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Original Research Article

Effect of anaemia on maternal and fetal outcome: an observational study

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ABSTRACT

Background: Anaemia in pregnancy is a globally health-related issue that affects both mothers and their new-born. Hence an observational study to see the effect of anaemia on maternal and foetal outcome was conducted.
Methods: 15024 mothers coming in OPD or IPD in past 4 years were recruited and their haemoglobin measured. Descriptive statistics was used for baseline characteristics. This observational study was conducted in department of obs and gynae, GSVM Medical College Kanpur from August 2018 to August 2022. All the data gathered was processed by SPSS version 25.
Results: The main outcomes included 4 maternal outcomes (postpartum haemorrhage, shock, ICU admission, and maternal mortality) and 4 neonatal outcomes (foetal growth restriction, birth weight, NICU admission, stillbirth). 60.03% of the mothers were anaemic in our study. Maternal and foetal complications were more in anaemic than non-anaemic mothers with incidence of PPH, shock, ICU admission, and maternal mortality being 14.07%, 11.33% ,4.30 and 1.31% respectively than non-anaemic mothers with incidence of 11.22%, 7.26%, 1.76%, and 7.28% respectively. Foetal outcome was also poorer in anaemic mothers with incidence of FGR, LBW, NICU admission, Still birth being 3.15%, 8.85%, 12.96%, and 1.09% higher than non-anaemic group with incidence being 1.80%, 3.43%, 9.75%, and 0.30 % respectively.
Conclusions: This observational study provides valuable insights into the effect of anaemia on both maternal and foetal outcomes. It emphasizes the importance of early detection and management of anaemia to mitigate the risks associated with this condition.

Keywords: Anaemia, Still birth, Postpartum haemorrhage, Shock, ICU admission

INTRODUCTION

Anaemia is a serious global public health problem that particularly affects young children and pregnant women. According to WHO 40% of pregnant women worldwide are anaemic, with maximum prevalence being in south east Asian countries.[1,2] In India, according to NFHS-V(National family health survey), 57 per cent of women have anaemia and During pregnancy 45.7% of women in urban areas and 52.1% in rural areas have haemoglobin levels <11 g/dl.[3]

It Is a well-established fact that there is a physiological drop in haemoglobin (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 anaemia in pregnancy.

According to WHO, during pregnancy, anaemia is identified by haemoglobin levels less than 11.0g/dl and may be divided into three levels of severity mild anaemia (Hb levels 9 to 10.9g/dl), moderate anaemia (Hb levels 7

to 8.9g/dl), and severe anaemia (Hb levels less than 7g/dl).[4,5] Anaemia in pregnant women has been regarded as detrimental to the foetal growth and pregnancy outcome. In the mother, Anaemia is associated with reduced physical performance, increased fatigue level, reduced cognitive performance, increased risk of infection and hospitalization, and inhibited lactation.[6-9] 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.[10-12] The role of anaemia in pregnancy and iron on the growing foetus has been studied in the last few decades. The outcome of these studies is either inconclusive or at the most supportive of the popular notions held so far regarding pregnancy outcome and anaemia. Hence, 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. Thus, we have conducted an observational study in our department to look for the effects of anaemia on maternal and foetal outcome.

METHODS

Study design

This is a retrospective 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.

Study setting and sample size

The study was conducted in the department of Obs and Gynae and department of paediatrics in GSVM Medical College, Kanpur with annual delivery rate of around 3022 and bedded Neonatal Intensive Care Unit. Study period was 4 years.

Inclusion criteria

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

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.

Sampling

This study was done over a period of 4 years. After obtaining consent, pregnant mothers were included provisionally into the study. They were initially interviewed and their antenatal record was checked. If they met any one of the exclusion criteria, they were excluded. Mothers once enrolled in the study, were followed till delivery to look for maternal and fetal outcome and their mean Hb in various trimesters. Mothers directly coming to us in labour were retrospectively followed for their Hb levels and maternal and fetal outcome was noted after delivery. All the data gathered was processed by SPSS (Statistical Package for the Social Sciences) version 25.

RESULTS

The mean haemoglobin level in various trimesters among the study population were as follows; Trend in haemoglobin over the three trimesters.

Table 1: Trend in haemoglobin over the three trimesters.

Parameters	Values
Mean Hb in T1	9.4 gm/dl
Mean Hb in T2	9.8 gm/dl
Mean Hb in T3	9.2 gm/dl

Among the total population size of 15024, 9015 (60.03%) of the mothers were anaemic at some point of the time while 6009 (39.96%) of the mothers were non anaemic. Highest percentage of anaemia was seen in third trimester with mean Hb of 9.2gm% followed by first trimester with mean Hb of 9.4gm% and second trimester with minimum prevalence of anaemia with mean Hb of 9.8gm%.

Table 2: Effect of anemia on maternal outcome.

Parameters	Anaemic mothers		Non anaemic mothers	
	N	%	N	%
PPH	1268	14.07	674	11.22
Shock	1021	11.33	436	7.26
Admission to ICU	388	4.30	106	1.76
Maternal mortality	118	1.31	52	0.87
No complication	6220	69.0	4741	78.90
Total	9015	100	6009	100

Chi-square value=109.69, p<0.0001

Maternal outcome was poorer in anemic population than non-anaemic population. Incidence of PPH was 14.07% higher in anemic group as compared to non-anaemic mothers where incidence of PPH was found to be 11.22%. In anaemic mothers shock was scene among 11.33 percentage of the population while in non-anaemic mothers it was seen in 7.26% of the population. 4.30% of the mothers in anaemic group were admitted to ICU with maternal mortality of 1.31% while in non-anaemic group 1.76% of the mothers were admitted in ICU with maternal mortality of 0.87%.

When foetal outcome was compared in anaemic versus non anaemic mothers it was found that anaemic mothers had higher incidence of foetal growth restriction, seen in 3.15% of the population as compared to non-anaemic mothers where incidence of FGR was only 1.8%. In anaemic mothers 8.85% of the babies were Low birth weight with NICU admission of 12.96% higher than non-anaemic mothers where 3.43% of the infants were low birth weight with NICU admission in 9.75% of mothers. Still birth was significantly higher in anaemic group with incidence that of 1.09% than non-anaemic mothers with incidence of 0.30%.

Table 3: Effect of anaemia on foetal outcome.

Parameters	Anaemic mothers		Non anaemic mothers	
	N	%	N	%
FGR	284	3.15	108	1.80
LBW	798	8.85	206	3.43
NICU admission	1168	12.96	586	9.75
Still	98	1.09	18	0.30
No complication	6667	73.95	5091	84.72
Total	9015	100	6009	100

Chi-square value=298.11, p<0.0001.

DISCUSSION

In recent years, there has been increased attention on the impact of anaemia during pregnancy on maternal and foetal outcomes. Anaemia is a condition characterized by a decrease in the number of red blood cells or a decrease in the level of haemoglobin in the blood. It is a significant public health concern, as it affects nearly 40% of pregnant women worldwide. This observational study aims to investigate the effect of anaemia on both maternal and fetal outcomes. The study design involved the collection of data from pregnant women attending prenatal clinics in a designated region. The study assessed various maternal and foetal outcomes including preterm birth, low birth weight, foetal growth restriction, foetal distress, and maternal complications.

The findings of the study revealed a clear association between anaemia and adverse pregnancy outcomes. Maternal complications, such as shock (11.3%), postpartum haemorrhage (14.07%), ICU admission (4.30 %), and mortality (1.31%) were significantly higher in anaemic women compared to non-anaemic women. This suggests that anaemia not only affects the mother's health during pregnancy but also increases the risk of complications during childbirth and postpartum period. This study is comparable with study done by Rani Hansda et al in 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%), Shock (8.9%), Maternal death (1.27%), eclampsia (8.72%).[13]

Furthermore, anaemia during pregnancy was found to have a negative impact on foetal outcomes. The incidence of FGR (3.15%), LBW (8.85%), NICU admission (12.96%), still birth (1.09%) was significantly higher in anaemic women compared to their non-anaemic counterparts. These results were comparable with retrospective cohort study at Nobel medical college Nepal by Ram Hari Ghimire et al during the period of April 2011 to April 2012 to find out the association between anaemia and perinatal and maternal complications showed the following; Intra uterine death occurred in 6%, preterm babies about 9.9%, IUGR babies-8.6%, Low birth weight babies-22%,Perinatal death 11%.[14] These findings highlight the importance of addressing anaemia during pregnancy to improve foetal growth and reduce the risk of adverse outcomes

Limitations

The study has several strengths, including a large sample size and the collection of data from a specific region, which enhances the generalizability of the results. However, there are also some limitations that should be considered. Firstly, the study design was observational, which limits the establishment of a causal relationship between anaemia and adverse outcomes. Secondly, the study did not investigate the aetiology of anaemia, as different types of anaemia can have differing effects on pregnancy outcomes.

CONCLUSION

Anaemia in pregnancy have a deleterious effect on both maternal and foetal outcome with higher incidence of maternal complications like PPH, shock, admission to ICU and maternal deaths seen in anaemic group than non-anaemic group with similar effects seen on foetus with higher incidence of foetal growth restriction, low birth babies, NICU admission and still birth seen in anaemic mothers than non-anaemic mothers.

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