

# Study Of Hematological Parameters In Pregnancy

Nikita Modh<sup>1</sup>, Sudha Jain<sup>2</sup>, Rina Lathiya<sup>3</sup>

2nd Yr. Resident<sup>1,3</sup>, Associate Professor<sup>2</sup>  
Department of Pathology,  
SMIMER, Surat, (Guj.) , India

**Abstract: Introduction:** The prevalence of anaemia during pregnancy is widely recognized as a major health problem throughout the world, particularly in the developing countries. Anaemia during pregnancy can lead to morbidity and mortality in mother as well as foetus. Anaemia cannot be diagnosed based upon the clinical picture alone and blood test is a definitive evidence of the same. According to the recent standard laid down by 'WHO', anaemia is present when the Haemoglobin (Hb) concentration in the peripheral blood is 11 gm/dl or less. The hematologic status in pregnant women can be evaluated by measuring different blood indices. **Aims and Objectives:** The aim of present study is to determine the effect of pregnancy on haematological parameters, prevalence of anaemia and to grade the severity, type & causal factors of anaemia in pregnant women at tertiary care hospital. **Material and method:** A prospective study was done among the pregnant women attending the Obstetrics and Gynaecology OPD department, SMIMER, Surat during May 2017 to July 2017. Blood samples from all cases were collected and analysed for various haematological parameters on automated cell counter with peripheral smear examination & relevant investigation. **Results:** Out of total 1500 pregnant women 947(63.13%) were anaemic. The age ranged from 19yrs to 38yrs with maximum pregnant women in age group of 20-25yrs, but anaemia among the women <20yrs more(67.76%). Among the anaemic pregnant women MCV, MCH and MCHC were below normal range in 90.28%, 84.26%, 69.58% respectively. 30 cases (3.1%) had MCV above normal range. Among anaemic women malaria & coomb's test was positive in 8(0.84%) patients while sickle cell trait and thalassemia trait seen in 6 (0.63%) & 5(0.52%) patients respectively. **Conclusion:** Haematological Parameter can aid in early recognition of type of anaemia during pregnancy. Although Microcytic hypochromic anaemia is more prevalent in pregnancy still other causes like folic acid deficiency, Malaria, Autoimmune disease and Genetic Hemoglobinopathy may be contributory factor.

**Key words :** Anaemia, Pregnant Women, Haematological Parameters.

## Introduction:

Anaemia is the most common haematological disorder during pregnancy. Women go through a variety of physiological changes during pregnancy. Changes in the blood circulatory system are particularly notable, permitting normal foetal growth. Even in normal pregnant women, the haemoglobin concentration decreases with dilution according to the increase in the volume of circulating blood.<sup>1</sup>

It is defined as decreased haemoglobin level, or circulating red blood cells that leads to a lack of oxygen-carrying ability, causing unusual complications during life time.

WHO estimates that prevalence of anaemia is 14% in developed countries, 51% in developing countries, and 65-75% in India.<sup>2</sup> India contributes to about 80% maternal deaths in South Asia, as estimated by WHO.<sup>3</sup> Prevalence of anaemia in all the groups is higher in India as compared to other developing countries.<sup>2</sup>

A haemoglobin concentration ([Hb]) of < 11.0 g/dl is commonly taken as indicator of anaemia in pregnancy.<sup>4</sup>

- Types of Anaemia (WHO Classification).<sup>4</sup>
- Mild Anaemia: Hb between 10 -10.9 gm/dl
- Moderate Anaemia: Hb between 7.0 -10.0 gm/dl
- Severe Anaemia: Hb <7.0 gm/dl

Physiologic anaemia is well recognized during pregnancy, resulting from an expansion of maternal plasma volume that occurs to a greater degree than the pregnancy-induced expansion of red cell mass. Maternal anaemia can also be present or develop during pregnancy because of deficiencies of essential haematinics such as iron, vitamin B12 and folate. Such pathologic anaemia can adversely affect foetal growth and development and also increases the risk of maternal morbidity and mortality mainly at delivery if postpartum haemorrhage occurs.<sup>5</sup>

There are several types of anaemia, produced by a variety of underlying causes. Anaemia can be classified in a variety of ways, based on the morphology of RBCs,

underlying etiologic mechanisms, and discernible clinical spectra. The diagnosis of anaemia in pregnancy is difficult to establish based on clinical picture alone; yet it is important that treatment should be initiated early because of the high morbidity and mortality associated with anaemia during pregnancy.

**Aims and Objectives:**

The aim of present study is to determine the effect of pregnancy on haematological parameters, prevalence of anaemia and to grade the severity, type & causal factors of anaemia in pregnant women at tertiary care hospital.

**Material And Method:**

A prospective study was done among the pregnant women attending the Obstetrics and Gynaecology OPD department, SMIMER, Surat during May 2016 to July 2017.

**Inclusion Criteria:**

1. Pregnant women in 1st antenatal visit.
2. Pregnant women of any age, religion, caste.
3. Pregnant women of any parity.

**Exclusion Criteria:**

1. Already diagnosed cases of anaemia.
2. Pregnant women on haematinics.

EDTA samples of all pregnant women were collected under sterile aseptic condition and peripheral smears were prepared. All samples were run in Sysmex KX21 three part haematological cell counter. Various haematological parameters were noted including haemoglobin (Hb), RBC count, MCV, MCH, MCHC, RDW, WBC count and Platelet Count.

Peripheral smears were stained with giemsa stain and examined under light microscope.

**Results:**

This study was done on pregnant women attending Obstetrics and Gynaecology dept, SMIMER. Total 1500 women were included in study; out of which 947(63.13%) were anaemic.

**Age wise distribution:**

Out of 1500 pregnant women; 955(63.66%) were of age group of 20-25 yrs followed by 348(23.2%) in 26-30 yrs of age group. Women below age of 20 yrs were 121(8.06%) while in 31-35 yrs of age 50(3.33%) women identified. Only 26(1.73) women were above 35 yrs. In age wise distribution of the anaemic cases 82(67.76%) cases were of <20 yrs of age and 636(66.59%) cases were of 20-25 yrs of age. (Table 2)

**Table 1: Normal value of parameters taken in to consideration**

PARAMETERS	NORMAL VALUE
Haemoglobin concent ration (Hb)	11-16g/dl
Total white blood cells (WBCs) count	4.0 – 10.0×10 <sup>3</sup> /μl
Total red blood cells (RBCs) count	4.0-5.2 million/mm <sup>3</sup>
Total platelet count	150-410×10 <sup>3</sup> /μl
Haematocrit (HCT)	36-49%
MCV	80-100fl
MCH	25-35pg
MCHC	31-37g%

**Table 2: Age wise distribution of Anaemic pregnant women.**

Age group in years	Pregnant women	Anaemic pregnant women	% of anaemic pregnant women from similar age group.
<20	121	82	67.76
20-25	955	636	66.59
26-30	348	205	58.90
31-35	50	18	36
>35	26	6	23.07
Total	1500	947	

**Table 3: Blood Indices wise distribution of the cases**

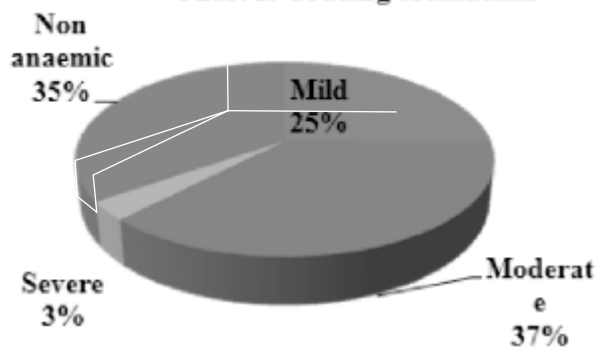
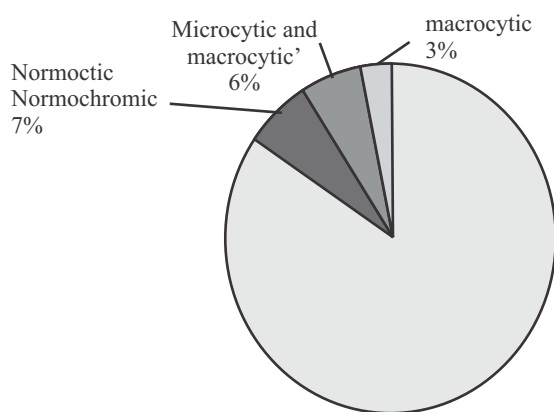
Indices	Below normal range in numbers and % of total anaemic
MCV	855 (90.28%)
MCH	798 (84.27%)
MCHC	659 (69.58%)

**Grading of anemia:**

Among the 947 anaemic pregnant women 553(36.86%) were moderately anaemic while 379(25.26%) were mildly anaemic. The degree of severity was classified on the basis of WHO classification. (Chart 1)

**Blood indices:**

Out of 947 anaemic pregnant women MCV, MCH and

**Chart 1: Grading of Anaemia****Chart 2: Types of anaemia based on peripheral smear examination:**

MCHC were below normal range in 855(90.28%), 798(84.27%) and 659(69.58%) women respectively. 30(3.1%) anaemic women had MCV above normal range. (Table 3)

Out of 947 anaemic pregnant women, Malaria & coomb's test was positive in 8(0.84%) patients while sickle cell trait and thalassemia trait seen in 6 (0.63%) & 5(0.52%) patients respectively.

Anaemia is not a disease but a symptom of any number of disorders. Anemia is the most prevalent hematologic abnormality in pregnancy. Anaemia is reduction in the number or volume of circulating red blood cells (erythrocytes) or an alteration in haemoglobin level. There are many types of anaemia, but many of them are rare. It is associated with significant fetal and maternal morbidity and mortality.

A number of diagnostic tests are currently available in assessing a anaemia in pregnant women e.g.:- haemoglobin concentration (Hb), haematocrit (HCT), blood indices, peripheral blood smear, reticulocyte count also perform some biochemical tests like Vitamin B12 & Serum ferritin which have important diagnostic role.

The present study was carried out on 1500 pregnant women in their first ANC visits. Out of 1500 pregnant women, 947 (63.13%) were anaemic. These findings are similar to the findings documented by National Family Health Survey - 3 (NF HS-III).<sup>6</sup> Singh AB et al (2009) in a study on anemia among pregnant women in Dehradun also reported that prevalence of anemia among pregnant women was 65.5%.<sup>7</sup>

In current study 955 (63.66%) women were of age group of 20-25 yrs and 348(23.2%) were of 26-30 yrs, followed by 121(8.06%) women were of <20 yrs. Though numbers of women in 20-25 yrs were more, percentage of anaemic women was more in <20 yrs of age; that was 82(67.76%) women out of 121, indicating lower age groups are higher risk of anaemia. In the study of Sharda Patra et al, the mean age of the women with severe anaemia was 27.5 ± 4.5 years. The majority were of age between 20 and 24 in their study. A significant number (12%) were teenagers. Half of the study population had been younger than 18 when they married.<sup>8</sup>

In present study 36.86% pregnant women were moderately anaemic while 25.26% were mildly anaemic. Severely anaemic women were 3.06%. Umesh Kapil et al, found that 78.8% pregnant women were suffering from anaemia as defined by their haemoglobin levels. The percentages of mild, moderate and severe anaemia in pregnant women were 29%, 48%, and 2%, respectively.<sup>9</sup> If we look for the blood indices; MCV, MCH and MCHC were below normal range in 855(90.28%), 798(84.27%) and 659(69.58%) women respectively. 30(3.1%) anaemic women had MCV above normal range. This is similar to the study by Amar R Shah et al, having low MCV value was reported in 37(72.6%) women; MCH was below normal range in 36(70.6%) while MCHC was below normal level in 29(58.9%) pregnant women.<sup>10</sup>

The highest percentage of types of anaemia revealed by this study is microcytic & hypochromic anaemia (84%). These types of anaemia were identified depending on the morphology of cells in peripheral smear and blood indices which in most cases is iron deficiency anaemia. WHO data indicates that iron deficiency anaemia is a significant problem throughout the world ranging from 1% (average of 14%) in the industrialized countries to an average of 56% (ranging from 35-75%) in developing countries. The study also showed that the occurrence of another type of anaemia among pregnant women, but to a lesser extent is macrocytic anaemia or megaloblastic anaemia (3%). The iron deficiency is not the only reason in cases of anaemia, but there is food and other essential materials which contribute to the process of red blood cell formation, including vitamin B12 and folic acid.

### Conclusion:

Anaemia continues to be a serious health problem in India where the life of pregnant women and her child are endangered. Haematological Parameter can aid in early recognition of type of anaemia during pregnancy. Although Microcytic hypochromic anaemia is more prevalent in pregnancy still other causes like folic acid deficiency, Malaria, Autoimmune disease and Genetic Hemoglobinopathy may be contributory factor.

### References:

1. An Overview of Anemia in Pregnancy Shaikh Sabina\*1, Syed Iftuqar1, Zahid Zaheer1, Mohd. Mukhtar Khan1, Sarfraz Khan1,1Dr. Rafiq Zakaria Campus, Y.B. Chavan College of Pharmacy, Aurangabad, Maharashtra, India; Journal of Innovations in Pharmaceuticals and Biological Sciences; page no.144.
2. De Mayor EM, Tegman A, Prevalence of Anaemia in the world, world Health Organisation 1998;38:302-16.
3. Kalaivani K. Prevalence and consequences of anaemia in pregnancy. Indian J.Med Res. 2009;627-33.
4. Nutritional anaemias . Report of a WHO Group of Experts. Geneva, World Health Organization, 1972 (WHO Technical Report Series, No. 503).
5. Singh P, Singh S, Topesh. Hematological parameters in anaemic pregnant women attending the antenatal clinic of tertiary care hospital. Int J Res Health Sci [Internet]. 2014 Oct 31; 2(4):981-6.
6. Ministry of Health and Family Welfare Government of India. National Family Health Survey (NFHS-3) 2005 - 2006 . Available from URL : [http://pdf.usaid.gov/pdf\\_docs/PNADK385.pdf](http://pdf.usaid.gov/pdf_docs/PNADK385.pdf). Accessed on Feb 9th 2016.
7. Singh A.B, Kandpal S.D, Chandra R, Srivastava V.K, Negi K.S. Anemia Amongst Pregnant And Lactating Women in District Dehradun. IndianJ.Prev.Soc.Med 2009;1:19-22.
8. Sharda Patra, Manju Puri, S S Trivedi, Shikha Pasrija; Clinical profile of women with severe anaemia in the thirh trimester of pregnancy Trop Doct April 2010 vol.40 no.2 85-86.
9. Umesh Kapil, P. Pathak, M. Tandon, C. Singh, R. Pradhan and S.N. Dwivedi; Micronutrient deficiency

disorders amongst pregnant women in three urban slum communities of Delhi January 28, 1999; Revision accepted: May 4, 1999.

10. Hematological parameters in anaemic pregnant women attending the antenatal clinic of rural teaching hospital; Amar R Shah\*, Neha D Patel, Menka H Shah Department of Pathology, Pramukhswami Medical College, Karamsad, Anand, Gujarat, India. Innovative Journal of Medical and Health Science 2: 5 Sep - Oct (2012) 70 - 73.

### Corresponding Author:

**Dr. Sudha Jain**  
8A, Tower-4,  
Meghsarman Complex,  
City Light Road,  
Surat (Gujarat)

