



Study of Association between Anemia and Maternal/Foetal Health in A Tertiary Care Teaching Hospital

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ABSTRACT

Background: Anemia, characterized by insufficient red blood cells, varies by age, gender, and pregnancy stages. It is linked to higher morbidity and mortality in women and children, adverse birth outcomes, and reduced adult productivity. **Objectives:** This study aims to estimate anemia prevalence in pregnant women and its impact on maternal and fetal health. **Materials and methods:** A comparative prospective observational study over six months involved 150 pregnant women admitted to the labor room. Data were collected and analyzed using Microsoft Excel. **Results and discussion:** Results indicated that 76% of the pregnant women were anemic, while 24% had normal hemoglobin levels. Among them, 68.42% took nutritional supplements during pregnancy, and 37.57% did not. Low birth weight was observed in 58.77% of infants born to anemic mothers, compared to 41.22% with normal birth weights. The APGAR scores revealed that 22.80% of infants from anemic mothers had low scores, versus 18.66% from non-anemic mothers. Preterm deliveries were also more common among anemic mothers. **Conclusion:** The study concludes that anemia during pregnancy increases risks for both mother and child. There is a clear correlation between the severity of maternal anemia and adverse perinatal outcomes, including low APGAR scores, low birth weights, and increased incidence of preterm births. Gestational anemia significantly contributes to poor maternal and fetal health outcomes, emphasizing the need for effective management and prevention strategies to improve pregnancy outcomes.

Keywords: anaemia, birth outcome, haemoglobin, low birth weight, pregnancy

INTRODUCTION

Anemia is a condition where the number of red blood cells (RBCs) is insufficient to meet the body's physiologic needs. Specific physiologic needs vary with a person's age, gender, altitude, smoking behaviour, and different stages of pregnancy. Based on the level of hemoglobin (Hg), World Health Organization (WHO) cut-off points for anemia varies by age, sex, and pregnancy status. Anemia is an indicator of both poor nutrition and poor health. It is caused by multiple factors. Approximately 50% of all anemia can be attributed to iron deficiency (ID), with the rest due to conditions such as deficiencies of other key micronutrients including folate, vitamin B12, and inherited disorders that affect RBCs such as thalassemia, where diets are based mostly on staple foods with little meat intake.^[1]

Anemia is the second most common cause of maternal death in India and contributing to about 80% of the maternal deaths caused by anemia in South East Asia. Anemia is also an established risk factor for intrauterine growth retardation, leading on to poor neonatal health and perinatal death.^[2]

Severe anemia has adverse effects on the mother and the fetus. Major maternal complications directly related to anemia are not common in women with a hemoglobin level greater than 6 gr/dl. However, severe iron deficiency anemia may be presented by complications of pregnancy, such as placenta previa or abruptio placenta, operative delivery and postpartum haemorrhage. These conditions if untreated by iron supplementation or blood transfusion may lead to severe complications.^[3]

Inadequate folate intake may result in a macrocytic anaemia but the recommended nutrient intake values during pregnancy vary widely between countries. WHO advises 400 µg of FA supplementation to continue throughout pregnancy in response to foeto-maternal cellular requirements and evidence of dietary deficiency. women needed to start FA supplementation before they became pregnant to achieve RBC folate measurements associated with a decreased risk of NTDs. The relationship between maternal intake



of both dietary folate and FA supplementation in early pregnancy with haematological indices both at the first prenatal visit and as pregnancy advanced.^[4]

Pregnancy and childbirth are significant events not only for women but also for their families, often filled with hope and joyful anticipation. The main objective of antenatal care is to ensure the health and well-being of both the mother and the baby by the end of the pregnancy. Emphasizing quality over quantity, antenatal care involves specialized attention and preventive measures to support a healthy pregnancy.^[5]

The neonatal period encompasses the initial 28 days following birth and is categorized into three phases: very early (birth to less than 24 hours), early (24 hours to less than 7 days), and late (7 days to less than 28 days). The neonatal mortality rate (NMR) serves as a critical health indicator, measuring the number of deaths of infants under 28 days old per 1,000 live births. The primary causes of neonatal mortality include infections, prematurity, perinatal asphyxia, congenital anomalies, among other factors.^[6] In today's era of science and technology, quality of life is of utmost importance and is significantly influenced by the reduction of morbidity and mortality rates among newborns. Premature births account for the highest number of NICU admissions and are the leading cause of neonatal mortality. Infants born before the 37th week of gestation are classified as preterm. The majority of preterm infants are born between 32 and 37 weeks of gestation and often die unnecessarily due to inadequate basic care such as warmth and feeding support. In low-income countries, more than half of these preterm infants do not survive, although many could be saved with accessible and effective care.^[7]

The World Health Organization (WHO) estimated that over 50% of all women living in developing countries are anemic, compared with 18% in industrialized countries. However, the burden of this condition is more pervasive in Asia and Africa where 60 and 52% of women are estimated to be anemic respectively. Previous studies have reported that maternal anemia during pregnancy is associated with a higher risk of low birth weight, preterm birth, perinatal and neonatal mortality, maternal morbidity and mortality, and low productivity. Regardless, a large body of research has established links between maternal anemia in pregnancy and poor infant birth outcomes. However, little is known whether maternal anemia, in general, has an influence on childhood anemia after delivery.^[8]

MATERIALS AND METHODS

It is a comparative prospective observational study carried out for a period of 6 months from February 2023 - August 2023 in Navodaya Medical College Hospital & Research Centre, Raichur.

Sample size: Sample size was calculated and found to be 150.

Study criteria: pregnant women above 18 years of age who are admitted in the labour room of the hospital and are in the last trimester of pregnancy were included in the study.

Data collection: The project was done by visiting labour room daily as per schedule. A total of 150 cases were collected and documented, data on the demographics, birth weight of child, complications in delivery, BMI of patient and APGAR score of infants were used. The collected data on foetal outcome of maternal anaemia was subjected to evaluation based on indicators recommended by WHO. The other collected data was tallied using excel sheet 2021.

Data Evaluation: The collected data were analysed. Data was analysed using descriptive statistics namely total numbers, percentage and frequency for the demographic analysis. Other data was recorded and analysed using Microsoft excel 2021. Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS

The study was carried out with 150 participants who were admitted in the labour room of a tertiary care teaching hospital. The results were calculated after analysing all the collected data.

Age distribution

Out of 150 participants included in the study, majority of the participants were under the age group of 21-25, i.e., 54 participants and only 6 participants were under the age group of above 35 years (table 1).



TABLE 1: Age distribution of patients [N=150]

Age group (years)	Frequency(N)	Percentage (%)
15-20	35	23.33%
21-25	54	36%
26-30	40	26.66%
31-35	15	10%
>35	6	4%
Total	150	100%

Hb level of patients

Out of the 150 samples analysed, majority of the patients were found to be anaemic, i.e., about 114 of them were found to be anaemic and only 36 of the patients were non-anaemic (table 2).

TABLE 2: Distribution of pregnant woman according to Hb level [N=150]

Hb in g/dL	Number	Percentage
<11 g/dL	114	76%
≥11 g/dL	36	24%
Total	150	100%

Nutritional supplements among anemic population

Among anaemic population, 68.42% of the patients were taking iron supplements during their pregnancy period and only 31.57% of the anaemic patients were not taking any supplements during their pregnancy (table 3).

TABLE 3: Nutritional supplements among anemic population [N=150]

Nutritional supplements in anemic patients	Frequency	Percentage
Yes	78	68.42%
No	36	31.57%
Total	114	100%

Gender of baby

The gender of the new-borns was analysed and found that 50.66% of the babies were males and 48% of the babies were females. This data has no relation with the prevalence of anemia in pregnant women to their babies (table 4).

TABLE 4: Gender of new born baby [N=150]

Gender of newborn baby	Frequency	Percentage
Male	76	50.66%
Female	72	48%
Total	150	100%



Birth weight of baby

The data reveals that among anemic mothers, 58.77% gave birth to babies with low birth weight, i.e., less than 2.5Kg and 41.22% gave birth to babies with normal birth weight. Among the non-anemic mothers, 66.66% gave birth to babies with normal birth weight and only 33.33% of non-anemic mothers gave birth to babies with low birth weight (table 5).

TABLE 5: Birthweight of baby [N=150]

Birth weight of baby (kg)	Anemia		No anemia		Total	Percentage
	Frequency	Percentage	Frequency	Percentage		
Low birth weight (LBW)	67	58.77%	12	33.33%	79	52.66%
Normal birth weight (NBW)	47	41.22%	24	66.66%	71	47.33%
Total	114	100%	36	100%	150	100%

Delivery outcome

Out of 114 anemic cases, 112 mothers gave birth to live babies and 2 of them had a case of abortion. And in case of 36 non-anemic mothers, only 1 of them had a case of abortion

(table 6).

TABLE 6: Delivery outcome [N=150]

Delivery outcome	Anemia		No anemia		Total	Percentage
	Number	Percentage	Number	Percentage		
Live baby	112	98.24%	35	97.22%	147	98%
Still birth/dysmenorrhea	2	1.75%	1	2.77%	3	2%
Total	114	100%	36	100%	150	100%

APGAR score of infants

On analysis of the samples, it was found that 22.80% of anemic mothers had babies with low APGAR score and 5.55% of non-anemic mothers had babies with low APGAR score.

77.19% of anemic mothers had babies with normal APGAR score and 94.44% of non-anemic mothers had babies with normal APGAR score (table 7).

TABLE 7: APGAR score of newborn babies [N=150]

APGAR score	Anemia		No anemia		Total	Percentage
	Number	Percentage	Number	Percentage		
<7 (abnormal)	26	22.80%	2	5.55%	28	18.66%
≥7 (normal)	88	77.19%	34	94.44%	122	81.33%
Total	114	100%	36	100%	150	100%

Gestational age

Out of 46 pre-term deliveries, 42 were to anaemic mothers and only 5 were to non-anaemic mothers. Out of 97 normal deliveries, 67 were to anaemic mothers and 30 were to non-anaemic mothers. Out of 7 post-term deliveries, 1 was to non-anaemic mother and 6 were to anaemic mothers (table 8).

**TABLE 8: Gestational age [N=150]**

Gestational age	Anemic		Non-anemic		Total	Percentage
	Number	Percentage	Number	Percentage		
Pre-term	41	35.96%	5	13.88%	46	30.66%
Normal	67	58.77%	30	83.33%	97	64.66%
Post-term	6	5.26%	1	2.77%	7	4.66%
Total	114	100%	36	100%	150	100%

Mode of delivery

Out of 150 samples analysed, 88.59% of the anaemic mothers delivered through caesarean and only 11.40% delivered through normal delivery. In case of non-anaemic mothers, 52.77% delivered through caesarean and 47.22% delivered through normal mode of delivery (table 9).

TABLE 9: Mode of delivery [N=150]

Mode of delivery	Anemic		Non-anemic		Total	Percentage
	Number	Percentage	Number	Percentage		
Caesarean	101	88.59%	19	52.77%	120	80%
Normal	13	11.40%	17	47.22%	30	20%
Total	114	100%	36	100%	150	100%

DISCUSSION

The results of the present study on the categorization of pregnant women according to their haemoglobin level reveals that majority of the patients had a haemoglobin level less than 11g/dl, i.e., they were anaemic (76%) and the rest were found to be normal (24%). This is depicted in **Table 2**. This data was found to be similar to the study conducted by Tazeen Shah et al. [9]. The current study reveals that majority of the pregnant women in the hospital were taking nutritional supplements during their pregnancy period (68.42%) and the remaining were not taking any supplements during the gestation (31.57%). This is depicted in **Table 3**. The current study depicts that the gender of the infants born to anaemic mothers did not have any association with the anaemic status of the patients. The gender of the infants was almost equal, i.e., male infants (50.66%) and female infants (48%). This is depicted in **Table 4**. In the present study, anaemic status in association with birth weight of the infant were studied and found that majority of the anaemic mothers had infants with low birth weight (58.77%) and 41.22% had infants with normal birth weight. This in comparison with non-anaemic mothers, majority had infants with normal birth weight (66.66%) and only 33.33% had infants with low birth weight. This is depicted in **Table 5**. This shows a similar data to the study conducted by Tazeen Shah et al. The study reports that the majority of the deliveries had live infants in both anaemic as well as non-anaemic mothers (98%) and 2% of the patients had still birth. In this, majority were to anaemic mothers. This is depicted in **Table 6**. This produces a similar result to the study conducted by Suryanarayana R et al. the present study revealed the APGAR status of the new born infants and found that in anaemic mothers, majority of the infants were born with a low APGAR compared to non-anaemic mothers, i.e., 22.80% and 18.66% respectively. This is depicted in **Table 7**. This produces a similar result to the study conducted by Smith C et al. [10] The gestational age among anaemic and non-anaemic women were analysed and was found that majority of the pre-term deliveries were to anaemic mothers (35.96%) as compared to the non-anaemic mothers (13.88%) also the post-term deliveries were more in case of anaemic mothers (5.26%) as compared to non-anaemic mothers (2.77%). The normal gestational age on the other hand were more in case of non-anaemic mothers (83.33%) as compared to anaemic mothers (58.77%). This is depicted in **Table 8**. In the current study, the comparison of mode of delivery of anaemic and non-anaemic mothers were carried out and found that majority of the caesarean deliveries were to anaemic mothers (89.59%) as compared to non-anaemic mothers (52.57%) and in case of normal deliveries, majority were seen in case of non-anaemic mothers (42.22%) compared to anaemic mothers (11.40%). This is depicted in **Table 9**. This shows a similar result to the study conducted by Suryanarayana R et al.



CONCLUSION

This study pinpoints the effect of maternal anaemia in infants observed in patients who are admitted in labour room of NMCH & RC, Raichur. The current study could assess the effect of maternal anaemia on infants. High prevalence of anemia in pregnant women (76%) indicates that anemia continues to be a major public health problem in rural areas of India. Anemia in pregnancy increases the maternal and fetal risks. To improve maternal and fetal outcome, it is recommended that the primary health care has to be strengthened and high priority has to be given to aspects such as prevention, early diagnosis, and treatment of anemia in pregnancy. It can be concluded that severity of anemia is directly proportional to poor and adverse perinatal outcomes in pregnancy. Gestational anemia is a probable cause of low Apgar, low birth weight, and small for gestational age (SGA) babies. Treating iron deficiency before conception or early in the antenatal period may help reduce maternal morbidity and perinatal morbidity and mortality. Awareness regarding maternal anaemia and its adverse outcome on new born infants should also be provided to the clinicians and other health care providers in order to take precautions to avoid any adverse effect on foetus as well as to improve the health condition of pregnant women.

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