

To Study the Spectrum of Anaemia and Haemoglobinopathies in Antenatal Patients in Rural Tertiary Care Centre of Western Uttar Pradesh

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ABSTRACT

Introduction: Anaemia refers to a condition in which the haemoglobin (Hb) content of the blood is lower than normal for a person's age, gender and environment, resulting in the oxygen carrying capacity of the blood being reduced. Iron deficiency anaemia is the most prevalent form (76%) followed by folate deficiency (20%) and combined iron-folate deficiency (20%)². Iron deficiency anaemia is the third leading cause of disability adjusted life years lost in females aged 15-44 years as per WHO rankings. Current research aimed to study the spectrum of anaemia and haemoglobinopathies in antenatal patients in rural tertiary care centre of western uttar pradesh.

Material and methods: This cross sectional study was conducted in the Department of Obstetrics and Gynaecology from January 2017 to June 2018 which consist of of antenatal anaemic patients who came to OPD or indoor of Department of Obstetrics and Gynaecology. Pregnant women of any age attending the antenatal clinic or admitted to labor ward of UPUMS, Saifai in 340 women which were screened by testing haemoglobin to enroll the anaemic cases with Hb level less than 11gm/dl in our study.

Results: Iron deficiency anaemia has the highest prevalence 71.47% followed by megaloblastic anaemia 18.23% and dimorphic anaemia 6.2%.

Conclusion: Iron deficiency anaemia has the highest prevalence 71.47% followed by megaloblastic anaemia 18.23% and dimorphic anaemia 6.2%. Prevalence of haemoglobinopathies was only 4.1%. The study concluded that moderate type of anaemia was the most common with microcytic hypochromic morphology of anaemia being the most common. Nutritional anaemia responded well to iron therapy as compared to haemoglobinopathies.

Keywords: Spectrum of Anaemia, Haemoglobinopathies, Antenatal

INTRODUCTION

Anaemia refers to a condition in which the haemoglobin (Hb) content of the blood is lower than normal for a person's age, gender and environment, resulting in the oxygen carrying capacity of the blood being reduced¹. Iron deficiency anaemia is the most prevalent form (76%) followed by folate deficiency (20%) and combined iron-folate deficiency (20%)². Iron deficiency anaemia is the third leading cause of disability adjusted life years lost in females aged 15-44 years as per WHO rankings¹. Prevalence of anaemia in India as per WHO is in the range of 33-89% and is different in different regions of the country³. The

World Health Organization (WHO) estimated that 56% of all pregnant women in developing countries are anaemic, about 75% are from Southern Asia and 88% from India⁴. Anaemia is primarily responsible for 20% maternal deaths and is an associated cause in another 20% maternal mortality⁵.

According to Indian Council of Medical Research (ICMR) anaemia in pregnancy is classified into⁶:

1. Mild anaemia (10-11)
2. Moderate anaemia (7-10gm/dl).
3. Severe anaemia (4-7gm/dl).
4. Very severe (less than 4gm/dl).

Another classification given by WHO (1992) for anaemia in pregnancy⁷:

1. Mild anaemia (9-11 gm/dl).
2. Moderate anaemia (7-9gm/dl).
3. Severe anaemia (<7gm/dl)

Haemoglobin concentration differ in normal pregnancy in each trimester so different values should be considered as anaemic range.

- First trimester less than 11g/dl.
- Second and third trimester less than 10.5g/dl.

According to WHO apart from haemoglobin concentration, haematocrit value of less than 33% irrespective of trimester is considered as anaemia in pregnancy⁸.

According to CDC (Centre of Disease Control and Prevention)^{9,10} it is:

- Hb less than 11g/dl and Haematocrit less than 33% in first and third trimester.
- Hb less than 10.5g/dl and Haematocrit less than 32% in second trimester.

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How to cite this article: Laspal P, Choudhary N, Kashyap P. To study the spectrum of anaemia and haemoglobinopathies in antenatal patients in rural tertiary care centre of Western Uttar Pradesh. International Journal of Contemporary Medical Research 2022;9(2):B17-B21.



The main cause of anaemia in India and other developing countries are faulty dietary habits, poor absorption of iron, hookworm infestation, some chronic diseases like chronic malaria, tuberculosis and also prevalence of some haemoglobinopathies like sickle cell anaemia and thalassemia.

Repeated frequent multiple pregnancies are responsible for anaemia in both mother and baby. Certain factors which are responsible for anaemia during pregnancy is conception in an anaemic state.

Anaemia can be classified on the basis of pathophysiology into 3 basic categories:

I. Anaemia due to increased blood loss:

- a. Acute post haemorrhagic anaemia.
- b. Chronic blood loss.

II. Anaemia due to impaired red cell production:

- a. Cytoplasmic maturation defects.
 - Deficient haem synthesis: Iron Deficiency Anaemia.
 - Deficient globin synthesis: Thalassemic syndrome.
- b. Nuclear Maturation Defect.
 - Vitamin B12 and/or Folic acid Deficiency: Megaloblastic anaemia.
- c. Defect in stem cell proliferation and differentiation.
 - Aplastic Anaemia.
 - Pure red cell Aplasia.
- d. Anaemia of chronic disorder.
- e. Bone marrow Infiltration.
- f. Congenital anaemia.

III. Anaemia due to increased red cell destruction (Haemolytic anaemias):

- a. Extrinsic (extracorporeal) red cell abnormalities.
- b. Intrinsic (intracorporeal) red cell abnormalities.

Morphological classification on the basis of peripheral blood smear is:

- I. Normocytic Normochromic.
- II. Normocytic Hypochromic.
- III. Microcytic Normochromic.
- IV. Microcytic Hypochromic.
- V. Macrocytic Normochromic.
- VI. Macrocytic Hypochromic.

Iron deficiency anaemia (IDA) is the commonest variety of anaemia in our country but haemoglobinopathies are also very commonly seen in Northeast region of our country contributing a lot of burden on our health facilities.

Iron Deficiency anaemia is also the commonest type of anaemia in pregnancy¹⁰. IDA prevalence (76%)² indicates the nutritional status of a community. Considering the effects of IDA on maternal and fetal mortalities, physical function and child growth and development, it is regarded as one of the main health indicators¹¹. Haemoglobinopathies are group of genetic disorders of haemoglobin in which there is a quantitative or qualitative abnormal production or structure of haemoglobin molecule^{12,13}. It is the commonest single gene disorder in the world first noted in the Mediterranean population and causing a significant morbidity and mortality

in India and abroad¹⁴.

Current research aimed to study the spectrum of anaemia and haemoglobinopathies in antenatal patients in rural tertiary care centre of western Uttar Pradesh with the objectives to study the spectrum of anaemia in antenatal patients of rural Western Uttar Pradesh and check the prevalence of haemoglobinopathies in anaemic antenatal patients.

MATERIAL AND METHODS

The study was conducted in the Department of Obstetrics and Gynaecology from January 2017 to June 2018. The population in this study consist of antenatal anaemic patients who came to OPD or indoor of Department of Obstetrics and Gynaecology. This study is an observational, cross sectional study conducted in 340 women for anaemia and haemoglobinopathies in antenatal patients of rural institute of Western Uttar Pradesh. Prevalence of anaemia in India as per WHO is in the range of 33-89%³.

Selection of participants: Pregnant women of any age attending the antenatal clinic or admitted to labor ward of UPUMS, Saifai were screened by testing haemoglobin to enroll the anaemic cases with Hb level less than 11gm/dl in our study.

Inclusion criteria

1. Antenatal women with haemoglobin <11 g/dl.

Exclusion criteria

1. Pregnant women with history of blood transfusion within the last 1 month.
2. Known case of haemoglobinopathy.
3. Pregnant women with certain medical conditions like:
 - Hypertensive disorder.
 - Tuberculosis.
 - Diabetes Mellitus.
 - Thyroid disorder.
 - Leukemias.
 - Bleeding diathesis.
 - Chronic renal disease.
 - HIV infected.
 - Patients on chemotherapy.

Methodology

This study was conducted in the Department of Obstetrics and Gynaecology with collaboration of Department of Pathology and Biochemistry, over a period of 18 months

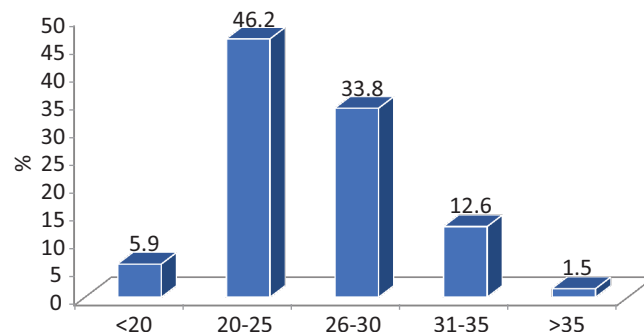


Figure-1: Distribution of cases according to age.

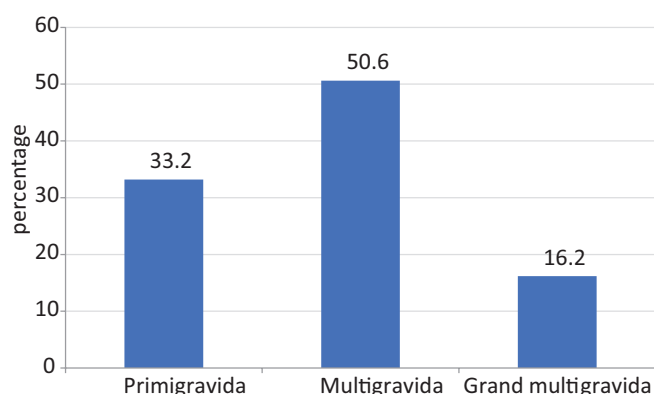


Figure-2: Distribution of cases according to Parity.

Grades of anaemia	No. (n=340)	Percentage (%)
Mild (9-11g/dl)	119	35.0
Moderate (7-9g/dl)	152	44.7
Severe (<7g/dl)	69	20.3

Table-3: Distribution of cases according to WHO Classification of Anaemia.

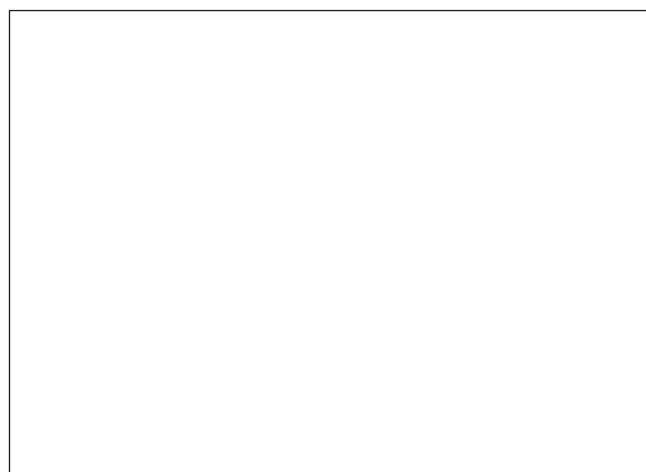


Figure-4: Distribution of cases according to Morphological Classification

from January 2017 to June 2018. All the antenatal cases who came for routine antenatal care or admitted in the labour ward in latent or active phase of labour, were evaluated thoroughly and those found fit based on our inclusion and exclusion criteria were enrolled in our study population.

The study was conducted after getting ethical clearance from ethical committee. Written informed consent was secured from study participants after explaining about the objective and purpose of the study to each participants. The participants were also assured about the confidentiality of the data.

All subjects were interviewed with the predesigned, pretested proforma and clinical examination was done. A detailed sociodemographic profile of the women, which include age, occupation, religion, type of family, obstetric history (gestational age and interpregnancy interval), educational level of women and family income was collected. Socio economic status suggested by Modified B.G. Prasad Scale 2017 was adopted. History of any blood transfusion within last one month and history of any chronic disease like hypertensive disorder, tuberculosis, diabetes mellitus, thyroid disorder, leukemias, bleeding diathesis, chronic renal disease, HIV infected and patients on chemotherapy were asked for exclusion criteria.

A thorough general and obstetrical examination was carried out before enrollement to assess the general condition and fetal well being.

World Health Organization classification of anaemia was used for diagnosing anaemia in pregnancy in our study. All the basic antenatal investigations were sent and those with Hb less than 11g/dl were enrolled for our study.

RESULT

The present study is an observational, cross sectional study conducted in Department of Obstetrics and Gynaecology in collaboration with Department of Biochemistry and Pathology UPUMS, Saifai, Etawah from January 2017 to June 2018 with the objective to determine the spectrum of anaemia and prevalence of haemoglobinopathies in antenatal

Haematological Parameters	Iron Deficiency Anaemia	Haemoglobinopathies	Megaloblastic Anaemia	p-Value
Haemoglobin	7.91±1.47	7.82±1.37	8.72±0.92	0.0002*
MCV	73.62±7.49	70.85±7.80	107.62±8.53	<0.0001*
MCH	24.08±3.25	21.28±3.93	31.01±2.92	<0.001*
MCHC	27.13±2.69	28.0±1.96	30.01±2.67	<0.001*
RDW	19.56±13.4	15.50±3.93	18.57±3.06	0.413
RBC	2.26±0.8	2.40±1.1	2.52±1.3	0.13

ANOVA test. *Significant, *p=0.001.

Table-5: Correlation between mean and standard deviation of various Haematological Parameters.

Types of Haemoglobinopathies	No. of Cases	Haemoglobin (Mean)	MCV	MCH	MCHC	RDW
β Thalassemia Trait	13	7.9±1.39	69.6±2.1	20.92±3.83	27.84±1.95	15.61±4.07
β Thalassemia Major	0	0	0	0	0	0
α Thalassemia	0	0	0	0	0	0
HbD Punjab	1	6.9±0	86.0±0	26.0±0	30±0	14.0±0

Table-6: Types of Haemoglobinopathies and their various Haematological Parameters.

anaemic patients of rural Western Uttar Pradesh.

In our study 395 cases were enrolled but 55 cases lost to followup, therefore finally the study was done on 340 cases, to know the prevalence of different types of anaemia, their spectrum and haemoglobinopathies.

DISCUSSION

Anaemia in pregnancy is a common health problem in developing countries^{15,16}. Iron deficiency anaemia (IDA) is the commonest type of anaemia in pregnancy¹⁰. Anaemia in pregnancy is a common health problem in developing countries^{15,16}. Iron deficiency anaemia (IDA) is the commonest type of anaemia in pregnancy¹⁰. In our study, most of the subjects belong to younger age group 20-25 years of age (46.2%). As they become pregnant at younger age due to rural background and early marriage, make them vulnerable to anaemia. Lack of knowledge is also an important factor for early age of marriage and pregnancy. (Table-1)

The results were similar to the study conducted by Priyanka Sharma *et al*¹⁹ in which majority of the subjects were between 20-25 (63%) years of age.

Another study conducted by Abel Gebre *et al*⁴⁴ showed similar result. The majority of subjects were between 18-24 (40.3%) years of age.

In our study multigravida has the highest prevalence of anaemia (50.6%) followed by primigravida (33.2%) and grand multigravida (16.2%) which is similar to the findings reported by Rajamouli J *et al*¹⁷. They found that majority of women having higher prevalence of anaemia were multigravida (43.3%) followed by primigravida (60%) and grand multigravida (29%).

According to WHO parameter, anaemia is graded as mild, moderate and severe anaemia. In our study more than one third of patients had moderate anaemia (44.7%) followed by mild (35%) and severe anaemia (20.3%).

The result of our study was similar to the study conducted by Neha Tyagi *et al*⁴¹ in which prevalence of moderate anaemia was found to be highest 60.30% followed by mild anaemia 32.5% and severe anaemia 7.23%.

On doing the morphological study, most of the subjects had microcytic hypochromic anaemia (75.58%), followed by macrocytic normochromic (18.2%), dimorphic predominantly macrocytic (5.88%) and dimorphic predominantly microcytic (0.2%).

The result of our study was similar to the study conducted by Neha Tyagi *et al*⁴¹ in which out of all anaemic cases majority of the cases had microcytic hypochromic anaemia (42%). Prevalence of normocytic normochromic anaemia was 28% followed by dimorphic anaemia in 23% and 7% cases showed macrocytic anaemia.

As per our study mean RDW level was lowest in haemoglobinopathies in comparison to IDA and megaloblastic anaemia and it can be utilized to differentiate among various anaemias. However the association was not found to be significant in our study (p value 0.413).

Mean RBC level was lower in all the different types of anaemia and there was insignificant (p value 0.13) association

between mean RBC level and different types of anaemia.

The prevalence of haemoglobinopathies in our study was 4.1% in anaemic pregnant population.

Among them 92.85% cases had β thalassemia trait and 7.14% case had Hb D Punjab.

Similar results were reported in the study conducted by Madhu Sinha *et al*¹⁸ in which the prevalence of haemoglobinopathies was 5.8%. Carrier rate for β thalassemia is 0-17% in different ethnic groups.

Other studies in antenatal cases have reported prevalence of β thalassemia trait to be 8.45%⁷³ and 3%⁷⁴. Keskin *et al* identified 3% cases in premarital screening¹⁹

To get the exact prevalence of haemoglobinopathies ideally antenatal screening should be done in all pregnant women especially where facilities for screening are available. It would help in identifying the couples at risk of severely affected child and prevent the financial and psychological burden imposed on the family and society by the treatment of the affected child. More work need to be done to identify parameters and their ratio to differentiate, different types of anaemia specially from nutritional anaemia which need completely different management plan as doing HPLC screening in all cases to detect haemoglobinopathies which are present in approx 4% female population is not cost effective in resource poor developing countries.

CONCLUSION

Iron deficiency anaemia has the highest prevalence 71.47% followed by megaloblastic anaemia 18.23% and dimorphic anaemia 6.2%. Prevalence of haemoglobinopathies was only 4.1%. The study concluded that moderate type of anaemia was the most common with microcytic hypochromic morphology of anaemia being the most common. Nutritional anaemia responded well to iron therapy as compared to haemoglobinopathies.

Antenatal screening for haemoglobinopathies should be done in all pregnant women especially where facilities for screening are available. It would help in identifying the couples at risk of severely affected child and prevent the financial and psychological burden imposed on the family and society by the treatment of the affected child. Ideally it should be done preconceptionally or as early as possible in pregnancy

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 10-11-2021; **Accepted:** 30-12-2021; **Published:** 28-02-2022