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Original Research Article

A clinical study of impact of anaemia in pregnancy on maternal and neonatal outcome

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ABSTRACT

Background: The aim is to study effect of anaemia in obstetrics patients during antepartum, intrapartum and postpartum and to find the incidence of maternal and neonatal morbidity and mortality in those patients.
Methods: A prospective clinical study was conducted on patients receiving obstetric care at Basaveshwara Medical College and Hospital from July 2016 to July 2018.Pregnant women with Hb less than 8g were included in the study to determine the outcome of pregnancy in severe anaemia and determine the causes of anaemia. Acute cases of obstetrical haemorrhages as in antepartum and postpartum haemorrhages and all medical and surgical high-risk factors except anaemia, were excluded from the study.
Results: A total of 200 pregnant anaemic patients with haemoglobin less than 8g/dl were included in the study. The patients were divided into two groups based on haemoglobin concentration at first presentation. Patients with haemoglobin level less than 5g/dl were included in group A (N=44, 22%), and rest of the patients were included in group B (N=156, 78%). Most commonly observed complications in the study were preeclampsia and eclampsia (46 cases), preterm labour (46 cases) and IUGR (30 cases). In both group of patients, the commonest cause of anaemia in pregnancy was iron deficiency. The greater the severity of anaemia in pregnancy, greater was the risk of preeclampsia, preterm delivery, low birth weight and stillbirth.
Conclusions: This study reveals that severe anaemia which is commonly observed in the pregnancy in our country, gives rise to maternal and perinatal morbidities and mortalities.

Keywords: Anemia, Haemoglobin, Perinatal outcome

INTRODUCTION

Anaemia is the commonest haematological disorder occurring in pregnancy in India. It affects 1.62 billion people globally, corresponding to 24.8% of world population.[1] In India, anaemia is a physiological process of pregnancy in mild degree, but becomes pathological if left undetected and untreated.

World Health Organization (WHO)defines anaemia in pregnancy as haemoglobin concentration less than 11gm/dl and haematocrit less than 0.33.[2] The center for disease control and prevention (1990) defines anaemia as Hb less than 11gm/dl in the first and third trimester and less than 10.5gm/dl in second trimester.[3]

WHO has estimated that prevalence of anaemia in pregnant women is 14% in developed countries, 51% in developing countries and 65-75% in India.[4] Iron deficiency is the most common cause and even in the developed country, an estimated 30-40% of pre-school children and pregnant women have iron depletion. The

incidence is more in rural population and in women belonging to poor socio-economic groups, poor nutrition thus being the leading cause of anaemia.

Other causes are worm infestation, frequent pregnancies at short interval, excess loss of blood at previous deliveries or during menses, bleeding piles, peptic ulcer, chronic infection and other blood dyscrasias, malaria etc.

Diet of an average class of Indian females is inadequate in iron, which gives very little opportunity to store iron and enable them to meet the demands of foetus when pregnancy supervenes. So, a diet inadequate in iron combined with the factors mentioned above, which are quite common in India, a female even if not actually anaemic is already depleted of essential haemopoetic factors and is in the borderline of developing anaemia. In such a female, anaemia rapidly develops as a result of increased demand in pregnancy.

With great advances in management, antenatal iron and folic acid supplementations, nutrition education and increased social awareness, the incidence of anaemia is gradually decreasing, but it is still a major problem in India. It is the commonest and more easily preventable medical disorder of pregnancy. The present study is to assess the maternal and foetal outcome in pregnancies complicated with severe anaemia.

METHODS

This prospective clinical study was conducted on patients receiving obstetrics care at Basaveshwara Medical College and Hospital from July 2016 to July 2018.

Inclusion criteria

- Pregnant women whose haemoglobin was less than 8g were included in this study to determine the outcome of pregnancy in severe anaemia and determine the causes of anaemia.

Exclusion criteria

- Acute cases of obstetrical haemorrhages as in antepartum and postpartum haemorrhages,
- All medical and surgical high-risk factors except anaemia
- Those with history of preterm delivery.

The cases were included after counselling and obtaining a written informed consent. These patients were studied and evaluated in detailed with proper history taking, clinical examination and relevant investigations like complete blood count, peripheral smear, serum ferritin, serum iron, total iron binding capacity. Ethical clearance was obtained from the institutional ethics committee of Basaveshwara Medical College and Hospital for conducting the study. All the study group patients with Hb less than 8g were admitted and background information, socio-demographic, anthropometry, obstetric profile and diet preference of the pregnant women were collected using questionnaire-cum-interview schedule. Blood pressure, maternal anthropometric measurements (height and weight) were taken using standardised techniques. Post-partum outcome of live birth, still birth, gestational age, congenital abnormality, type of delivery were collected. At delivery, neonatal anthropometry (weight, length, head circumference) were measured at birth using standardised techniques. Neonates with birth weight <2.5 kg were defined as those with low birth weight (1.50-2.49kg), further sub classifying the birth weight as very low birth weight (1.00-1.49kg) and extremely low birth weight (<1.00kg). Patients were appropriately treated with oral or parenteral haematinics or blood transfusion guided by their gestational age and haemoglobin level at presentation and by their tolerance to oral haematinics, after with advice on diet. After being adequately treated these patients were followed till their delivery and the outcome of pregnancy was noted wherever possible.

Statistical analysis

The data were analysed by using SPSS Statistics software Version 22.0. The quantitative measures are presented by mean and standard deviation and qualitative variables by proportions. Chi-square test, correlation coefficient, and logistic regression were used for testing significance. $P \leq 0.05$ was considered statistically significant.

RESULTS

A total of 200 pregnant anaemic patients with haemoglobin less than 8gm/dl were included in the study. The patients were divided into two groups based on haemoglobin concentration at first presentation.

Patients with haemoglobin level less than 5gm/dl were included in group A (N=44, 22%), and rest of the patients were included in group B (N=156, 78%). The findings of the two groups were then analysed and compared. Most of the women (67%) in group A with Hb (less than 5g) were unregistered, while 89% women were registered in group B with Hb (5.1-8g). Most of the women were young falling in the age group of 21-25 years with 40% in group A and 48% in group B.

Majority of the patients were from low socio-economic strata of society with 95.45% of patients with Hb less than 5g and 93% of patients with Hb between 5.1-8g belonging to class 4 and 5 of the modified B. G Prasad classification. In group A most of the patients were third gravidas (45%). In group B most of the patients were either second gravidas (41%) or primigravida (26.28%).

In both groups' anaemia was diagnosed mostly at gestational age between 28 to 36 weeks. 65.9% in group A and 71.1% in group B belonged to gestational age between 28 to 36 weeks (Table 1).

Table 1: Gestational age at detection of anaemia.

Gestational age	Group A		Group B		Total	
	N	%	N	%	N	%
<12	8	18.1	11	7.0	19	9.5
12-27	4	9.0	30	19.2	34	17
28-36	29	65.9	111	71.1	140	70
37-40	3	6.8	4	2.6	7	3.5
Total	44	100	156	100	200	100

In group A patients with Hb (less than 5g) 63.6% came first time in labour room. In group B, 64% patients had less than four Ante Natal Care (ANC) visits.

Table 2: Distribution of patients according to causes of anaemia.

Causes	Group A		Group B		Total	
	N	%	N	%	N	%
Iron deficiency	34	77	120	76.9	154	77
Vit B12 and Folic acid deficiency	3	6.8	12	7.6	15	7.5
Worm infestation	0	0	3	1.9	3	1.5
Infection	0	0	2	1.3	2	1
Chronic blood loss	2	4.5	6	3.8	8	4
Chronic diseases	4	9.0	9	5.7	13	6.5
Sickle cell anaemia	0	0	2	1.2	2	1
Thalassemia	0	0	2	1.2	2	1
Bone marrow depression	1	2.2	0	0	1	0.5
Total	44	100	156	100	200	100

The common symptoms in group A were pedal edema and breathlessness on exertion, while common symptoms seen in group B were weakness, fatigue and pedal edema.75 patients in group B were asymptomatic at the time of diagnosis. 29 patients in group A and 112 patients in group B, had no any past-history.

There was a statistically significant difference in the packed cell volume, MCHC and MCH value in two groups. There was no statistically significant difference in MCV value. Microcytic hypochromic picture was commonly found in 61.36% of group A and 52.56%of group B patients.

In both group of patients, the commonest cause of anaemia in pregnancy was iron deficiency (Table 2). In group A, patients were mainly treated by blood transfusion, while in group B patients were treated mostly by combined treatment (blood transfusion and iron therapy).

The most commonly observed complications in the study were preeclampsia and eclampsia (46 cases), Preterm labour (46 cases) and IUGR (30 cases) (Table 3).

Table 3: Distribution of patients according to maternal antepartum and intrapartum complications.

Complications	Group A	Group B	Total
Preeclampsia	13	29	42
Eclampsia	1	3	4
Antepartum haemorrhage	0	2	2
IUGR	7	23	30
Preterm labour	12	34	46
PROM	0	9	9
Oligohydromnios	2	5	7
CCF	6	1	7
Sickle cell crisis	1	0	1
UTI	2	3	5
Prolonged labour	2	7	9

In many cases there were combinations of complications like pre-eclampsia and IUGR and preterm labour and preeclampsia with IUGR. Postpartum haemorrhage, episiotomy wound infection and LSCS wound infection were the most commonly observed postpartum complications.

Table 4: Distribution of cases according to perinatal outcome.

Outcome	Group A	Group B	Total
Preterm deliveries	18	41	59
LBW (<1.5-2.5kg)	21	59	80
VLBW(<1.5kg)	1	4	5
Intrauterine death	1	1	2
Neonatal death	2	4	6
Neonatal sepsis	4	7	11
Pneumonia	1	8	9
Jaundice	1	6	7
Congenital anomalies	0	0	0
NICU Admission	7	22	29
ARDS	1	3	4

Most of the study cases delivered unassisted vaginally at term 36.36% in group A and 50.6% in group B. While in full term vaginal delivery, episiotomy incision was taken in 13.6% of patients in group A and 15.36% of patients in group B. The rate of full-term caesarean sections done was 9% in group A and 14.7% in group B. 4.54% in group A and 1.92% in group B had abortion. In group A there were 22 babies weighing less than 2500 grams which included 18 preterm babies and rest had intrauterine growth restriction. In group B there were 63 babies weighing less than 2500grams which included 41 preterm babies and rest had intrauterine growth restriction. 2 (4.54%) patients in group A with very severe anaemia had maternal death. There was statistically significant difference in mean birth weight in two groups of anaemic patients (Table 4).

DISCUSSION

This Prospective clinical study was conducted to determine the outcome of pregnancy in patients with moderate to severe degree of anaemia with haemoglobin concentration <8gm/dl, as the cut off limit for the study, because available data from India and elsewhere indicates that maternal morbidity and perinatal mortality rates are higher in women with Hb <8g/dl.

67% of patients in group A were not registered anywhere, they came first time in labour room. While 89% of patients in group B were registered and 11% were not registered. It means that many patients have not consulted to doctor and not taken treatment throughout their pregnancy, not even taken iron and folic acid tablets (IFA) during pregnancy. In the study of Couillet et al., found that 23% had not undertaken any ANC consultation during last pregnancy.[5] As per IFA tablet supply and received, 75.7% had received IFA tablets. Shidhaye PR et al., found that 57.6% had received IFA tablets.[6] In the study of Piyusha et al., only 71.7% had registered for antenatal care and 28.3% were not registered.[7]

Majority of patients in group A with (Hb <=5g), 45.45% are third gravidas, 18% are fourth gravid as while 20.45% are second gravidas. While in group B, 41% of patients were second gravidas, 23.71% were fourth gravidas and 26.3% were primigravida. In the study of Ahmad N et al., the severity of anaemia was more in those with parity of two or more.[8] In the study of Usha singh et al., 55% multi gravid mothers showed anaemia in comparison with 45% primigravida who showed anaemia.[9] In the study of R.G. Vivek et al., risk of developing anaemia in pregnant women with 3 to 5 pregnancies is increased when compared with those who had less than 3 pregnancies.10 This could be due to the loss of iron and other nutrients during increased and repeated pregnancies and also the possibility of sharing of resources with the foetus. 55% multi-gravida mothers showed anaemia, in comparison with 45% primigravida who showed anaemia. In the study of Ivan E. A. et al., high percentage of anaemia was noted in those with multi-parity (55%).[11]

Table 1 shows the duration of pregnancy at time of detection of anaemia. 65.9% of patients in group A, admitted in hospital between 28-36 weeks of gestation and 19.2% of patients in group A admitted between 12-27weeks of gestation. While in group B also majority of patients 71.2% were detected with anaemia between 28-36weeks of gestation and 19.2% were detected with anaemia between 12-27weeks of gestation. Surveys done in different parts of India have revealed that 60-80% of women who belonged to low socio-economic status were anaemic in the last trimester of pregnancy. Study done by Balarajan U et al. and R.G Viveki et al. which also indicated that the prevalence of anaemia was higher in pregnant women in the third and second trimesters.[10,12,13]

63.63% of patients in group A came in labour room first time, they had not registered anywhere before it, means they have not taken iron and folic acid tablets, throughout their pregnancy. While 29.5% of patients in group A has less than four antenatal check-ups. In group B, 64.1% of patients has less than four antenatal visits while only 23% of patients has more than 4 antenatal visits. In district level household survey done in 2006, most women in poorly performing states did not come for antenatal check-up. Many of those who came for antenatal check-up did not get IFA throughout pregnancy nor did they get 100 tablets. Majority of those who got the tablets did not consume all the tablets.[14]

There was statistically significant difference in MCH and MCHC value in both groups. But there was no statistically significant difference in MCV value in present study because dimorphic picture was present in more patients.

The commonest cause of anaemia in present study was iron deficiency anaemia as seen in table 2 and it is concluded from the peripheral blood smear picture and the red blood indices. 77.27% of patients in group A and 76.9% of patients in group B has iron deficiency anaemia. Macrocytic hypochromic picture suggestive of megaloblastic anaemia was seen in 6.8% of patients in group A and 7.6% of patients in group B. Apart from poor nutrition, infections too was cause of anaemia. 1.28% of patients in group B, had infection malaria, 1.92% of patients in group B had worm infestations which is quite common in India due to poor sanitary conditions, especially in low socio-economic group. 2 patients in group A and 4 patients in group B had chronic blood loss, in 6 patients 2 patients were suffered from bleeding piles while 4 had menorrhagia.2 patients in group B, 1.28% of patients in group A had sickle cell anaemia. 1.28% of patients in group B had thalassemia. 2.27% of patients in group A had bone marrow depression. According to WHO iron deficiency anaemia is the cause of 75% of anaemic cases.[15] In the study of Chowdhury S et al., the most common cause of anaemia in pregnancy was iron deficiency.[16] It usually occurs due to low iron stores prior to pregnancy.

In the study conducted by Abdel aziem, et al., at a hospital in Kassala, women with severe anaemia had a 3.6 times higher risk of pre-eclampsia than women with no anaemia.[17] It was recently observed that 17 (17.7%) of 97 women with severe anaemia had gestational hypertension or preeclampsia and 2 (2.1%) had eclampasia.18 The greater the severity of the anaemia in pregnancy, the greater the risk of preeclampsia, preterm delivery, low birth weight and stillbirth.[17] The susceptibility of women with severe anaemia to pre-eclampsia could be explained by a deficiency of micronutrients and antioxidants. Recent results indicate that reduction in serum levels of calcium, magnesium and zinc during pregnancy might be possible contributors to the development of preeclampsia.

Table 4 shows the distribution of cases according to perinatal outcomes. Preterm deliveries were observed in 40.9% of patients in group A and 26.28% of patients in group B. Low birth weight was seen in 47.72% of patients in group A and 37.82% of patients in group B. 2.27% of patients in group A and 2.56% of patients in group B had very low birth weight. In the study of Kalaivani K.19 the risk of preterm delivery increased significantly with the severity of anaemia, with odds ratio of 1.4, 1.4 and 4.1 respectively for mild, moderate and severe anaemia. The corresponding risks for low birth weight and very low birth weight were 1.2 and 1.7, 3.8 and 1.5, and 1.9 and 4.2 respectively.

A doubling of low birth weight rate and 2 to 3 fold increase in the perinatal mortality rates is seen when the Hb is <8gm/dl.[19] Lone et al., in a multivariate analysis of their study population showed that the risk of low birth weight babies in the anaemic population was 1.9 times higher (95% Cl=1.0-3.4).[20] Badshah et al., in their study found that there is highly significant difference($P<0.01$) in the incidence of low birth weight babies among the anaemic mothers compared to non-anaemic mothers.[21] Their study also showed that anaemic mothers are at increased risk of small for gestational age infants. 15.9% in group A and 14.1% in group B had NICU admission. NICU admission was mainly seen in neonates with low birth weight and those who were suffering from neonatal sepsis, pneumonia and jaundice. 9.09% in group A and 4.48% in group B had neonatal sepsis. 4.5% in group A and 2.56% in group B had neonatal deaths in present study. 2.27% in group A and 0.6% in group B had intrauterine death. While the neonatal deaths were predominantly a result of complications developing due to preterm deliveries and low birth weight. Intrauterine deaths were mainly observed in patients with severe preeclampsia or eclampsia due to abruption or severe fetoplacental insufficiency. According to Prema K, there is usually a 2 to 3-fold increase in perinatal mortality when maternal haemoglobin levels fall below 8gm/dl and 8-10-fold increase when it falls below 5gm/dl.[22]

There were two maternal deaths (4.54%) among 44 patients with very severe anaemia over the period of 2 years of the duration of the study. In India, anaemia is directly or indirectly responsible for 40 per cent of maternal deaths. There is 8 to 10-fold increase in maternal mortality rate when the Hb falls below 5gm/dl.[19] According to WHO in India about 4-16% of maternal death is due to anaemia, which is similar to present study.[15] In Asia, anaemia (irrespective of severity) is the second leading cause of maternal death and account for 12.8% of maternal death independent of death due to postpartum haemorrhage.

There was statistically significant difference in mean birth weight in both groups indicating that the birth weight increased with increase in haemoglobin concentrations. Basically, a good haemoglobin concentration means a good nutritional status of the mother, resulting in a healthy baby from a healthy mother. Maternal anaemia is commonly considered a risk factor for low birth weight babies.

There were 6 neonatal deaths and 2 intrauterine deaths which were mainly as a result of complications of preterm births like neonatal sepsis, respiratory distress, pneumonia and jaundice.

CONCLUSION

This study reveals that severe anaemia which is commonly observed in the pregnancy in our country, gives rise to maternal and perinatal morbidities and mortalities. Therefore, anaemia in pregnancy is definitely a high risk needing aggressive antenatal treatment than the non-anaemic antenatal patients. Hence antenatal registration, early diagnosis and treatment of anaemia in pregnancy in our country, by various national and state level programs with improved outreach, can lead to a remarkable improvement in the pregnancy outcomes and will be foundation for further healthy population .

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