

Study on types of anaemia and foetomaternal outcome in antenatal patients

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ABSTRACT

Anemia is the most common haematological disorder in pregnancy. Anemia increases maternal morbidity and mortality. It is a condition that can be diagnosed and treated during antenatal period, preventing the serious complications of anemia during pregnancy and labour. **Aims:** This study investigated the prevalence of types of anemia during pregnancy and foetomaternal outcomes among pregnant women. **Study Design:** This was a cross-sectional study that enrolled 1100 pregnant women who were in the third trimester of pregnancy with haemoglobin level <11.0 gm/dl between March 2019 and August 2020. **Methods and Material:** Participants were selected by consecutive sampling and baseline data were collected by using a predesigned and pretested structured questionnaire. **Data Analysis:** Data were entered and analysed by using SPSS version 20. **Results:** The prevalence of anemia in third-trimester pregnancy in this study was 91.05%. Iron deficiency anemia was most common (69.18%) among pregnant women followed by megaloblastic anemia (2.5%). Most of pregnant women (45.90%) were mildly anemic. Mean \pm SD of haematological parameters among the anemic pregnant women during third trimester of pregnancy were haemoglobin (8.08 \pm 2.24 gm/dl), haematocrit (28.92 \pm 7.78%), mean corpuscular volume (MCV) (93.02 \pm 11.32fl), mean corpuscular haemoglobin (MCH) (26.03 \pm 2.90 pg), mean corpuscular haemoglobin concentration (MCHC) (27.99 \pm 2.01 gm/dl), RBC count (3.05 \pm 0.67million/mm³). Most common maternal complications due to anemia in pregnancy was preterm labour (30%). Fetal outcome in the form of an alive term, most commonly seen in mild anemia (34.7%), fetal complications like Preterm alive (11.3%), preterm intrauterine fetal death (IUFD) (2.7%) most commonly associated with severe anemia. **Conclusion:** The present study concludes that the prevalence of anemia among pregnant women in third trimester of pregnancy was 91.05% which is a serious public health problem. Proper counselling to the patients and their family members regarding cause of anemia, effect of anemia and complications of anemia. So, that such preventable condition can be prevented.

Keywords: Anaemia in pregnancy, foetomaternal outcome, grades of anaemia, prevalence

Introduction

Anaemia in pregnancy is a serious public health issue and a leading cause of poor foetal and maternal outcomes, particularly in underdeveloped countries. The World Health Organization (WHO) described the diagnosis of anaemia in the antenatal period as haemoglobin level less than 11 g/dl and haematocrit of less than 33%.^[1] It has varied prevalence,

aetiology and degree of severity in different populations. Iron deficiency anaemia is the commonest nutritional deficiency in pregnancy followed by folate deficiency anaemia. A study by the Nutrition Foundation of India and the Indian Council of Medical Research (ICMR) Task Force in 2020 observed the prevalence of anaemia as 84% and 84.9% among pregnant women, respectively.^[2] WHO in 2019/World Health Statistics data showed that 36.5% of pregnant women worldwide were anaemic.^[3] According to National Family Health Survey-5 (2019–2020), 66.4% of women suffered from anaemia.^[4]

Along with physiological causes, social causes are also responsible for anaemia like early age at marriage, teenage pregnancy, less

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spacing between two pregnancies, poor supplementation of iron, malnutrition, food habits that prevent iron absorption, coupled with poor bioavailability of iron, pre-existing iron status, endemic diseases like worm infestation and malaria.^[5] The consequences of anaemia in pregnancy are increased incidence of pre-eclampsia, preterm labour, sepsis and postpartum haemorrhage. It causes direct as well as indirect deaths from cardiac failure, haemorrhage, infection and pre-eclampsia. It also increases perinatal mortality and morbidity consequent to preterm deliveries, intrauterine growth retardation, low iron stores, iron deficiency anaemia and cognitive and affective dysfunction in the infant.^[6] The purpose of the study is to evaluate the prevalence, types and degree of anaemia, its associated sociodemographic factors and foetomaternal outcomes in antenatal patients. This study will help the primary physician in better management of anaemia in pregnant women, which will further lead to improvement of foetomaternal outcomes and attainment of our sustainable development goal of decreasing the maternal mortality ratio (MMR) and neonatal mortality rate (NMR).

Study design and study population

This was a cross-sectional observational study, which was conducted among 1100 pregnant women admitted for a period of 18 months. All women who were admitted during third-trimester pregnancy and those with Hb levels <11.0 g/dl were taken as study subjects and were investigated further to be assessed according to WHO. The study is approved by institutional ethical committee Memo no 52, IEC, RIMS Ranchi dated 16 February 2019.

Sample recruitment and sampling procedure

All pregnant women who came to the obstetrics emergency ward during the third trimester of pregnancy with Hb <11 g/dl after giving consent were screened for eligibility in the study. Pregnant women who were having known chronic disease and those having bleeding in the pregnancy, patients with first and second trimester of pregnancy and haemoglobin more than 11 g/dl were excluded. The target pregnant mothers were selected by consecutive sampling based on inclusion and exclusion criteria.

Data collection procedure

Data on sociodemographic variables and obstetric characteristics were collected by using a predesigned and pretested structured questionnaire. The venous blood sample was collected once from each pregnant woman as they visited in obstetrics emergency ward during the data collection period in the third trimester of pregnancy by well-trained laboratory technologists. The collected venous blood was tested in the laboratory and results were collected in time.

Data analysis

Data were entered and analysed by using Statistical Package for the Social Sciences (SPSS) version 20. Bivariate logistic regression was computed to assess the statistical association between anaemia and independent variables. The significance of statistical association was tested at P value <0.001.

Results

The total number of antenatal patients admitted in the emergency ward in the third trimester of pregnancy over a period of 18 months was 1208, out of which 1100 patients were anaemic. So, the prevalence of anaemia in third-trimester pregnancy in this study was 91.05%. It was observed that anaemia was most common in the age group of 20–30 years (59.5%), women living in rural areas (63.36%), low socioeconomic class (66.27%), unbooked antenatal history (59.64%) and multigravida women (57.5%). There was a significant association of anaemia with the above sociodemographic variables [Table 1].

In the present study, out of 1100 anaemic pregnant women cases, 505 cases (45.90%) were found to be mildly anaemic, 275 cases (25%) moderately anaemic, 206 cases (18.74%) severely anaemic and 114 cases (10.36%) were very severely anaemic. Iron deficiency anaemia was the most frequent anaemia followed by megaloblastic anaemia among pregnant women in this study. Some pregnant women were anaemic due to acute blood loss causes like abruptio placentae, placenta previa, rupture uterus and postpartum haemorrhage [Figure 1].

Haematological profiles of pregnant women

Overall, haematological parameters of 1100 anaemic pregnant women were described as mean \pm SD. Among the anaemic pregnant women during third trimester of pregnancy, haematological parameters were haemoglobin

Table 1: Sociodemographic characteristics of pregnant women with anaemia

Variables	Frequency and percentage n (%)	P
Age in years		<0.001
<20	257 (23.4)	
20-30	655 (59.5)	
>30	188 (17.1)	
Residence		<0.001
Rural	697 (63.36)	
Urban	403 (36.64)	
Socioeconomic status		<0.001
Upper	0 (0)	
Upper middle	37 (3.38)	
Lower middle	151 (13.72)	
Upper lower	183 (16.63)	
Lower	729 (66.27)	
Educational status		<0.001
Illiterate	403 (36.63)	
Primary school	348 (31.63)	
Secondary school and above	349 (31.72)	
Booked/unbooked history		<0.001
Booked	444 (40.36)	
Unbooked	656 (59.64)	
Gravidity		<0.001
Primigravida	467 (42.45)	
\geq G2	633 (57.5)	

G2=Gravida2

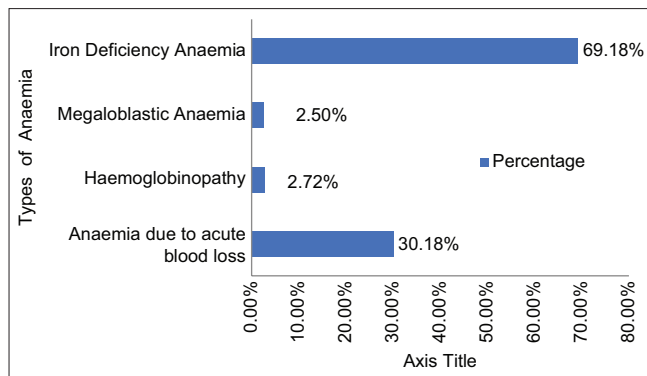


Figure 1: Prevalence of types of anaemia in pregnant women in present study

(8.08 ± 2.24 g/dl), haematocrit ($28.92 \pm 7.78\%$), mean corpuscular volume (MCV) (93.02 ± 11.32 femtolitre (fl)), mean corpuscular haemoglobin (MCH) (26.03 ± 2.90 picogram (pg)), mean corpuscular haemoglobin concentration (MCHC) (27.99 ± 2.01 g/dl) and red blood cell (RBC) count (3.05 ± 0.67 million/mm³) [Table 2].

Foetomaternal outcome in the third trimester of pregnancy

The most common maternal complications due to anaemia in pregnancy were preterm labour in the present study, others were pre-eclampsia, postpartum haemorrhage, post-operative wound infection, abruptio placentae, sepsis, eclampsia, 8.9% of patients were in shock, while 120 (10.90%) cases of rupture uterus cause anaemia. Out of 21 sickle cell anaemic pregnant patients in the present study, 5 patients had sickle cell crisis. Among 1100 anaemic pregnant patients, 14 did not survive due to cardiac failure [Table 3]. Foetal outcome in the form of the alive term was most commonly seen in mild anaemia and the majority of term intrauterine foetal death (IUFD) and term stillbirth were seen in mild anaemia in this study. Preterm alive and preterm IUFD were most commonly associated with severe anaemia. The majority of preterm stillbirth and intrauterine growth restriction (IUGR) were seen in moderate anaemia and mild anaemia, respectively. The congenital malformation is most commonly seen in severe anaemic pregnant patients [Table 4].

Discussion

Prevalence of anaemia in the third trimester of pregnancy was 91.05% in the present study which was comparable with Bansal *et al.*^[7] who reported the prevalence of anaemia in pregnant women was 81.8%.

Anaemic group was divided into mild (Hb - 10–10.9 g/dl), moderate (Hb - 7–9.9 g/dl), severe (Hb - 4–6.9 g/dl) and very severe (Hb - <4 g/dl). This classification was according to WHO 2011.^[8] In the present study, among anaemic pregnant women, 45.90% were found to be mildly anaemic, 25% were moderately anaemic, 18.74% were severely anaemic and 10.36% were very severely anaemic. Whereas a study done by Nigar *et al.*,^[9] observed

Table 2: Haematological profiles of pregnant women (mean±SD) in third trimester of pregnancy with anaemia

Complete blood count results	Mean±SD
Haemoglobin (g/dl)	8.08±2.24
Haematocrit (%)	28.92±7.78
MCV (fl)	93.02±11.32
MCH (pg)	26.03±2.90
MCHC (g/dl)	27.99±2.01
RBCs (million/mm ³)	3.05±0.67

SD=Standard deviation, MCV=Mean corpuscular volume, MCH=Mean corpuscular haemoglobin, MCHC=Mean corpuscular haemoglobin concentration, fl=Femtolitre, pg=Picogram

Table 3: Associated maternal complications in anaemic pregnant women during third-trimester pregnancy

Maternal complications	Number and percentage
Pre-eclampsia	202 (18.36)
Eclampsia	96 (8.72)
Preterm labour	330 (30)
Abruptio placentae	77 (7)
Rupture uterus	98 (8.90)
Sickle cell crisis	05 (0.45)
Postpartum haemorrhage	106 (9.6)
Sepsis	108 (9.8)
Post-operative wound infection	130 (11.81)
Shock	98 (8.9)
Cardiac failure	14 (1.27)
Maternal death	14 (1.27)

that among pregnant women moderate anaemia was most prevalent (44.8%), followed by mild anaemia (10%) and severe anaemia (2.8%). It was also comparable with a study by Goyal *et al.*,^[10] who also observed that 29.35% were moderately anaemic, 19.6% were mildly anaemic and 21% were severely anaemic.

Sociodemographic variables [Table 1]

Age is an important determinant of anaemia in pregnancy. The maximum numbers of anaemic patients (60.81%) were in the age group of 20–30 years in the present study. Whereas Nigar *et al.*^[9] observed in his study that maximum numbers of anaemic pregnant women were in the age group of 20–25 years (49.5%). Vinod Kumar *et al.*^[11] reported in their study that the percentage of anaemia in ≤20, 21–30 and ≥30 years age group was 60%, 83.6% and 100%, respectively. The early age of marriage and poor iron stores contribute to a high prevalence of anaemia in this age group. The locality of patients is a major determinant of literacy, health access and socio-economic status. In the present study, 63.36% of anaemic pregnant women were from rural areas while 36.64% were from urban areas, which is comparable with a study by Lal *et al.*^[12] (52% and 48%, respectively) and also with a study by Nigar *et al.*,^[9] who observed that 72.4% of anaemic pregnant women were from rural areas and 27.6% were from urban areas. It is evident from the above results that women coming from rural areas had a high prevalence of anaemia as they are uneducated, unaware, poor and malnourished with poor hygiene. They are not getting and not aware of basic medical facilities available to them. Socioeconomic status is one of the determinants of any

Table 4: Foetal outcome in anaemic pregnant women in relation with degree of anaemia

Grades of anaemia	Foetal outcome							
	Term alive	Term IUFD	Term stillbirth	Preterm alive	Preterm IUFD	Preterm stillbirth	IUGR	Congenital malformation
Mild	382 (34.7%)	18 (1.6%)	12 (1.1%)	0 (0%)	19 (1.7%)	0 (0%)	65 (5.9%)	6 (0.5%)
Moderate	154 (14.0%)	4 (0.4%)	0 (0%)	51 (4.6%)	18 (1.6%)	11 (1%)	27 (2.5%)	13 (1.2%)
Severe	2 (0.2%)	10 (0.9%)	0 (0%)	124 (11.3%)	30 (2.7%)	7 (0.6%)	10 (0.9%)	23 (2.1%)
Very severe	0 (0%)	0 (0%)	0 (0%)	101 (9.2%)	11 (1.0%)	2 (0.2%)	0 (0%)	0 (0%)
Total	538 (48.9%)	32 (2.9%)	12 (1.1%)	276 (25.1%)	78 (7.1%)	20 (1.8%)	102 (9.3%)	42 (3.8%)

P<0.001

disease. A major part of anaemic pregnant women was from low socioeconomic status, as these are likely to be less privileged in the field of nutrition, housing, education and antenatal care. In the present study, the highest population (66.27%) belonged to the lower socioeconomic class which is comparable to a study by Miglani *et al.*^[13] who observed a maximum number (40%) of anaemic pregnant women belonging to the upper lower socioeconomic class. Literacy is an important determinant of maternal morbidity and foetal outcome. Literacy is a symbol of women's empowerment. Literate women can understand the severity of the disease and become aware of their condition and the available facilities. Ravishankar Suryanarayana *et al.*^[14] observed among the education category, majority suffering from anaemia were illiterate (38.7%), 2.9% women were having up to a primary level of education, 25.2% were having up to secondary school and 9.1% were graduates in his study, which is similar with the present study in which maximum numbers of anaemic pregnant women (36.63%) were illiterate. Each pregnancy causes a major change in the body of the mother, which has tremendous demand of for rest and energy. If mothers do not have good nutrition and health care during their pregnancy, they get deprived of energy to fight against pregnancy complications. During pregnancy, iron demand increases and if it could not be fulfilled, the mother becomes anaemic and the risk of complications of pregnancy increases. Khatana *et al.*^[15] reported that the maximum numbers of anaemic pregnant women were primigravida, i.e., 33.84%; 25.53% were P1 and 24% were P2. In the present study, maximum numbers of anaemic pregnant women (57.5%) were multigravida. It has been noted that the patients who were unbooked and had no antenatal check-up or had inadequate antenatal check-up had a higher number of anaemic cases (59.64%) in the present study which is comparable with a study by Miglani *et al.*^[13] who observed that 65% anaemic pregnant women were unbooked. Among the anemic cases, 40.36% were booked; this was due to non-compliance with iron therapy in present study. In present study, Table 2 shows that iron deficiency anaemia is the most common (94.72%) among pregnant women followed by megaloblastic anaemia (2.5%), 2.72% cases were having haemoglobinopathies. This study was comparable with Daisy Kameng Baruah *et al.*^[16] who also observed that iron deficiency anaemia is the most common anaemia in pregnancy (39%). The mean of haematological parameters in anaemic pregnant women during the third trimester of pregnancy was haemoglobin (8.08 g/dl), haematocrit (28.92%), MCV (93.02 fl), MCH (26.03 pg), MCHC (27.99 g/dl), and

RBC count (3.05 mill/cu.mm) in the present study, which was comparable with a study done by Sharan *et al.*^[17] who observed the mean haematological profiles in pregnant women to be haemoglobin (8.5 g/dl), haematocrit (26.1%), MCV (76 fl), MCH (24.8 pg), MCHC (31.8 g/dl), and RBC count (3.5 mill/cubic mm). There is also evidence that severe anaemia is associated with poor pregnancy outcomes. Lower haemoglobin levels may lead to significant morbidity in pregnant women, such as infections, increased hospital stays and other health problems. In the present study, the most common complications associated with anaemia in pregnancy were preterm labour (30%) and other complications were pre-eclampsia (18.36%), postpartum haemorrhage (11.45%), post-operative wound infection (11.81%), abruptio placentae (7.8%), sepsis (9.8%), eclampsia (8.72%), 8.9% patients were in shock while 10.90% cases of rupture uterus cause anaemia [Table 3]. The present study is comparable with Goyal *et al.*^[10] who observed in her study that the pregnancy complications associated with anaemia were prematurity (28.5%), pre-eclampsia (25%), IUGR (20%) and abruptio placentae (1%). The present study shows the following foetal outcomes in anaemic pregnant women: 538 (48.9%) were alive term baby, 32 (2.90%) were term IUFD, 32 (2.9%) were term stillbirth babies; 276 (25.1%) were a preterm alive baby, preterm IUFD (7.1%), preterm stillbirth (1.8%); 42 (3.8%) babies had congenital malformations like anencephaly, hydrops foetalis, hydrocephalous; and 102 (9.3%) babies were small for date baby [Table 4]. The present study is comparable with (Late) Akhuli *et al.*^[18] who observed that presence of birth asphyxia was in 12.5%, IUFD was 1.56%, stillbirth (1.56%) and death of a baby during hospital stay (4.68%) in case of neonates of an anemic mother. Foetal outcome in the form of the alive term was most commonly seen in mild anaemia, and a majority of term IUFD and term stillbirth were seen in mild anaemia in this study. Preterm alive and preterm IUFD were most commonly associated with severe anaemia. This study was similar to Kruti Savaliya *et al.*^[19] who also observed that IUFD, low birth weight, meconium aspiration syndrome, respiratory distress syndrome and neonatal intensive care unit (NICU) admission were mostly associated with severe anaemia. The majority of preterm stillbirth and IUGR were seen in moderate anaemia and mild anaemia, respectively. Congenital malformation was most commonly seen in severe anaemic pregnant patients in the present study.

Conclusion

The present study has shown a high prevalence (91.05%) of anaemia among pregnant women in the third trimester of pregnancy. The high prevalence of anaemia among pregnant women is an alarming sign and indicator of poor nutritional status and health care utilisation. This can be improved by the following measures: Implementation and strengthening of the antenatal services to keep up the full coverage of antenatal women at primary and community health centres; strengthening malaria and hookworm prevention, improving upon dietary intake and regular monitoring of Hb levels during pregnancy; and establishment of more blood banks in all government setups and creating awareness in society to come forward for blood donation. Nationwide multicentric studies are required to see the improvement of foetomaternal outcomes after the establishment and implantation of various government programmes like Anaemia Mukh Bharat,^[20] Poshan Abhiyaan^[21] and Mother Infant Young Child Nutrition (MIYCN).^[22] So, the family and the society are blessed with healthy mothers and healthy babies.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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