



## **Severity of Maternal Anemia and Feto-Maternal Outcome at Tertiary Care Hospital**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors RRJ and Nousheen Memon designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors Nazia Memon and AFS managed the analyses of the study. Author AGD managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Objective:** To determine the severity of anemia among pregnant women and its impact on feto-maternal outcome at tertiary care Hospital.

**Materials and Methods:** This was a cross-sectional study; conducted at gynae department of LUMHS; during 6 months from November 2019 to April 2020. Women with age >15 years, visited antenatal clinic and admitted for delivery and those who were admitted through emergency with labour pain and either of parity were included. A 3 ml fresh blood sample was taken from each woman and was sent immediately to the Hospital diagnostic laboratory for the assessment of haemoglobin level. Mothers having haemoglobin levels <11 g/dL, were considered as anemic. All the information regarding feto-maternal outcome, in terms of maternal and fetal complications including prolonged Hospital stays mortality were documented via self-made study proforma. Data analysis was done by using SPSS version 20.

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**Results:** Total 150 pregnant women were enrolled. Maternal mean age was 26.83±4.13 years and mean gestational age was 35.96±2.61 weeks. Most of the women utilized an unsatisfactory diet. Out of all, 83(55.3%) women underwent C-sections and 67(44.7%) underwent normal vaginal deliveries. majority of the women 90(60.0%) underwent blood transfusion. Maternal anemia was highly prevalent (90.7%). Moderate anemia was most common in 64(42.7%) women, followed by mild anemia among 39(26.0%) women, and 33(22.0%) women were severely anemic, while only 14(9.3%) were found with normal haemoglobin level. According to maternal and fetal outcomes, 02.7% women had acute kidney injury, 02.0% had blood transfusion reaction, pre-eclampsia was seen in 06.0% women, 04.7% women were admitted in ICU and mortality rate was 04.7%. Pre-term birth rate was 35.3%, ABG was seen in 26.7% of the cases, early neonatal death rate was 02.0%, neonatal intensive care unit (NICU) admission rate was 02.7% and intrauterine death was 15.3%.

**Conclusions:** Severity of anemia observed to be highly prevalent in our population and found to be associated with adverse fetomaternal outcomes.

*Keywords: Anemia; complications; mortality.*

## 1. INTRODUCTION

Pregnancy is an important aspect of a mother's life; however it also comes with a higher risk of various complications for both the fetus and the mother [1]. Anemia is among the most common complications that affect people all over the world [1]. In low-income nations, anaemia during pregnancy remains a prevalent issue, leading to a significantly adverse effect on both the child and the mother [2]. It has a number of negative impacts on maternal health, including a decrease in immune function, a higher likelihood of cardiac dysfunction, and an increase in the likelihood of risks associated with childbirth [2]. The prevalence of anaemia indicates the nutritional status of a community and it often goes untreated especially in pregnant women where it can be most dangerous [3]. Anemia during pregnancy has a wide range of prevalence and causes, based on where you live. In underdeveloped nations, the prevalence of anaemia is up to 35-75%, compared to just 19% in developed nations [4,5]. Though, according to the World Health Organization (WHO) the incidence of anaemia among pregnant population to be about 38% [3]. Even though the incidence of anaemia among pregnant females in urban regions is similar to those attending antenatal facilities in a privately owned, tertiary hospital facilities in Karachi (29 - 50%) [6-8]. As per severity, mild anemia was reported in 75.0% of pregnant females, moderate anemia in 14.8% and severely anemia was reported in 0.7% of pregnant females, however only 9.5% had normal haemoglobin level [6]. However, Anemia during pregnancy is a preventable condition that can be quickly detected and managed with readily available

procedures and equipment that are both inexpensive and effective to use in primary healthcare settings [1,9]. This study has been conducted to evaluate the severity of anemia in pregnant females and its impact on fetomaternal outcome at tertiary care Hospital.

## 2. MATERIALS AND METHODS

This was a cross-sectional study; conducted at gynae department of LUMHS; during 6 months from November 2019 to April 2020. All the women with age >15 years, visited antenatal clinic and admitted for delivery and those who were admitted through emergency with labour pain and either of parity were included. All the women who were not agreeing to participate in the study were excluded. Complete medical history and clinical examination were done. After taking informed consent a 3 ml fresh blood sample was taken from each woman and was sent immediately to the Hospital diagnostic laboratory for the assessment of haemoglobin level. Mothers having haemoglobin levels <11 g/dL, were considered as anemic. As per severity of anemia, hemoglobin level 9.0 to 10.9 g/dL was considered as mild anemia, hemoglobin levels 7.0 to 8.9 g/dL were considered as moderate anemia and hemoglobin levels less than 7.0 g/dL were considered as severe anemia. All the women underwent normal vaginal deliveries and C-sections as per requirements. All the information regarding fetomaternal outcome, in terms of maternal and fetal complications including prolonged Hospital stays mortality were documented via self-made study proforma. Data analysis was done by using SPSS version 20. Categorical variables were presented in the form of frequency and percentage. Numerical

variables were analyzed in the form of mean and standard deviation. Chi-square test was applied and a p-value <0.05 was considered as significant.

### 3. RESULTS

Total 150 pregnant women were enrolled to observe the severity of anemia and feto-maternal outcome. Maternal mean age was found to be 26.83±4.13 years and mean gestational age was 35.96±2.61 weeks. The majority of the women were booked 124(82.7%), and 26(17.3%) were un-booked. Most of the women 86(57.3%) were uneducated. Out of all, 124(82.7%) women were house wives followed by 17(11.3%) factory worker, 07(4.7%) school teacher, 07(4.7%) field worker and one woman had private job. Most of the women 126(84.0%) had compliant of generalized weakness, 54(32.7%) had palpitation, 37(24.7%) had dyspnea and 101(67.3%) had easy fatigability. Most of the women 83(55.3%) utilized unsatisfactory diet.

83(55.3%) women underwent C-sections and 67(44.7%) underwent normal vaginal deliveries. Most of the women 90(60.0%) underwent blood transfusion, 1-2 blood transfusions were given by 90(60.0%) women. Out of all, 90.7% women were anemic, moderate anemia was most common in 64(42.7%) women, followed by 39(26.0%) of women were mild anemic, and 33(22.0%) women were severely anemic, while only 14(09.3%) were found with normal haemoglobin level Table 1.

According to maternal outcome 02.7% women had acute kidney injury, 02.0 had blood transfusion reaction, pre-eclampsia was in 06.0% women, 04.7% women were admitted in ICU and mortality rate was 04.7% Table 2.

As per neonatal outcome, pre-term birth rate was 35.3%, ABG was seen in 26.7% of the cases, early neonatal death rate was 02.0%, NICU admission rate was 02.7% and intrauterine death rate was 15.3% Table 2.

**Table 1. Demographic characteristics of the patients n=150**

Variables	Statistics
Age	Mean±SD 26.83±4.13 years
Gestational age	Mean±SD 35.96±2.61 weeks
Parity	Mean±SD 3.2±1.54
Booking status	Booked 124(82.7%) Un-booked 26(17.3%)
Educational status	Educated 64(42.7%) Uneducated 86(57.3%)
Occupation	Housewife 124(82.7%) Factory worker 17(11.3%) School teacher 07(4.7%) Field worker 07(4.7%) Private job 01(0.7%)
Presenting complaints	Palpitation 54(32.7%) Generalized weakness 126(84.0%) Dyspnea 37(24.7%) Fatigability 101(67.3%)
Diet history	Satisfactory 67(44.7%) Unsatisfactory 83(55.3%)
Mode of delivery	NVD 67(44.7%) C-section 83(55.3%)
Number of blood transfusions	NO 28(18.7%) 1-2 90(60.0%) 3-4 29(19.4%) >4 03(02.1)
Anemia	Mild 39(26.0%) Moderate 64(42.7%) Severe 33(22.0%) Normal haemoglobin level 14(09.3%)

**Table 2. Patients distribution according to fetal and maternal outcome n=150**

	<b>Variables</b>	<b>Frequency</b>	<b>Percent</b>
Maternal outcome	No complications	100	66.7
	PPH	43	28.7
	Acute kidney injury	04	02.7
	Blood transfusion reaction	03	02.0
	HELP syndrome	01	0.7
	DIC	02	01.3
	Severely fatigue	65	43.3
	Pre-Eclampsia	09	06.0
	ICU admission	07	04.7
	Mortality	07	04.7
<b>Neonatal complications</b>			
Birth	Pre-term	53	35.3
	Term	97	64.7
Complication	Normally survived	80	53.3
	ABG	40	26.7
	Low birth weight	33	22.0
	ENND	03	02.0
	NICU	04	02.7
	IUD	23	15.3

ENND= Early neonatal death, NICU= Neonatal Intensive care unit, IUD= Intrauterine death

#### 4. DISCUSSION

In underdeveloped nations, anaemia affects nearly 2/3rd population of pregnant females, contributing to foeto-maternal mortality and morbidity. Anaemia during pregnancy is a major public health issue around the world. In this study, maternal mean age was 26.83±4.13 years and mean gestational age was 35.96±2.61 weeks. 82.7%, and 17.3% were un-booked and most of the women 86(57.3%) were uneducated. Study conducted by Aamir F et al. [10] reported that the patients' mean age was 26 years. Most patients (82%) were aged between 20 and 30 years. Out of all those who received antenatal care, 60% of mothers were booked and 40% of mothers were un-booked. In current study, 90.7% of the pregnant females were anemic, moderate anemia among 64(42.7%) of the pregnant women remain the most common condition, followed by 39(26.0%) of women were mild anemic, and severe anemia was seen among 33(22.0%) of women, while only 14(9.3%) were found with normal haemoglobin level. In a large retrospective cohort Indian study, Nair et al. [11] reported that 35% of pregnant females were moderately to severely anemic. In the present study, according to maternal outcome, 02.7% women had acute kidney injury, 02.0 had blood transfusion reaction, pre-eclampsia was seen in 06.0% women, 04.7% women were admitted in ICU and mortality rate was 04.7%. There is insufficient

data on known haemoglobin concentrations under which the likelihood of mortality raises and no prospective cohort studies have shown that anaemia itself raises the likelihood of maternal mortality. A large study conducted by Chi I et al. [12] from Indonesia reported that the rates of maternal mortality for females with <100 g/L of hemoglobin concentration was 70 deaths per 10000 deliveries in comparison to nonanemic women (19.7 deaths per 10000 deliveries). Though, the researchers suggested that the connection between anaemia and maternal mortality was due to a higher level of haemorrhage and a late admission time instead of the influence of prenatal anaemia.

In this study, as per neonatal outcome, pre-term birth rate was 35.3%, ABG was seen in 26.7% of the cases, early neonatal death rate was 02.0%, NICU admission rate was 02.7% and the intrauterine death rate was 15.3%. Study conducted by Mahmood T et al<sup>4</sup> reported that adverse neonatal outcomes like small-for-gestational-age (73% anemic vs. 23% non-anemic; p-value <0.0001), low birth-weight (59% anemic vs. 29% non-anemic; p-value <0.0001), preterm delivery (39% anemic vs. 15% non-anemic; p-value <0.0001), early neonatal death (9% anemic vs. 2% non-anemic; p-value 0.000), and stillbirth (8% anemic vs. 3% non-anemic; p-value 0.01) were correlated more with being anemic. Low hemoglobin levels can cause placental angiogenesis to change, resulting in

foetal hypoxia. Hemoglobin depletion, as per this concept, may lead to a decrease in oxygen and nutrients to the foetus because of defects in placental transportation. A decrease in uterine blood perfusion, an increase in vascular resistance, as well as growth restriction of the trophoblastic layer, which is accountable for expelling maternal arterial circulation towards placenta, are all possible components of restriction in uterine growth. Thus, gaseous exchange within the fetomaternal complex may be limited, resulting in insufficient/low birth weight (LBW). Another study conducted by Pena Rosas JP et al. [13] reported that maternal anemia correlates with low birth-weight (LBW). Another study by Demmouche A et al. [14] found correlation between mean birth weight and anemia. Result revealed that The mean birth weight of neonates born to a mother who had anemia during pregnancy was 303.73 g, which was significantly lower than the mean birth weight among neonates born to mothers who did not have anemia ( $p = 0.04$ ). Lone, et al. [7] reported that anaemic population of Pakistan has 1.9 fold higher risk of giving birth to LBW babies. Ahmed, et al. [15] stated that maternal anaemia is associated with raised likelihood of LBW. In Pakistan, other research studies also reported comparable findings [16]. There is close association between LBW and anaemia. Jones et al. [17] also documented a raised likelihood of LBW babies being born to mothers who have anaemia, however the variance from non-anaemic group in the above reported study was statistically non-significant ( $p$ -value =0.11). Badshah et al. [18] documented that the projected prevalence statistics for LBW babies reveals a rises in anaemic mothers from Tribal regions of Pakistan, with a greatly significant variance in the prevalence ( $p < 0.01$ ) of LBW babies being born to mother who have anemia in comparison to mothers without anaemia. Moreover, the above study reported that mothers who have anaemia are at a raised likelihood of giving birth to babies that are small for gestational age in comparison to mothers without anemia. Mavalankar et al. [19], from Ahmedabad, India also reported the findings in line with the study of Badshah et al. [15], in terms of the maternal anemia's effect on low birth weight.

## 5. CONCLUSION

As per findings of the study, severity of maternal anemia was highly prevalent as 22.0% of the women had severe anemia. This is an alarming

sign of adverse outcomes associated with maternal and fetal health. Maternal anemia was found to be responsible for adverse fetal and maternal outcome. PPH, pre-eclampsia, ICU admission were the commonest maternal complications with maternal mortality rate of 04.7%. However as per fetal outcome pre-term births, ABG, low birth weight and IUD were frequency found. In this study most of the women were booked but mostly they did not follow the complete visits and proper medications and this may because of poor socioeconomic status and maternal illiteracy. However proper management strategies should be developed to the prevent the severity of anaemia among pregnant women.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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