

Relevancy of Basic Hematological Parameters in the Prognostic Evaluation of 80 Pregnant Women in SDH and B.C. Roy Hospital: An Observational Study

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Article Received:12-03-2025

Article Accepted:29-04-2025

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ABSTRACT

Background: Anemia during pregnancy remains a significant public health challenge, particularly in developing and semi-urban regions, where it poses substantial risks to both maternal and fetal outcomes. Iron deficiency is the most prevalent cause, often leading to microcytic hypochromic anemia.

Objective: This study aimed to evaluate the prognostic relevance of basic hematological and biochemical parameters in diagnosing and classifying anemia among pregnant women attending antenatal clinics at Sub-Divisional Hospital (SDH) and B.C. Roy Hospital in West Bengal, India.

Methods: A cross-sectional observational study was conducted from January to June 2024 involving 80 pregnant women aged 18–35 years in their second trimester. Hematological indices such as Hemoglobin (Hb), Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), and biochemical markers including Serum Ferritin and Total Iron Binding Capacity (TIBC) were analyzed. Data were assessed using SPSS v25, with significance set at $p < 0.05$.

Results: Over 75% of participants were found to be anemic, with mild anemia (37.5%) being most common, followed by moderate (31.2%) and severe (6.2%) anemia. The majority showed microcytic hypochromic profiles, and serum ferritin levels were below 15 ng/mL in 52 women, indicating iron deficiency. TIBC levels were inversely related to serum ferritin, further supporting this diagnosis.

Conclusion: Basic hematological and biochemical parameters are effective tools in the early detection and classification of anemia in pregnancy. Their integration into routine antenatal care, particularly in resource-limited settings, can significantly improve maternal health outcomes.

Keywords: Hematological Parameters, Pregnancy, Prognosis, Maternal Health

INTRODUCTION

Anemia during pregnancy is a common clinical condition worldwide, especially in developing and semi-urban regions, posing substantial risks to both maternal and fetal health. According to the World Health Organization (WHO), anemia affects approximately 40% of pregnant women globally, with iron deficiency being the most common cause¹. In India, despite various national health programs, iron-deficiency anemia continues to contribute significantly to maternal morbidity and mortality².

Hematological indices, such as Hemoglobin (Hb), Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), and Mean Corpuscular Hemoglobin Concentration (MCHC), are standard components of antenatal screening³. In addition, iron profile markers—namely Serum Ferritin and Total Iron Binding Capacity (TIBC)—are crucial in evaluating iron storage and transport mechanisms, offering prognostic insights in early diagnosis and therapeutic interventions⁴.

This observational study aims to analyze the prognostic relevance of these hematological and biochemical parameters in a cohort of 80 pregnant women attending antenatal clinics at SDH and B.C. Roy Hospital.

MATERIALS AND METHODS

This observational cross-sectional study was conducted at Sub-Divisional Hospital (SDH) and B.C. Roy Hospital (BCRHH), both semi-urban tertiary healthcare institutions catering to a large antenatal population in West Bengal, India. The study was carried out over a 6-month period from January 2024 to June 2024.

A total of 80 pregnant women, aged between 18 and 35 years, attending routine antenatal check-ups at the aforementioned centers were enrolled after obtaining informed consent.

Inclusion criteria included second trimester pregnancy, singleton gestation, and absence of known chronic illness. Exclusion criteria included multiple gestation, known hemoglobinopathies, and chronic systemic diseases.

5 mL of venous blood was collected from each participant. Hematological parameters were analyzed using a Sysmex XN-330 analyzer. Serum Ferritin and TIBC were estimated using chemiluminescence and colorimetry, respectively. Data were analyzed using SPSS v25, with significance set at $p < 0.05$.

RESULTS

A total of 80 pregnant women participated in the study. The mean age was 25.6 ± 4.2 years.

Parameter	Mean $\pm$ SD	Reference Range
Hemoglobin (g/dL)	10.3 ± 1.6	11.0 – 14.0
PCV (%)	31.2 ± 4.3	33 – 45
MCV (fL)	76.5 ± 9.1	80 – 96
MCH (pg)	25.3 ± 2.5	27 – 32
MCHC (g/dL)	30.1 ± 1.9	32 – 36
Serum Ferritin (ng/mL)	18.4 ± 6.5	15 – 150
TIBC (μ g/dL)	368 ± 42	240 – 450

Figure 1: Distribution of Anemia Severity Among Study Population

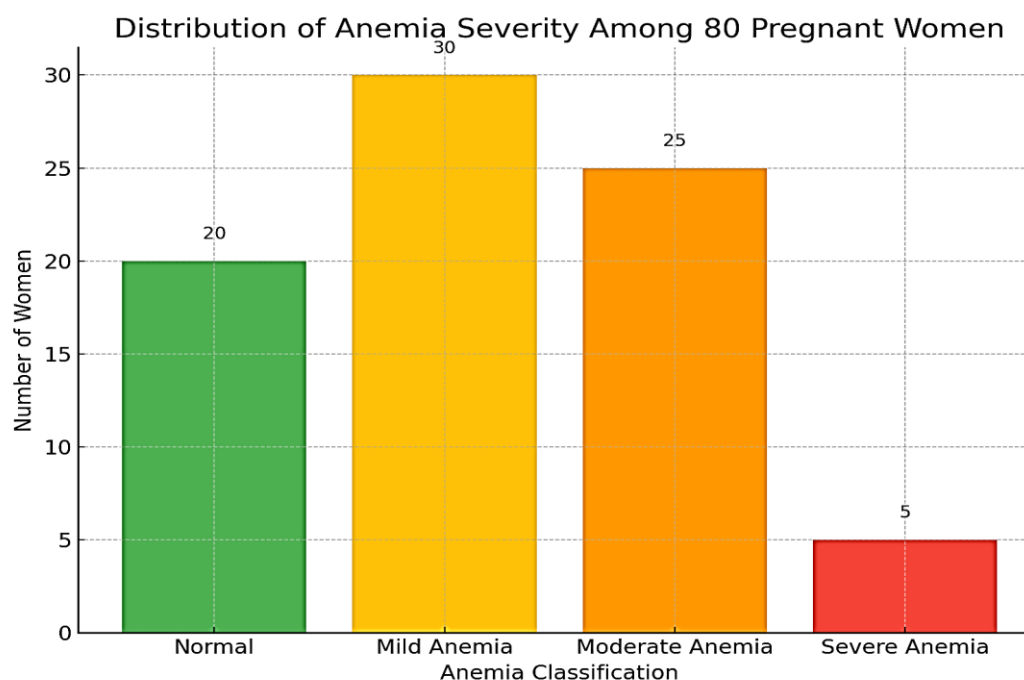
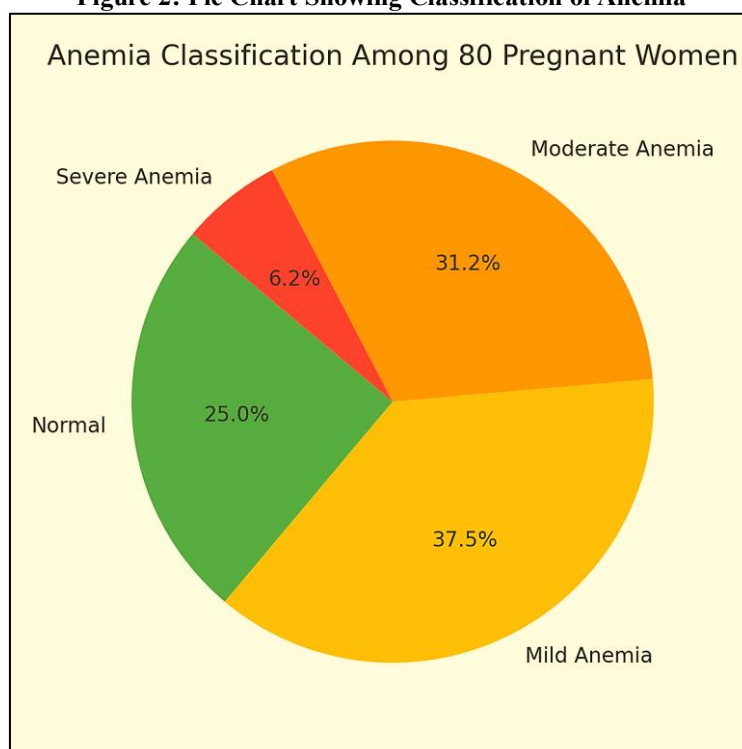


Figure 2: Pie Chart Showing Classification of Anemia



DISCUSSION

Anemia in pregnancy is a preventable but prevalent complication. Over 75% of participants in our study had some form of anemia. The majority presented with microcytic hypochromic indices, consistent with iron deficiency anemia. Reduced serum ferritin (<15 ng/mL) in 52 cases highlighted iron deficiency as the leading cause. TIBC was inversely correlated with ferritin, reinforcing this diagnosis.

The findings are consistent with NFHS-5 data and prior research. Serum ferritin remains a powerful tool in antenatal screening. This study validates the integration of hematological and iron markers into routine pregnancy care, especially in resource-limited settings.

CONCLUSION

Basic hematological and biochemical markers such as Hb, PCV, MCV, MCH, MCHC, Serum Ferritin, and TIBC are effective in the early identification and prognosis of anemia in pregnancy. Their routine use can improve outcomes in semi-urban and rural healthcare settings.

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