

ORIGINAL RESEARCH

Effect of anemia on pregnancy outcome: An Observational Study

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ABSTRACT

Background and Aim: Anaemia in pregnancy is a globally health-related issue that affects both mothers and their newborn. Objective of present study was to find association between maternal anaemia and neonatal complications and to find long term morbidity and mortality of babies born to anaemic mothers. **Material and Methods:** The Present Observational study was conducted in the department of Obstetrics and Gynecology, Tertiary Care Teaching Institute of India for the duration of 1 year. All subjects were analyzed in full details and hemoglobin estimation done during 1st visit, at 30th week and 36th week of gestation. Blood cultures were done in all the babies admitted to NICU for various reasons. Pre-tested questionnaire was administered and details like sociodemographic information, past history of medical illness, menstrual history were collected. A sample size of 300 was obtained using the hypothesis testing method. **Results:** Most numbers of participants (43.3%) were belonged to 19 to 24 years age group followed by 35.0% in 25 to 30 years and 11.0% in less than 18 years respectively. Almost 66.6% cases were multi-gravida and 60.0% cases pregnant within less than 2 years of previous pregnancy. Present study observed pregnancy related risk factor like PE, PROM, oligohydramnios, hypothyroidism, Rh -ve, placenta previa, GDM, GHTN, abruptio placenta etc. Severity of anaemia seen more among un-registered pregnant participants and multigravida participants and this association was statistically significant ($p < 0.05$). **Conclusion:** Anemia is the commonest medical disorder in pregnancy which exist world over and is a very common problem in most of the developing countries. It is not only a medical problem, but is a major public health problem. In country like India, it is frequently severe and contributes significantly to maternal mortality and reproductive health morbidity. 60-80% of pregnant women in developing countries have anaemia and 40% of maternal deaths in the third world are related to anaemia.

Key Words: Anaemia, Hemoglobin, Multi-gravida, Pregnancy

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INTRODUCTION

Anemia is crucial among all nutritional disorder in all over the world.¹ More than 50% female in the world suffering from anaemia during their pregnancy.²⁻⁵ Developing countries like India has a big issue of anaemia in pregnancy and reported 87% prevalence of anemia in pregnancy.

Iron deficiency anaemia during pregnancy leads to preterm birth, low birth weight and small-for-gestational age babies, and increases incidence of postpartum haemorrhage (PPH) and this the reason for the incidence of PPH is higher in India compared with the rest of the world.⁶⁻⁸

It is a well-established fact that there is a physiological drop in hemoglobin (Hb) in pregnancy due to increase in plasma volume, and hence decrease in blood viscosity. This aids in better circulation in the placenta but the nadir of this drop is variable, and

hence there was a need for criteria for defining anemia in pregnancy.

According to WHO, during pregnancy, anemia is identified by hemoglobin levels less than 11.0g/dl and may be divided into three levels of severity mild anaemia, moderate anaemia, and severe anaemia.^{9,10}

Anemia in pregnant women has been regarded as detrimental to the foetal growth and pregnancy outcome. In the mother, Anemia is associated with reduced physical performance, increased fatigue level, reduced cognitive performance, increased risk of infection and hospitalization, and inhibited lactation.¹¹⁻¹³ Also, pregnant women with anaemia are at a greater risk of perinatal mortality and morbidity. Adverse consequences for the foetus include spontaneous abortion, premature delivery, intrauterine foetal death, low birth weight, small for gestational-

age babies, hypertension, neurologic impairment, etc.¹⁴⁻¹⁶

Prevention and management of maternal anemia is crucial, especially Iron deficiency anemia that accounts for the most cases of anemia in pregnancy. There are four strategic approaches that have been established to prevent anemia and iron deficiency.¹⁷ These include dietary change in order to increase iron intake, weekly iron supplementation regime to prevent gestational anemia, food fortification such as wheat and rice and lastly general public health measures. The last intervention is a highly crucial approach that includes child spacing, improving the nutritional status of women, sanitation, immunization, control of diarrheal diseases, etc.^{17,18} Therefore, imposing a strengthened intervention program will not only improve the health of pregnant mothers but also the present and upcoming generation.

Most of the countries have adopted the policy of supplementing pregnant women with iron and folic acid with a view that increasing the Hb levels has some beneficial effect. Objective of present study was to find association between maternal anaemia and neonatal complications and to find long term morbidity and mortality of babies born to anaemic mothers.

MATERIAL AND METHODS

This was an observational study without any specific interventions done. Mothers were taken for the study as and when they arrived for antenatal check-up or delivery and remaining information was taken from their antenatal records. Remaining data was collected after the delivery of baby.

The study was conducted in the department of Obstetrics and Gynecology, Tertiary Care Teaching Institute of India for the duration of 1 year.

Inclusion criteria were; Mothers more than 18 years of age, Mothers less than 45 years of age and Mothers willing to participate in study.

Exclusion criteria were; Mothers less than 18 years of age, Mothers more than 45 years of age, Multiple Pregnancy, Presence of hemoglobinopathy (ex. Thalassemia) and Mothers not willing to participate in study.

All subjects were analyzed in full details and hemoglobin estimation done during 1st visit, at 30th week and 36th week of gestation. Blood cultures were done in all the babies admitted to NICU for various reasons. Pre-tested questionnaire was administered and details like sociodemographic information, past history of medical illness, menstrual history were collected. A sample size of 300 was obtained using the hypothesis testing method and based on following assumptions: 95% confidence intervals, prevalence of anemia in pregnancy in India was 51.0% from the previous study and 7.5% allowable error.¹⁹ The calculated minimum sample has been inflated by 10% to account for anticipated subject non-response.

The investigations that done on these subjects were:

- Hemoglobin percentage: Quantitative estimation of hemoglobin was done by Sahli's method
- Peripheral smear:

The type of anemia was studied by peripheral smear examination.

All the subjects were classified according to WHO criteria and according to degree of anemia all the subjects were treated with either oral iron or intravenous iron or blood transfusion and carefully followed in the antepartum, intrapartum and postpartum periods. Finally, the modes of delivery, maternal and perinatal outcome were studied in all the study subjects.

STATISTICAL ANALYSIS

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). Quantitative variables were described as means and standard deviations or median and interquartile range based on their distribution. Qualitative variables were presented as count and percentages. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

RESULTS

Table 1 show that mean age of study participants was 25.5 years. Most numbers of participants (43.3%) were belonged to 19 to 24 years age group followed by 35.0% in 25 to 30 years and 11.0% in less than 18 years respectively.

Socio-economic status was measured by Kuppuswami classification and divided in two categories. Almost 80% participants were in lower class. Around 39.33% participants were studied up to primary level followed by illiterate (30.66%), secondary level (21.66%) and graduation and above (8.33%) respectively. only 50.66% cases were enrolled as registered cases and 29.33% were referred cases.

Almost 66.6% cases were multi-gravida and 60.0% cases pregnant within less than 2 years of previous pregnancy. Present study observed pregnancy related risk factor like PE, PROM, oligohydramnios, hypothyroidism, Rh -ve, placenta previa, GDM, GHTN, abruptio placenta etc. Risk factor present in 58.0% cases and maternal complications in puerperium observed in 15% cases. Table 1 shows that moderate anemia observed in almost 52.2% cases followed by mild (30%) and severe (18%) respectively.

Table 2 shows that severe and moderate anaemia seen more among age group of 19-24 and 25-30 years respectively. This association was statistically significant ($p < 0.05$). Anaemia more seen among lower socio-economic class but and this association was not statistically significant ($p > 0.05$).

Severe and moderate anaemia seen more among illiterate participants and less among literate participants and this association was statistically

significant ($p < 0.05$). Severity of anaemia seen more among un-registered pregnant participants and multigravida participants and this association was statistically significant ($p < 0.05$). Present study observed statistically non-significant association between risk factor, space between pregnancy with severity of anaemia ($p > 0.05$).

LSCS observed more among participants with severe anaemia and this association was statistically significant ($p < 0.05$). Present study observed statistically significant association between foetal outcome with severity of anaemia ($p < 0.05$) but not between birth weight and severity of anaemia ($p > 0.05$).

Table 1: Clinico-social information of study participants (N=300)

Variable	Number	Percentage (%)
Age (Years)		
<18	33	11
19-24	130	43.33
25-30	105	35
>30	32	10.66
Socio-economic status		
Lower	240	80
Middle	60	20
Literacy status		
Illiterate	92	30.66
Primary	118	39.33
Secondary	65	21.66
Graduate and above	25	8.333
Registration status pregnancy		
Booked	152	50.66
Un-booked	60	20
Referred	88	29.33
Parity		
Primigravida	100	33.3
Multi-gravida	200	66.6
Risk factor		
Present	180	60
Absent	120	40
Degree of anaemia		
Mild	90	30
Moderate	156	52.2
Severe	54	18
Mode of delivery		
Vaginal	185	61.6
LSCS	115	38.3

* indicate statistically significance at $p \leq 0.05$

Table 2: Association between socio-clinical characteristics with severity of anaemia (N=300)

Variable	Severity of anaemia			P value
	Mild	Moderate	Severe	
Age				
<18	16	12	5	0.01*
19-24	50	65	15	
25-30	16	60	29	
>30	8	19	54	
Socio-economic status				
Lower	70	120	50	0.05*
Middle	20	36	4	
Literacy status				
Illiterate	12	45	35	0.03*
Primary	40	70	8	
Secondary	25	30	10	
Graduate and above	13	11	1	

Registration status pregnancy				
Booked	60	90	2	0.02*
Un-booked	18	40	2	
Referred	12	36	50	
Parity				
Primigravida	40	45	15	0.01*
Multi-gravida	50	111	39	
Space between pregnancy				
<2	21	72	27	0.25
>2	21	42	14	
Mode of delivery				
Vaginal	63	118	4	0.001*
LSCS	27	38	50	

* indicate statistically significance at $p \leq 0.05$

DISCUSSION

The prevalence of anemia assessed at a global scale demonstrates that it is highly prevalent among pregnant women. A study extracted from the WHO Vitamin and Mineral Nutrition Information System for 1993-2005 concluded that out of a survey data covering 48.8% of global population, 41.8% (56 million) of pregnant women were anemic amongst the estimated anemia prevalence being 47.4%²⁰

The various parameters of the subjects were studied, analyzed and evaluated with the standard literature reading available. In present study, 29.5% mild, 53% moderate and 17.5% were severely anemic. Majority of the anemic study subjects in the present study belonged to the age group of 20-24 years (46.5%). This was comparable with the results of Alli R et al.²¹

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Low socio-economic status is said to predispose to anemia, poor nutrition being the leading cause of anemia. In the present study, 82.5% of the anemic women belonged to the low socioeconomic group while 100% of women of the study of Alli R et al belong to the low socioeconomic group.²² Findings of the present study were also comparable with Rangnekar et al, in whose study 67% of anemic women belonged to low socio-economic group suggesting a close relationship between low socioeconomic conditions and pregnancy anemia.²³

Effective and adequate antenatal care is essential for early identification and treatment of anemia. In present study 53% of women were booked cases. 29.5% and 17.5% were unbooked and referred cases respectively. In present study 74.2% had severe anemias in unbooked and referred cases were also comparable with Awasthi A et al (83.5%).²⁴ Anemia in pregnancy is more common in women of high parity due to frequent pregnancy and inadequate spacing. Mean spacing between births has an impact on the hemoglobin status of women. In present study

spacing between pregnancy 2 years in 38.8%. It was comparable with Khandait DW et al, 55.9% and 44.1% in 2 years respectively.²⁵ Severity of anemia is positively associated with <2 years of spacing between two pregnancies with $p > 0.05$. A definitely association has been suggested between severe anemia and pregnancy induced hypertension. In the present study, 22.5% women had pregnancy induced hypertension. It was comparable with Awasthi A et al (24.5%) and Sarin AR et al (28.5%).^{24,26}

The commonest type of anemia in the present study was Microcytic Hypochromic anemia followed by Dimorphic anemia. Which was comparable with the study of Awasthi A et al (66.5%), Rangnekar GA et al (65%), Alli R et al (68%).^{21,23,24} In the present study, 91.5% of subject received oral iron. 51.5% and 13.5% received parenteral (IV) iron and blood transfusion respectively. The requirement of blood transfusion were more in unbooked and referred (31.4%) cases compared to booked cases, which is statistically significant. Preterm deliveries, IUGR and IUD were the important maternal outcome in present study, which was comparable with the study of Sarin AR who observed that 31.2% women had preterm deliveries. High incidence of preterm deliveries, IUGR and IUD were seen in spacing between pregnancy <2 years.²⁶

One of the recent study done in Muscat by Angelitta J and all suggests that maternal age, parity and late prenatal visit were independently associated with maternal anemia, low birth weight and preterm birth.²⁷ In 2010 one study done in India through a retrospective approach, 4,456 women's hospital record were reviewed and the result shows that 17.9% (798) of them were anemic, out of this 2.15% (96) of them were found to be severely anemic and six out of 96 women died due to severe anemia.²⁸

High incidence of adverse fetal outcome in the form of preterm, IUGR, NICU admission and IUD seen in present study. These were comparable with the observation of Awasthi A et al PT, IUGR and IUD and also comparable with Rangnekar et al PT, IUGR and IUD.^{23,24} In the present study, incidence of preterm deliveries in unbooked cases and referred cases were high compared with booked cases. High

incidence of IUGR was seen in unbooked and referred cases compared with booked cases. As anemia predisposes to birth asphyxia due to placental insufficiency, need for NICU admission were more. Among those unbooked and referred required more NICU admission compared to booked cases due to severe anemia. IUD was seen more in referred cases with severe anemia and associated risk factors were severe preeclampsia, GDM and PROM. These all outcome were statistically significant. Incidence of low birth weight babies in the present study was 46.3% which was comparable with 66% observed by Rangnekar et al and 69.1% by Khalida H et al.^{23,29} Limitations of the study were the study design was observational, which limits the establishment of a causal relationship between anaemia and adverse outcomes. Another limitation of this study was the small sample size and the fact that it was done in one tertiary hospital and hence the results cannot be generalized.

CONCLUSION

Anemia is the commonest medical disorder in pregnancy which exist world over and is a very common problem in most of the developing countries. It is not only a medical problem, but is a major public health problem. In country like India, it is frequently severe and contributes significantly to maternal mortality and reproductive health morbidity. 60-80% of pregnant women in developing countries have anaemia and 40% of maternal deaths in the third world are related to anaemia. Iron supplementation during pregnancy in iron deficient mothers improves iron status during pregnancy and postpartum period, thus providing some protection against iron deficiency in the subsequent pregnancy. Ensuring maternal iron sufficiency during gestation is the most cost-effective method of preventing perinatal iron deficiency and related morbidities. Joint social and medical efforts are required for overall improvement of living status of women. Proper antenatal care is the basic requirement for prevention, early detection and treatment of anaemia. Emphasis should be laid on prevention of anaemia by active participation of governmental and nongovernmental organizations, FOGSI, local societies etc.

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