

# EFFECTS OF ANEMIA ON PREGNANCY OUTCOMES AT MANIPAL TEACHING HOSPITAL

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## ABSTRACT

### Introduction

Anemia is one of the most common disorders affecting the pregnant women in the developing countries like Nepal. Anemia during pregnancy is commonly associated with adverse pregnancy outcomes. Identifying iron deficiency anemia in pregnancy and knowing its common complications will help improve maternal quality care.

### Objectives

The objective was to assess the effects of anemia on pregnancy outcome at Manipal Teaching Hospital

### Methodology

This cross sectional study was conducted in Manipal Teaching Hospital from September 2019 to April 2020. A total of 200 anemic pregnant ladies attending obstetrics Out Patient Department were selected. Hemoglobin level was taken as criteria for deciding anemia and to classify severity of anemia. Anemia in pregnancy is defined by World Health Organization as hemoglobin level less than 11 gm/dl, and hemoglobin concentration of 10–10.9 g/dl, 7–9.9 g/dl, and <7 g/dl was considered as mild, moderate, and severe anemia, respectively. All were treated depending on severity of anemia and followed up for maternal and perinatal outcome. Data was collected in Microsoft Excel and analyzed by using SPSS version 16.

### Result

We found moderate anemia in 129 (64.5%) cases followed by mild in 61(30.5%) and severe in 10(5%) cases. Common maternal complications in anemic patients were premature rupture of membrane in 30 (15%) cases and Urinary Tract Infection in 30(15%) cases. During puerperium Postpartum Hemorrhage was observed in 12(6%) and wound infection in 9 (4.5%) cases of anemic patient. High incidence of adverse fetal outcome in the form of preterm in 39 (19.5%), Intrauterine growth restriction in 23(11.5%), Intensive Care Unit admission in 28(14%), low birth weight in 41(20.5%) and Intrauterine Death in 4(2%) cases of anemic patients were seen.

### Conclusion

Maternal infection and adverse perinatal outcome in form of intrauterine growth restriction, Intensive Care Unit admission, low birth weight and perinatal death were significantly associated with anemia in pregnancy.

## KEY WORDS

anemia; neonatal; outcome; pregnancy.



## INTRODUCTION

Anemia is one of the most common disorders affecting the pregnant women in the developing countries. Some degree of physiological dilution in hemoglobin concentration is part of normal pregnancy physiology which is recognized as physiological anemia.<sup>1</sup> It is important to distinguish pathological anemia from physiologic anemia, as well as to identify other less common causes of anemia that may require treatment. Pathological anemia can have serious adverse effects on maternal and child health.<sup>1</sup> Anemia is defined by World Health Organization (WHO) as hemoglobin level less than 11 gm/dl in pregnancy. Anemia was classified based on the WHO criteria as hemoglobin concentration of 10–10.9 g/dl, 7–9.9 g/dl, and <7 g/dl was considered as mild, moderate, and severe anemia, respectively.<sup>2</sup> The Prevalence of anemia in pregnant women all over the world is 38% and is as high as 73% among pregnant women in Nepal.<sup>3,4</sup>

The causes of anemia during pregnancy in developing countries are multi factorial; these include micro nutrient deficiencies of iron, folate, and vitamins A and B12 and anemia due to parasitic infections such as malaria and hookworm or chronic infections.<sup>5</sup> Anemic patient are increased risk of maternal morbidity and mortality especially, those with severe anemia. Anemia causes maternal morbidity due to increased susceptibility to infections, physical weakness and increased risk of postpartum hemorrhage. Neonate born to anemic mother encounter negative consequences including low birth weight, preterm birth, intrauterine growth restriction, need of intensive care unit admission and perinatal deaths.<sup>1,6</sup> Managing anemia in pregnancy will help to prevent adverse fetal and maternal outcomes as well as reduce the need for allogeneic red blood cell transfusion.<sup>7</sup>

Severe anemia causes lot of complication in pregnancy. In Nepal many studies were done on anemia in pregnancy showing high prevalence but relatively few studies has been done to analyze the maternal and fetal outcome. We aimed at finding the incidence of maternal and perinatal complications with mild and moderate anemia in our center.

## METHODOLOGY

This cross sectional study was conducted in Manipal Teaching Hospital from September 2019 to April 2020. Data collection was done after ethical permission from institutional review committee (MEMG/IRC/267/ GA;12/09/ 2019) and verbal consent of clients. The sample size was calculated using formula,

$$n = Z^2 \times p \times (1-p) / e^2 = 1.96^2 \times 0.67 \times (1 - 0.33) / 0.07^2 = 0.7909 / 0.0049 = 173$$

Where,

n= required sample size.

p=proportion 67%, taken from the previous study.<sup>8</sup>

e= margin of error, 7%.

Z= 1.96 at 95% Confidence Interval.

Therefore, the calculated sample size was 173. Adding a non-response rate of 15%, the sample size was 199.

A total of 200 anemic pregnant lady attending obstetrics Out Patient Department in third trimester (more than 28 weeks of gestation) for the first time were selected. Exclusion criteria were all pregnant woman less than 28 weeks of gestation, multiple pregnancy, patients with chronic disease such as, hypothyroidism, chronic renal failure, severe cardiac disease, chronic liver disease and chronic lung disease. Physical examination and hemoglobin estimation was done at first visit in third trimester. Pre-tested questionnaire was administered and details like age, gravida, period of gestation, past history of medical illness, menstrual history was collected. Patients were investigated for complete hemogram, urine routine examination and microscopy, stool routine examination and microscopy, peripheral blood smear and any other investigation as and when required. Anemia was classified based on the WHO criteria; HB concentration of <11 g/dl was considered as anemia. Hemoglobin concentration of 10–10.9 g/dl, 7–9.9 g/dl, and <7 g/dl was considered as mild, moderate, and severe anemia, respectively.<sup>2</sup>

According to degree of anemia, all the subjects were treated with either oral iron or blood transfusion and carefully followed in the antepartum, intrapartum and postpartum periods. Finally, the modes of delivery, maternal complications in the form of pregnancy induced hypertension (PIH), premature Rupture of membrane (PROM), Antepartum hemorrhage (APH), infections, postpartum hemorrhage (PPH) and wound infection and perinatal complications in the form of preterm birth, IUGR (intra uterine growth restriction), low birth weight, intensive care unit (ICU) admission and perinatal deaths were noted in all the study participants. Data collection was done after ethical clearance of IRC and verbal consent of patient. The data were recorded in an Excel sheet and descriptive analysis was performed using SPSS 16 version statistical software.

## RESULT

In our study we included 200 anemic patients. We observed that majority of anemic patients (64.50%) showed moderate anemia followed by mild (30.5%) and severe (5%) anemia (table 1).

**Table 1:** Proportion of severity of Anemia in Study participants (n=200)

Degree of anemia	n =200=(%)
Mild anemia	61(30.5)
Moderate anemia	129(64.5)
Severe anemia	10(5)



**Table 2:** Socio-clinical information of study population (n=200).

Socio-clinical Variables		n =200 (%)
Age	<20	10(5)
	20-29	119(59.50)
	≥30	71(35.50)
Period of gestation at the time of delivery	<37 weeks	39(19.50)
	≥37 weeks	161(80.5)
Gravida	Primigravida	80(40)
	Multigravida	120(60)
Mode of delivery	Caesarean section	108(54)
	Vaginal delivery	92(46)

The mean age of study participants was 27.3 years with standard deviation of 5.2 years. Majority of the anemic patient (59.50%) belonged to age group of 20-29 years. Anemia were more common in multigravida (60%) and majority (54%) of patients were delivered through caesarean section. (Table 2)

**Table 3:** Maternal complication and perinatal complication in study population (n=200)

Complications		n =200(%)
Maternal complication	Premature rupture of membrane	30(15)
	Antepartum hemorrhage	9(4.5)
	Pregnancy Induced Hypertension	15(7.5)
	Urinary Tract Infection	30(15)
	Post Partum Hemorrhage	12(6)
	Blood transfusion	36(18)
	wound infection	9(4.5)
Perinatal complications	Preterm birth	39(19.50)
	Intra Uterine Growth Restriction	23(11.5)
	Perinatal death	4(2)
	Intensive Care Unit admission	28(14)
Birth weight	<2.5 kg	41(20.5)
	≥2.5 kg	159(79.5)

Premature rupture of membrane (15%) and urinary tract infection (15%) were common complications in anemic patients. Complication in neonate in form of low birth weight were 20%, preterm birth were 19.5%, intra uterine growth restriction were 11.5%, perinatal death were 2% and admission to intensive care unit were 14%. (Table 3)

**Table 4:** Association of socio-clinical Information with severity of anemia.

Variables		Mild anemia (n=61)	Moderate anemia (n=129)	Severe anemia (n=10)	P value
Age (Years)	<20	4(6.6%)	5(3.9%)	2(20%)	0.161
	20-29	39(63.9%)	74(57.4%)	6(60.0%)	
	≥30	18(29.5%)	50(38.8%)	2(20.0%)	
Gravida	primigravida	31(50.8%)	47(36.4%)	2(20.0%)	0.066
	multigravida	30(49.2%)	82(63.6%)	8(80.0%)	
Mode of delivery	Cesarean section	39(63.9%)	65(50.4%)	4(40.0%)	0.140
	Vaginal delivery	22(36.1%)	64(49.6%)	6(60.0%)	

We found that cases of mild, moderate and severe anemia were more common in the age group of 20-29 year (63.9%, 57.4% and 60% respectively). Cases of mild, moderate and severe anemia were found in multigravida (49.2%, 63.6% and 80% respectively). Increase association of cesarean section was found in mild anemic cases (63.9%). (Table 4)

**Table 5:** Association of maternal complications with severity of anemia.

Maternal Complications	Mild anemia (n=61)	Moderate anemia (n=129)	Severe anemia (n=10)	P value
Pregnancy Induced Hypertension	4(6.5%)	11(8.52%)	0	0.401
Premature rupture of membrane	11(18.03%)	19(14.72%)	0	0.159
Urinary Tract Infection	16(26.22%)	13(10.07%)	1(10%)	0.013
Antepartum hemorrhage	0	9(6.97%)	0	0.017
Postpartum hemorrhage	5(8.19%)	6(4.6%)	1(10%)	0.543
Blood transfusion	3(4.91%)	16(12.4%)	10(100%)	0.0001
Wound infection	1(1.63%)	6(4.65%)	2(20%)	0.034

We analyzed that postpartum hemorrhage (10%) and wound infection (20%) were more in patient with severe anemia, where as pregnancy induced hypertension (8.52%) and antepartum hemorrhage (6.97%) were more among patient with moderate anemia. In patient with mild anemia common pregnancy complications were urinary tract infection (26.22%) and Premature rupture of membrane (18.3%). Present study observed statistically significant association of urinary tract infection ( $p=0.013$ ), APH ( $p=0.017$ ) and wound infection ( $p=0.034$ ) with severity of anemia. (table 5)

In present study, 91.5% patients were treated with oral iron and 8.5% required blood transfusion during pregnancy. Among them all the patient of severe anemia received blood transfusion and 7(5.4%) patient of moderate anemia received blood transfusion during pregnancy. Whereas during postpartum period one patient (10%) of severe anemia, nine (6.9%) patients of moderate anemia and three (4.9%) patients of mild anemia required blood transfusion, which is statistically significant ( $p=0.0001$ ) with severity of anemia.

**Table 6:** Association of perinatal complication with severity of anemia.

Perinatal Complications	Mild anemia (n=61)	Moderate anemia (n=129)	Severe anemia (n=10)	P value
Intra uterine growth restriction	11(18.03%)	9(7.14%)	3(30%)	0.014
Preterm birth	11(18.03%)	24(18.60%)	4(40%)	0.24
Perinatal death	0	2(1.55%)	2(20%)	0.018
Intensive Care Unit Admission	3(4.91%)	19(14.70%)	2(20%)	0.007
Low Birth Weight	8(13.11%)	28(21.70%)	5(50%)	0.024

Whereas we found that fetal complications like intrauterine growth restriction (30%), preterm birth (40%), perinatal death (20%), intensive care unit admission (20%), low birth weight (50%) were increased among the patient with severe anemia. And association of fetal complication like Intra uterine growth restriction, perinatal death, Intensive care



unit admission and low birth weight ( $p=0.014$ ,  $P=0.018$ ,  $p=0.007$  and  $p=0.024$  respectively) were statistically significant with severity of anemia. (table 6)

## DISCUSSION

In this study 200 anemic patients were included. We found that majority of the patients had moderate (65%) anemia followed by mild (30%) cases of anemia which is similar to study done by L. Gede few et al (60% and 34.3%) and by O. T. Okube et al (70.7% and 26.3%) where majority of the cases of anemia were moderate followed by mild.<sup>9,10</sup> Whereas Severe anemia among patients in present study was low (5%) which was similar to study done by Singh P et al from western Nepal (4.29%).<sup>8</sup>

In our study we found that anemia was more common in the age group of 20-29 years (59.5%) and among the multigravida patients (60%). This study was comparable to the study done by Ghimire RH et al where 67% were of age group 20-29 and 60% were multigravida.<sup>11</sup> It is generally believed that anemia in pregnancy increases with rising parity and maternal age. Multigravida may induce anemia by reducing maternal iron reserves at every pregnancy and by causing blood loss at each delivery.<sup>12</sup>

In present study 91.5% patients received oral iron and 18% patients received blood transfusion which is similar to study done by Upadhaya N.<sup>13</sup>

Common maternal complications in present study was premature rupture of membrane (15%) and Urinary tract infection (15%). This result was comparable to the study done by Upadhaya C et al and Ghimire et al where Premature rupture of membrane in 26% and infections in 16 were observed.<sup>11,13</sup> Whereas with increasing severity of anemia, significant association of Antepartum hemorrhage ( $p=0.017$ ), Urinary tract infection ( $p=0.013$ ) and wound infection during puerperium ( $p=0.034$ ) was noted. Although we observed increased risk of postpartum hemorrhage (10%) in patient of severe anemia but are not statistically significant. Ghimire et al and Dare FO et al also observed significant association of infection with severity of anemia.<sup>11,14</sup> Low iron level during anemia alters the function of host immune system. In addition, low hemoglobin level causes lower oxygen saturation at peripheral tissue. Delay in wound healing and low infection prevention finally leads to high risk of developing post procedure infection.<sup>15</sup>

In our study we observed high incidence of perinatal complications in form of preterm birth (19.5%), Intra uterine growth restriction (11.5%), Intensive care unit admission (14%), low birth weight (20.5%) and perinatal death (2%). These were comparable with the study done by Shradha S. Maka et al where preterm (20%), Intra uterine growth

restriction (28%), Neonatal care unit admission (25%) and Intra uterine death (3%) were observed. Our result were also comparable with the observation of Neerja singa let al where preterm birth (17%), perinatal death (3.5%), Intensive care unit admission (28.5%) and low birth weight babies (27.5%) were seen.<sup>16,17</sup> We found that perinatal complication was more among the patient of severe anemia and were statistically significant. Anemia decreases the blood flow and lowers oxygen saturation to the uterus and placenta which can be the reason of low birth weight baby and Intra uterine growth restriction among the patient of severe anemia.

## CONCLUSION

From present study it was concluded that anemia in pregnancy was associated with common complication such as urinary tract infection and premature rupture of membrane. Whereas ante partum hemorrhage, wound infection during puerperium, requirement of blood transfusion and perinatal complication in form of Intra uterine growth restriction, perinatal death, Intensive care unit admission and low birth weight were significantly associated with severity of anemia.

## RECOMMENDATION

Anemia during pregnancy is associated with adverse maternal and fetal outcomes. Proper antenatal care and regular visit during pregnancy is required to improve maternal and fetal outcome.

## LIMITATIONS OF STUDY

First limitation was that we have done the hemoglobin estimation at first visit in third trimester and not after that, so we don't know the status of anemia at the time of delivery.

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## CONFLICT OF INTEREST

None declared

## FINANCIAL DISCLOSURE

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