

# ANEMIA IN PREGNANCY: A PROSPECTIVE STUDY OF 1781 CASES IN WESTERN INDIA

Amit Agravat<sup>1</sup>, Krupal Pujara<sup>2</sup>, Gauravi Dhruva<sup>3</sup>, Vikas Chauhan<sup>4</sup>

<sup>1</sup>Professor, Department of Pathology, PDU Medical College and Hospital, Rajkot, India.

<sup>2</sup>Assistant Professor, Department of Pathology, PDU Medical College and Hospital, Rajkot, India.

<sup>3</sup>Professor and Head, Department of Pathology, PDU Medical College and Hospital, Rajkot, India.

<sup>4</sup>2<sup>nd</sup> year Resident, Department of Pathology, PDU Medical College and Hospital, Rajkot, India.

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## Corresponding Author:

Dr Vikas Chauhan, 2<sup>nd</sup> year Resident, Department of Pathology, PDU Medical College and Hospital, Rajkot, India.

Email:[vikaschauhan9586@gmail.com](mailto:vikaschauhan9586@gmail.com)

## Abstract

**Background:** Anemia during pregnancy is a common condition where there is a decrease in the number of red blood cells or hemoglobin in the blood. Most common hematologic abnormality in pregnancy is anemia. This can occur due to a variety of factors, including increased blood volume during pregnancy, inadequate intake of iron and other nutrients, or conditions such as iron deficiency anemia or Vitamin B12 deficiency mainly. **Material and Methods:** A prospective study was conducted among 1781 pregnant women who attended antenatal clinic between March 2023 to February 2024 in a tertiary care hospital at whose blood samples and socio-demographic information were collected. Hemoglobin concentration, blood indices, WBC & RBC counts were determined by automated hematology cell counter. Grading was done according to WHO criteria and morphological typing was done on the basis of peripheral blood smear examination. **Result:** A high prevalence (86%) of anemia was observed among 1781 pregnant women commonly seen in younger age group (20-30 years). Factors such as age at marriage, age at first childbirth, gravida, residence and socioeconomic status were found to be significant. According to blood indices and peripheral blood smear analysis hypochromic microcytic anemia (50.2 %) was the commonest morphological type of anemia followed by normochromic normocytic anemia (35.2 %). Iron deficiency anemia was the most common cause of anemia during pregnancy. **Conclusion:** The present study concluded that a well-balanced diet rich in iron, vitamins, and minerals along with regular prenatal check-ups should be implemented to reduce the prevalence of anemia.

**Keywords:** Anemia, Pregnancy, Iron Deficiency

## Introduction

Anemia is characterized by a deficiency of red blood cells or hemoglobin in the blood, leading to decreased oxygen-carrying capacity. Hemoglobin is measured in grams per liter or grams per deciliter. Anemia can occur in any population but pregnant women and children are common victims of this hematologic abnormality. Anemia in pregnancy has serious maternal and fetal complications, which might lead to maternal mortality. The major causes of anemia in pregnancy are nutritional deficiencies (iron, vitamin B12, and folate), parasitic infections and acute blood loss. Many studies have reported that the commonest cause of anemia in pregnancy is due to iron deficiency, especially in low- and middle-income countries, where it is attributed to poverty and malnutrition.

## Materials and Methods

The present study was carried out in the Central Clinical Laboratory (CCL), P.D.U Medical College and Hospital, Rajkot carried out over a period of 1 year between March 2023 to February 2024 which is a tertiary care hospital in western India. **Sample size:** A prospective study of 1781 pregnant women attending antenatal clinic in a tertiary care hospital. **Inclusion criteria:** Pregnant women age  $\geq 18$  years attending ANC (antenatal care) clinic in first trimester. **Exclusion criteria:** Diagnosed cases of anemia on treatment, history of recent blood transfusion. The clinical details were obtained from Central Laboratory requisition forms accompanying the blood samples. The detailed history, clinical and physical examination and hematological investigations were performed. The socioeconomic status of the patient was calculated by using Revised Modified BG Prasad socioeconomic classification scale, 2016. A total of 1781 random cases were studied. Blood counts were done by a 5part BC-6200 - Automated Hematology cell counter. Followed by peripheral smear examination. Differential count and red cell morphology were done manually by staining the blood smears with Field's and Leishman's stain. Following Investigations Were Carried Out: Hemoglobin, RBC count, WBC count, Platelet count, Hematocrit, Red cell indices, RDW, Peripheral blood smear examination, Reticulocyte count.

## Results

Out of total 1781 Pregnant women, 1549 were anemic and 232 Non-anemic. The most common affected age group was 21-30 years in both anemic (79.8%) and non-anemic (81.8%). The maximum pregnant women (1424) at the time of marriage were in the age group of 20-30 years

Category. The peripheral blood smear examination showed hypochromic microcytic picture in 50.2% cases followed by Normocytic Normochromic in 35.2% cases.

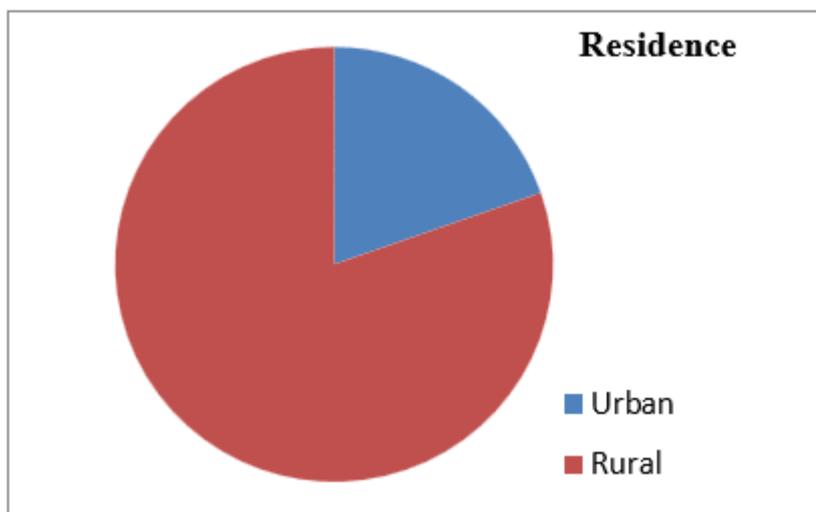
**Table1:Prevalence/Incidenceofanemicandnon-anemicpregnantwomenaccordingtoagegroups.**

Agegroup(Year s)	Anemic	Non-anemic	Total
18-20	45(2.9%)	10(4.3 %)	55
21-30	1234(79.8)	190(81.8%)	1424
31-40	258(16.6)	28(12.1%)	286
41-50	12(0.7%)	4(1.8%)	16
<b>Total</b>	<b>1549 (100 %)</b>	<b>232(100%)</b>	<b>1781</b>

**Table 2: Distribution of anemic pregnant women according to gravid status**

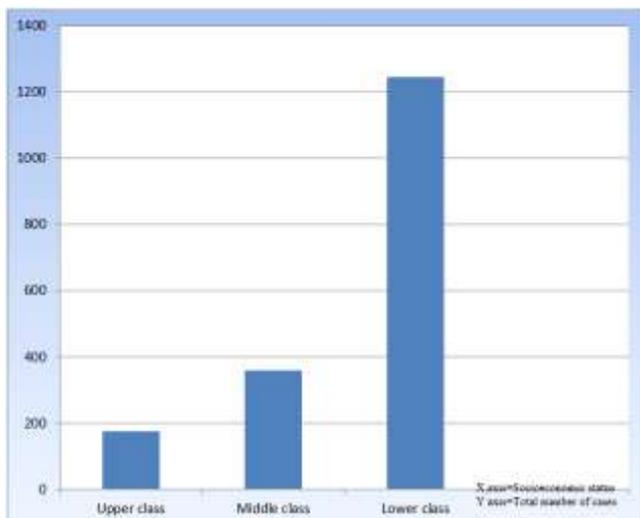
Numberofpregnantwomen	
Primigravida	Multigravida
755	1026

Out of the total 1781 anemic cases, 755 are of primigravida and 1026 are of multigravida.



**Figure 1: Distribution of anemic pregnant women according to residence**

1431 cases (80.3 %) cases were of rural population while 350 cases (19.7 %) were of urban population out of the total 1781 anemic cases.



**Figure 2: Socioeconomic status in antenatal women**

Lower class were the most anemic group among all having percentage of 69.9 % ( 1245 cases) followed by middle class 20.2% (359 cases) and upper class 9.9% (177 cases).

**Table 3: Red cell morphology on peripheral blood smear of anemic pregnant women.**

RBC morphology on peripheral blood smear	Number of pregnant women	Percentage
Normocytic Normochromic (NN)	628	35.2%
Microcytic Hypochromic (MH)	895	50.2%
Macrocytic (Mac)	26	1.6%
Non-anemic	232	13.0%
<b>Total</b>	<b>1781</b>	<b>100%</b>

The commonest red cell morphology on peripheral blood smear was Microcytic Hypochromic changes in RBC (50.2%) (Table 3).

**Discussion**

Anemia is one of the major and important health problems among pregnant women. It affects 25-50% of the population of the world. Anemia before and during pregnancy can influence maternal health as well as child's health [29]. The diagnosis of anemia during is important because it helps to carry out an intervention at an early stage so complications of anemia can be prevented thus reducing maternal and perinatal mortality. The present study included 1781 pregnant women in their first trimester. The main aim was to assess the prevalence /incidence of anemia in pregnant women. In India the prevalence of anemia in women with pregnancy is about 65-75% [19].

In the present study according to hemoglobin level of 1781 pregnant women who were randomly selected, 87% pregnant women were anemic and 13% non-anemic. The prevalence rate (87%) of anemia in the present study was similar to the study conducted by Lokareet al.[5] in 2012. The prevalence of anemia in the present study was closer to the studies done by Vivekiet al.[6] and Somen Saha[36] which was 82.9% and 72.9% respectively (Table

5).The factors contributing to high prevalence of anemia can be low dietary iron and folic acid or chronic blood loss due to infections. In India, the other factors leading to high prevalence of anemia in pregnancy includes, less birth spacing, multiple pregnancies, early marriage phytate rich Indian diet and worm infestations [29, 30].

**Table 4: Comparison of prevalence rate of anemia in different studies.**

Authors	Country	Year	Number of cases	Prevalence Rate
Somen Saha[36]	Gujarat(India)	2022	1185	72.92
Lokareet <i>al.</i> [5]	India	2012	352	87.2%
Gedefawet <i>al.</i> [15]	Ethiopia	2014	363	41.8%
Charles[37]	USA	2010	204	34.80
Vivekiet <i>al.</i> [6]	India	2012	228	82.9%
Leonard [38]	Australia	2018	1796	54.34
Hinderaker[40]	Norway	2001	3836	36.10
Ma[39]	China	2009	6413	58.60
Bivalkaret <i>al.</i> [11]	India	2014	150	43.4%
Mahashabdeet <i>al.</i> [13]	India	2014	300	63%
Morsy et <i>al.</i> [14]	Egypt	2014	400	91.25%
Suryanarayana et <i>al.</i> [17]	India	2015	446	64%
Mangla et <i>al.</i> [19]	India	2016	850	98%
Prashant et <i>al.</i> [21]	India	2017	291	72.75%
<b>Present study</b>	<b>India</b>	<b>2023</b>	<b>1781</b>	<b>87%</b>

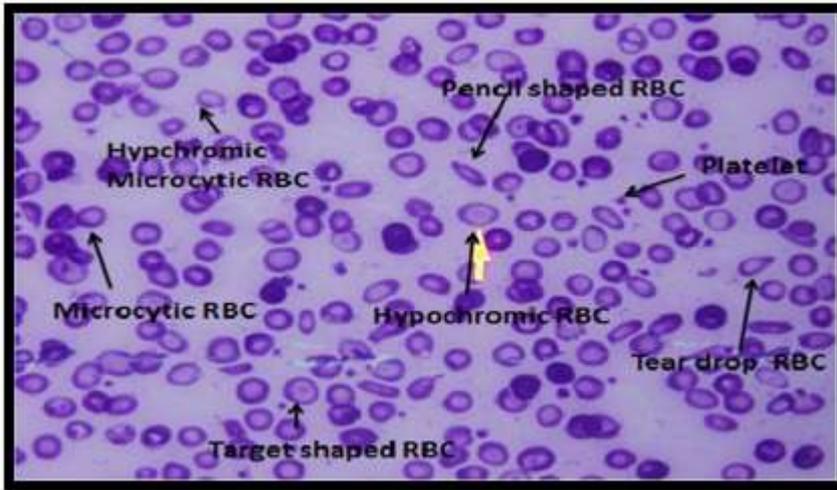
**Age:** In the present study, the age of the pregnant women ranged from 18-50 years .Age group affected most commonly in both anemic & non-anemic pregnant women was 21-30 years(79.8%) anemic &81.8 %( non - anemic) (Table 1). This finding was similar to findings observed by Lokareet *al.* [5], Mahashabde *et al.* [13] and Bhise M [25].

**Socio-economic status, residence and working status of pregnant women:**It was observed that the prevalence of anemia was more in women of lower socio-economic group (69.9%), and those residing in rural areas (80.3%).Many authors have stated that as the socioeconomic status decreases the prevalence of anemia also increases.

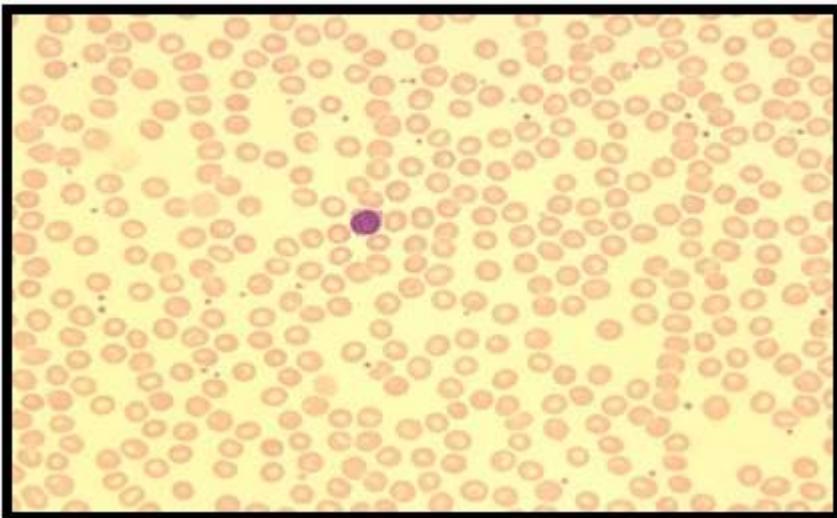
**Gravidity:** Out of 1781 cases, 57.6% were multigravida and 42.3% were primigravida. The prevalence of anemia in this study was more in multigravida (66.9%) as compared to primigravida (60%) (Table 2).

**Red cell morphology:** On peripheral blood smear examination, anemia was classified into microcytic hypochromic, macrocytic, normocytic normochromic. Maximum cases of hypochromic microcytic (50.2%), followed by normocytic normochromic (35.2%) and macrocytic (1.6%) (Table 3) were observed. These findings were consistent with studies done by Rawat *et al.* [26] (51%), Bivalkaret *al.* [11] (55.4%).The commonest cause of anemia in pregnancy by WHO report is nutritional i.e. iron deficiency. According to present study, it

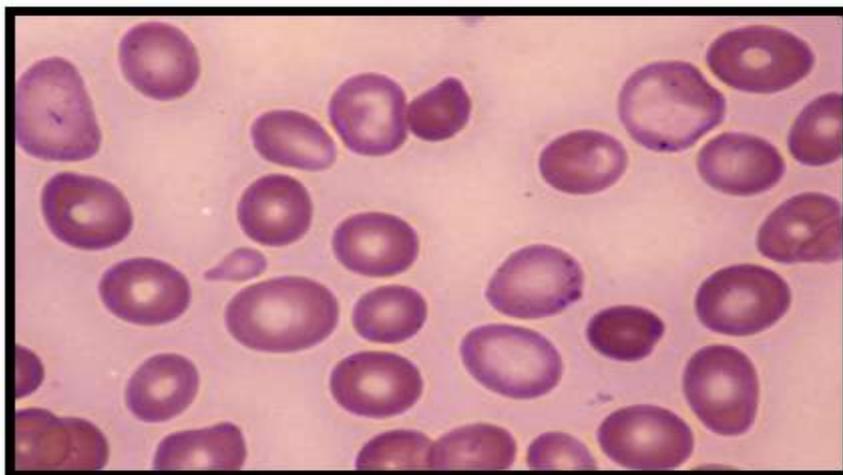
showed hypochromic microcytic anemia to be the most predominant type of morphological anemia.



**Figure 3: Iron deficiency anemia - microcytic hypochromic red blood cells with target cells**



**Figure 4: Normochromic, Normocytic red blood cells**



**Figure 5: Peripheral smear showing Macrocytic anemia**

### **Conclusion**

The present study was done to assess the prevalence, type and cause of anemia in pregnancy. Prevalence of anemia among pregnant women was higher indicating that anemia in pregnancy is still a major public health problem. Socio-demographic factors can contribute in increasing the prevalence of anemia in pregnancy. Health education is necessary about nutrition and about complications of anemia in pregnancy. History and clinical examination along with investigations of all pregnant women is must so that anemia can be diagnosed as early as possible, thus decreasing maternal and fetal morbidity and mortality during pregnancy.

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