# HEMATOLOGICAL PARAMETERS IN PREGNANT WOMEN WITH SPECIAL REFRENCE TO IRON

**Abstract:**

Several biological factors, particularly haematological, are physiologically altered during normal pregnancy. Biologists and doctors who are aware of these changes in the maternal body can screen for potential abnormalities. The aim of this research is to find healthy pregnant women's reference values. This was a cross-sectional research of pregnant women who attended an antenatal clinic at Sree Balaji Medical College, with anaemic and non-anemic pregnant women. Pregnant women were categorized into three groups -Group I - First Trimester (50 cases); Group II - Second Trimester (50 cases) and Group III - Third Trimester (72 cases) while non- pregnant women formed the fourth group (30 cases).

Comment [TJ1]: Abstract seems to be too short, there is no mention of methodology, results and conclusions.

**Keywords:** Haematological, Pregnant women, anemic.

## INTRODUCTION

Pregnancy represents a period of stress with excessive demands of nutrients not only for the mother but also for the offspring which reflects in the hematological parameters. Pregnancy causes a state of hydraemic plethora [1]. There 1s disproportionate increase of plasma volume during pregnancy leading to apparent reduction of erythrocyte, hemoglobin and hematocrit value. This disproportionate expansion of plasma volume and red cell mass resulting in hemodilution has been, perhaps wrongly termed as physiological anemia in pregnancy [2].

Comment [TJ2]: Grammatical mistake

Comment [TJ3]: Rephrase sentence

Comment [TJ4]: Duplication of same word in consecutive sentences

There are insufficient data to give physiological limits for the expected dilution. Most iron transfer to the fetus occurs after thirty weeks of gestation and relates to the increased maternal absorption which is regulated by the placenta. Thus the pregnancy induced hemodynamic change alters the physiologic state sufficiently to obviate the general rules [3].

Comment [TJ5]: Rephrase sentence

The mean minimum normal hemoglobin in healthy pregnant women fs between 11 and 12 g/dl. World Health Organization (WHO) definesanemia in pregnancy as hemoglobin less than 11.0 g/dl and graded the degree of anemia is to mild (9.0 -11.0 g/dl), moderate (7.0 - 9.0 g/dl) and severe (< 7.0 g/dl)[4,5].

Comment [TJ6]: Both the sentences need rephrasing

Comment [TJ7]: Spelling mistake

Comment [TJ8]: ??

Comment [TJ9]: References inappropriate

## MATERIALS AND METHODS

A total number of 202 cases attending the Sree Balaji Medical College and Hospital, during the period of July 2009 to August 2011 were included in the present study. Pregnant women were randomly selected and grouped accordingly into three groups -1 Trimester (50 cases), II Trimester (50 cases) and III Trimester (72 cases). Blood samples from 30 normal healthy (non pregnant and non lactating) women were also included **(IV Group))**

**Comment [TJ10]:** Shouldn't it be used as control group instead of 4th?

All samples were analyzed for hematological parameters (Erythrocyte Count, Hemoglobin, Hematocrit, Mean Corpuscular Volume, Mean Corpuscular Hemoglobin, Mean Corpuscular Hemoglobin concentration, Red Cell Distribution Width, Leukocyte count and Platelet count). Among the above-mentioned cases, randomly selected 22 women in third trimester were analyzed for iron profile studies (Serum Iron, Total Iron Binding Capacity,% Saturation and Serum Ferritin).

**Comment [TJ11]:** Why only 22 anemic patients underwent iron profile and not all of them

The clinical history with special reference to anemia, use of drugs, iron intake and investigation reports were tabulated as per the proforma.

**Comment [TJ12]:** How the proforma was prepared give reference of the articles which helped in preparing this proforma

ANEMIA - CRITERIA FOR DIAGNOSIS

Anemia was defined using the WHO criteria for anemia m pregnancy as well for non-pregnant women. With these criteria the hemoglobin cutoff used to define anemia during pregnancy was l lg/dl and for non-pregnant women was 12 g/dl. The corresponding cutoff for hematocrit was 33% and 36% for pregnant and non-pregnant women respectively [6].

**Comment [TJ13]:** Reference?

**Comment [TJ14]:** Inappropriate reference

All the patients included under the study first underwent the preliminary workup according to the profonna already made.

**Comment [TJ15]:** Rephrase sentence

SAMPLE COLLECTION FOR HEMATOLOGICAL PARAMETERS

Blood was withdrawn from an ante cubital vein by means of dry sterile 5 ml, disposable plastic syringe with a needle of 20 gauge after preparing the cubital fossa with a sterile swab. Two ml of blood was withdrawn slowly. Immediately blood is

transferred to sterile glass bottle with di-potassium EDTA as anticoagulant and was analyzed in an automated cell counter[7-10].

Comment [TJ16]: ???

Comment [TJ17]: Reference 7 is inappropriate here.

Comment [TJ18]: At which temperature the samples were kept and how much time delay was observe
Reticulocyte count & Differential counting was not carried out. But why???

SAMPLE COLLECTION FOR IRON PROFILE STUDIES

Blood was withdrawn in a sterile condition as mentioned above, immediately blood is transferred to two sterile glass bottles, one with di-potassium EDTA as anticoagulant and another bottle without anticoagulant. Blood in the anticoagulant bottle was taken for the automated cell counter analysis. The blood in the bottle without anticoagulant was allowed to clot without disturbances for 30 - 60 mints at room temperature. Once the stable clot was formed, the serum separates out. The serum was taken through long Pasteur pipette and centrifuged at 3000 RPM for 10 mints and the supernatant was taken into a sterile plastic radioimmunoassay tube and stored at - 20 degree.

**STATISTICAL ANALYSIS**

All the data of the case details, investigation parameters entered routinely on the Microsoft Office - Excel 2003 edition for data management.

Standard software has been used for the application of one-way analysis variant method to compare the four groups on the selected parameters. The results are signi ficant, Bonferroni multiple comparison test has been applied on which group statistical significance has occurred. Pearson correlation coefficient method has been applied to-find out the relationship between the selected parameters

Comment [TJ19]: Which software?

Comment [TJ20]: ?

**RESULTS**

Hematological parameters in 172 pregnant and 30 non-pregnant women were evaluated in the present study. Pregnant women were categorized into three groups -Group I - First Trimester (50 cases); Group II - Second Trimester (50 cases) and Group III - Third Trimester (72 cases) while non- pregnant women formed the fourth group (30 cases). [Ref Table: I/Chart: 1]

*Groups in tlte present study (Table: 1)*

Comment [TJ21]: ?

| GROUPS | NUMBER OF CASES |
|---|---|

| | |
|---|---|
| Group 1: I Trimester (0-12 Weeks) | 50 |
| Group 2: II Trimester (13 - 28 Weeks) | 50 |
| Group 3: III Trimester (2'.:29 Weeks) | 72 |
| Group 4: Non – Pregnant | 30 |

In the present study, the age of the pregnant and non-pregna nt women varies from 20 to 27 years. The majority of the pregnant women (73.8%) and non-pregnant women (83.3%) were below 25 years. [Ref Table: 2/ Chart: 2]

*Age Incidence (Table: 2)*

| AGE Years | GROUP ! | GROUP II | GROUP III | GROUP IV | TOTAL |
|---|---|---|---|---|---|
| <25 | 40(80%) | 40(80%) | 47(65.3%) | 25(83.3%) | 152(75.3%) |
| 2:25 | 10(20%) | 10(20%) | 25(34.7%) | 05(16.7%) | 50(24.7%) |

Comment [TJ22]: ?

Comment [TJ23]: Mark this group as control

In the present study, 77/172 cases (44.8%) were primigravida, among them 20 (40%), 23 (46%) and 34 (47.2%) women were in I II and III groups respectively. 95/172 cases (55.2%) were multigravida, among them 30 (60%), 27 (54%) and 38 (52.8%) women were in I, II and III groups respectively. [Ref Table: 3/ Chart: 3]

Gravida Status in Pregnant women (Table: 3)

| GRAVIDA | GROUPI | GROUP II | GROUP III | TOTAL |
|---|---|---|---|---|
| PRIMIGRA VIDA | 20 (40%) | 23 (46%) | 34(47.2%) | 77(44.8%) |
| MULTIGRAVIDA | 30 (60%) | 27 (54%) | 38(52.8%) | 95(55.2%) |

**RED BLOOD CELL COUNT (RBC):**

In the present study, 51/172 (29.7%) pregnant women had RBC count less than 3.6 millions per cu.mm, 66/172 (38.3%) pregnant women had RBC count within 3.6 to 4.2 millions per cu.mm and 55/172 (32%) pregnant women had more than 4.2 millions per cu.mm.

In non-pregnant women, 06 (20%) had RBC count less than 3.6 millions per cu.mm, 06 (20%) had RBC count within 3.6 to 4.2 millions per cu.mm and 18 (60%) had RBC count more than 4.2 millions per cu.mm . [Ref Table: 4/ Chart: 4]

***RBC Count in the study groups (Table: 4)***

| RBCCOUNT (millions/cu.mm) | GROUP I | GROUP II | GROUP III | GROUP IV | TOTAL |
|---|---|---|---|---|---|
| <3.6 | 15 (30%) | 07 (14%) | 29 (40.3%) | 06(20%3 | 57(28.3%) |
| 3.6 -4.2 | 21 (42%) | 22 (44%) | 23(31.9%) | 06(20%) | 72 (35.6%) |
| 4.2 - 4.5 | 14 (28%) | 21 (42%) | 20 (27.8%) | 18(60%) | 73(36.1%) |

HEMATOCRIT (HCT):

In the present study the hematocrit was less than 33% in majority of the pregnant women (119/172 cases - 69.2%).

In non-pregnant women majority of them had hematocrit more than 33% (63.3%) and 36.7% of them had hematocrit less than 33%. [Ref Table: 5/ Chart: 5] *(Individual values in all groups Ref Graph: 2)*

*HCTvalues in the study groups (Table: 5)*

| HEMATOCRIT (%) | GROUP I | GROUP II | GROUP m | GROUP IV | TOTAL |
|---|---|---|---|---|---|
| <33.0 | 42 (84%) | 39 (78%) | 38(52.8%) | 11(36.7%) | 130(64.4%) |
| 33.0 - 36.0 | 08 (16%) | 11(22%) | 34 (47.2%) | 19(63.3%) | 72 (35.6%) |

HEMOGLOBIN (HgB):

In the present study hemoglobin of the pregnant women was < 11.0 g/dl in 139/172 cases (80.8%) and it was above 11.0 g/dl in 33/172 cases (19.2%). All the non-pregnant women had hemoglobin more than 12.0 g/dl.

Among the pregnant women mild degree of anemia (9.0 to 11.0 g/dl) seen in 47.1% of cases , moderate degree of anemia (7.0 to 9.0 g/dl) seen in 26.7% of cases and 7% of cases were severely anemic (:S 7.0). [Ref Table: 6/ Chart: 6]

*(Individual values in all groups Ref Graph: 3)*

***HgB values in the study groups (Table: 6)***

| HEMOGLOBIN (g/dl) | GROUPI | GROUP II | GROUP III | TOTAL |
|---|---|---|---|---|
| 11.0 | 03(6%) | 08 (16%) | 22 (30.6%) | 33 (19.2%) |
| 9.0 -< 11.0 *(MILD)* | 22 (44%) | 29 (58%) | 30(41.7%) | 81 (47.1%) |
| 7.0- <9.0 *(MODERATE )* | 16 (32%) | 13 (26%) | 17(23.6%) | 46 (26.7%) |
| 7.*0 (SEVERE)* | 09(18%) | - | 03 (4.1%) | 12 (7%) |

MEAN COPUSCULAR VOLUME (MCV):

In the present study, among pregnant women 99/172 (57.6%) had MCV below 80 fl, 68/172 (39.5%) had MCV within the normal range (80 - 100 fl) and 5/172 (2.9%) had MCV more than 100 fl. In non-pregnant women, 20 (66.8%) had MCV below 80 fl and 10 (33.3%) had MCV within normal range. [Ref Table: 7/ Chart: 7]

*(Individual values in all groups Ref Graph: 4)* ***MCV values in the studygroups (Table: 7)***

| MCV (fl) | GROUP I | GROUP II | GROUP ill | GROUP IV | TOTAL |
|---|---|---|---|---|---|
| < 80.0 | 34 (68%) | 37 (74%) | 28 (38.8%) | 20 (66.7%) | 119(58.9%) |
| 80.0 -100.0 | 16 (32%) | 13 (26%) | 39(54.2%) | 10(33.3%) | 78 (38.6%)) |
| > 100.0 | - | -- | 05 (7%) | - | 05 (2.5%) |

**Comment [TJ24]:** <80 grouping is not appropriate in a country where Thalassemia and other hemoglobinopathies are very common, there the grouping should include <60 and so on.

MEAN COPUSCULAR HEMOGLOBIN (MCH):

In the present study, 80/172 (46.5%) pregnant women had MCH below 25.9 ng, 91/172 (52.9%) had MCH within the normal range (26.0 - 34.9 ng) and 01/172 (0.6%) had MCH more than 35.0 ng. In non-pregnant women, 10 (33.3%) had MCH less than 25.9 ng, 12 (40%) had MCH within normal range and 08 (26.7%) had MCH more than 35.0 ng. [Ref Table: 8/ Chart: 8]

***MCH Values in the study groups (Table: 8)***

| MCH (fig) | GROUPI | GROUP II | GROUP III | GROUPIV | TOTAL |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| <25.9 | 27 (54%) | 24 (48%) | 29(40.3%) | 10(33.3%) | 90 (44.6%) |
| 26.0-34.9 | 22 (44%) | 26 (52%) | 43 (59.7%) | 12 (40%) | 103 (51%) |
| >35.0 | 01 (2%) | ~ | ~ | 08 (26.7%) | 09(4:4%) |

MEAN COPUSCULAR HEMOGLOBIN CONCENTRATION (MCHC):

In the present study, 84/172 (48.8%) pregnant women had MCHC below 30.9 g/dl, 84/172 (48.8%) had MCHC within the normal range (31.0 - 36.0 g/dl) and 04/172 (2.4%) had MCHC more than 36.1 g/dl. In non- pregnant women, 18 (60%) had MCHC within normal range and 12 (40%) had MCHC more than 36.1 g/dl. [Ref Table: 9/ Chart: 9]

| MCHC (g/dl) | GROUPI | GROUP II | GROUP III | GROUP IV | TOTAL |
|---|---|---|---|---|---|
| 30.9 | 19(38%) | 12(24%) | 53(73.6%) | -- | 84(41.6%) |
| 31.0-36.0 | 30(60%) | 38(76%) | 16(22.2%) | 18(60%) | 102(50.5%) |
| 2:36.1 | 01(2%) | - | 03(4.2%) | 12(40%) | 16(7.9%) |

Table 8: RED CELL DISTRIBUTION WIDTH (RDW);

In the present study, 33/172 (19.2%) pregnant women had RDW within the normal range (10.0 -16.0 %), 139/172 (80.8%) had RDW more than 16.0%.

In non-pregnant women, 17 (56.7%) had RDW within normal rangeand 13 (43.3%) had RDW more than 16.0%. [Ref Table: 10/ Chart: 10]

**RDWvalues in the study groups (Table: 10)**

| RDW(%) | GROUP I | GROUP II | GROUP III | GROUP IV | TOTAL |
|---|---|---|---|---|---|
| 10.0 - 16.0 | 13(26%) | 12(24%) | 08(11.1%) | 17(56.7 %) | 50(24.8 %) |
| >16.0 | 37(74%) | 38(76%) | 64(88.9%) | 13(43.3%) | 152(75.2 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | %) |

Discussion, conclusion etc

Comment [TJ25]: Where is discussion and conclusion

**REFERENCE**

Comment [TJ26]: Most of the references are 8-10 years old. New references must be coated


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