal growth restriction.

In addition, Hypoxia caused by Iron deficiency anemia may induces maternal and fetal stress, and the release of the adrenal cortex hormone releasing hormone (CRH), and cause a series of downstream effects, including regulating cell factor inhibits fetal weight gain, stimulating the release of prostaglandin F2a and promote uterine contraction.[11]

Fetus born from anemic mother have higher chance of low birth weight.

CONCLUSIONS

As anemia is multifactorial, so in order to eradicate it we have to fight it in many fronts.

"To fight with the enemy you must know your enemy." So early detection and prompt response should be done. The need for regular blood investigations to check hemoglobin levels should be strictly emphasized.

There is prodigious need for socioeconomic upliftment and education standard improvement. The basic right of education must be provided. A knowledgeable woman is more concerned about health of herself and her baby, and is more careful for her nutrition, and cautious about anemia & its complication in pregnancy.

Children born of anemic mothers are more susceptible for low birth weight. Imparting the nutritional education only can significantly bring down the maternal and fetal mortality and morbidity.

The complete blood hemogram, Red cell indices and Peripheral smear are routinely available investigations which are valuable in determining the morphologic classification of anemia, its aetiology, and need of special investigations like micronutrient assay (S.iron in case of microcytic anemia and S.folic acid & vit B12), ferritin and TIBC. These all are crucial part of diagnosis of a critical curable condition.

Timely applied these parameters not only can help the clinician to treat the disease but also can save millions of lives of mothers and their despair of fetal wastage.

REFERENCES:
1. http://www.who.int/topics/anaemia/en
2. World Health Organization, Prevention and management of severe anaemia in pregnancy. WHO 1993. Page 2.
3. Maternal-Child Nursing-Emily Slone McKinney, Susan R. James-5th edition,2015. chapter 26, page 561
4. Ezzati M, Lopez AD, Rodgers A, Vander Hoorn S, Murray CJ. Selected major risk factors and global and regional burden of disease. Lancet. 2002 Nov 2;360(9343):1347-60.
5. Preventing and controlling iron deficiency anemia through primary health care. E.M. DeMaeyer. 1990. Chapter 2. Page 8.
6. Maternal Mortality in India, Project Report, Dr. Rohit V Bhat, Maternal Mortality Committee, Federation of Obstetric and Gynaecology Societies of India, 1992- 94.
7. K Jagadish, N Asha, D Srinivasa Murthy, and MS Sujata. Maternal Anemia in Various Trimesters and its Effect on Newborn Weight and Maturity: An Observational Study. Int J Prev Med. 2013 feb; 4(2):193-199.
8. WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011 (WHO/NMH/NHD/MNM/11.1) (http://www.who.int/vmnis/indicators/haemoglobin.
9. Anía Lafuente BJ, Fernández-BurrielTercero M, Suárez Almenara JL, Betancort Mastrángelo CC, Guerra Hernández L. Anemia and functional incapacity at admission to a geriatric home. An Med Interna.2001 Jan;18(1):9-12.
10. Scholl TO. Iron status during pregnancy: setting a stage for women and infant. Am J Clin Nutr. 2005 May;81(5):1218S-1222S.
11. Allen LH. Biological mechanisms that might underlie iron's effects on fetal growth and preterm birth. J Nutr. J Nutr. 2001 Feb;131(2S-2):581S-589S.