

# Impact Of Anemia on Feto-Maternal Outcomes In One Of The Tertiary Care Hospitals In Khyber Pakhtunkhwa

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## Abstract

**Objective:** This descriptive case series aimed to determine the frequency of feto-maternal outcomes in pregnant women with iron deficiency anaemia at the Mardan Medical Complex, Mardan. The study was conducted between December 2020 and May 2021 in the Department of Obstetrics and Gynecology.

**Methods:** A total of 125 pregnant women diagnosed with anaemia were included in the study. Participants were followed up until delivery, and fetomaternal outcomes, including gestational hypertension, preeclampsia, postpartum haemorrhage, prolonged labour, low Apgar score, low birth weight, preterm delivery, and early neonatal death, were recorded based on predefined operational definitions.

**Results:** The study participants ranged from 18 to 40 years, with a mean age of  $27.784 \pm 3.13$  years. The mean gestational age was  $30.112 \pm 2.89$  weeks. Among the participants, gestational hypertension was observed in 47.2% of patients, preeclampsia in 60.8%, postpartum haemorrhage in 33.6%, prolonged labour in 40%, low Apgar score in 50.4%, low birth weight in 30.4%, preterm delivery in 28.8%, and early neonatal death in 8%.

**Conclusions:** The study findings suggest that maternal anaemia, specifically iron deficiency anaemia, increases the risk of adverse maternal and neonatal outcomes. It is crucial to closely monitor and promptly treat pregnant women with iron anaemia to reduce the risk of feto-maternal complications.

**Keywords:** Pregnancy, Iron deficiency anemia, Feto-maternal outcomes.

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## 1. Introduction

Anaemia is a widespread health concern, affecting a significant portion of the global population. Iron deficiency is the primary cause of anaemia worldwide, particularly among women. Various factors such as gastrointestinal illnesses such as inflammatory bowel disease, celiac disease, chronic kidney disease, cancer, and chronic heart failure can increase the risk of anaemia and iron deficiency. These conditions may also influence clinical outcomes.<sup>1</sup> During pregnancy, maternal anaemia is a common occurrence, with approximately 50% of pregnant women worldwide being affected.<sup>2</sup> Iron deficiency anaemia, characterized by low haemoglobin and serum ferritin levels, can have detrimental effects on both the mother and the baby.<sup>3</sup> The World Health Organization (WHO) defines maternal anaemia during pregnancy based on specific haemoglobin concentration cutoff values, which may vary slightly depending on healthcare guidelines and populations.<sup>4</sup> Regular prenatal care is crucial for monitoring haemoglobin levels and addressing signs of anaemia to ensure a healthy pregnancy outcome.

Maternal anaemia is linked with low birth weight, prematurity, perinatal mortality, maternal infections, and reduced tolerance to blood loss and infection.<sup>2,3</sup>

Additionally, it can negatively impact infant neurodevelopment.<sup>4</sup> Regardless of its cause, maternal anaemia has been linked to various adverse maternal and neonatal outcomes, such as cesarean sections, blood transfusions, low APGAR scores, preterm delivery, small-for-gestational-age infants, postpartum haemorrhage, and preeclampsia.<sup>3,5</sup>

Several studies have examined the frequency of fetomaternal outcomes in pregnancies complicated by iron deficiency anaemia. Mahmood et al. (2018) reported a high frequency of gestational hypertension, preeclampsia, postpartum haemorrhage, prolonged/obstructed labour, low birth weight, preterm delivery, and early neonatal death in women with iron deficiency anaemia during pregnancy.<sup>5</sup> Adnan et al. (2019) also found elevated frequencies of gestational hypertension, postpartum haemorrhage, low birth weight, and low APGAR scores in pregnant women with iron deficiency anaemia.<sup>6</sup>

In Pakistan, a significant proportion of women experience anaemia during pregnancy, underscoring the importance of investigating the frequency of

fetomaternal outcomes in this population. While extensive research has focused on neonatal outcomes, there is a dearth of information regarding maternal outcomes. Therefore, further studies are needed to determine the frequency of adverse outcomes associated with iron deficiency anaemia during pregnancy and to develop targeted interventions for pregnant women in Pakistan.

**2. Materials & Methods**

This descriptive case series was conducted in the Department of Obstetrics and Gynaecology, Mardan Medical Complex, Mardan from December 1, 2020, to May 30, 2021. The sample size of 125 was calculated using the WHO sample size software, with a 95% confidence level, 5% margin of error, and expected prevalence of early neonatal death by 8.9% in pregnancy with iron deficiency anaemia. The sampling technique was Non-probability consecutive sampling. Women aged 18-40 years with singleton pregnancy on ultrasound, gestational age > 20 weeks, parity 0-4, and maternal anaemia were included in the study. The World Health Organization (WHO) defines maternal anaemia in pregnancy as a haemoglobin concentration below 11.0 grams per deciliter (g/dL) in the first and third trimesters and below 10.5 g/dL in the second trimester.

Women with a history of thalassemia, sickle cell anaemia, and with antepartum haemorrhage, were excluded from the study.

Patients who met the inclusion criteria were enrolled after ethical committee permission. Baseline demographic information was collected, and informed consent was taken. Fetomaternal outcomes were noted until delivery. Quantitative variables were analyzed for mean ± standard deviation, while frequencies and percentages were calculated for qualitative variables. Fetomaternal outcomes were stratified by age, gestational age, parity, poor economic status, and education level. Post-stratification was done through the chi-square test, with a p-value less than 0.05 considered significant.

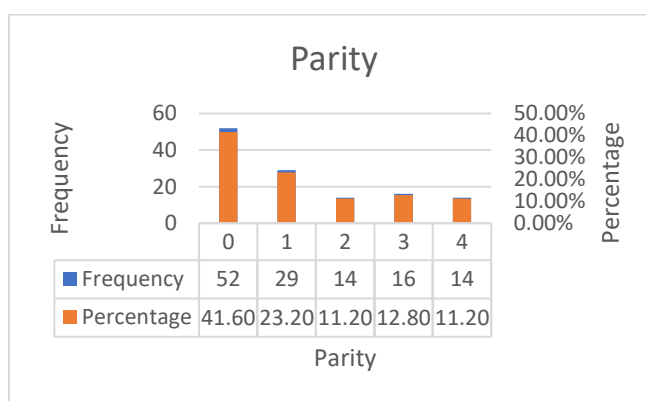
**3. Results**

Table 1 depicts the mean age and standard deviation of 27.784±3.13 years while the mean gestational age and standard deviation was 30.112±2.89 weeks. The frequency and percentages of complications associated with pregnancy were assessed; Gestational hypertension was observed in 47.2% of the patients, preeclampsia 60.8%, postpartum haemorrhage 33.6%, prolonged labour 40%, low Apgar score 50.4%, low birth weight

30.4%, preterm delivery 28.8% and early neonatal death in 8% of the patients.

**Table 1: Mean ± Standard Deviation of age(years) and gestational age(weeks); frequency distribution of characteristics associated with pregnancy**

Characteristics	Mean	Standard Deviation
Age (Years)	27.784	3.13
Gestational Age (Weeks)	30.112	2.89
Characteristics	Frequency	Percentage
Gestational Hypertension		
Yes	59	47.2%
No	66	52.8%
Preeclampsia		
Yes	76	60.8%
No	49	39.2%
PPH		
Yes	42	33.6%
No	83	66.4%
Prolonged Labour		
Yes	50	40%
No	75	60%
Low Apgar Score		
Yes	63	50.4%
No	62	49.6%
Low Birth Weight		
Yes	38	30.4%
No	87	69.6%
Preterm Delivery		
Yes	36	28.8%
No	89	71.2%
Early Neonatal Death		
Yes	10	8%
No	115	92%



**Figure 1: Frequency and Percentage of patients according to parity.**

Figure 1 shows the frequency distribution and percentage of patients according to parity. The

frequency of parity levels 0,1,2,3 and 4 was 52, 29, 14, 16, and 14 respectively.

Table 2: presents the stratification of fetomaternal outcomes concerning gestational hypertension with age, gestational age, and parity while preeclampsia with age, gestational age, and parity. All of the data shows non-significant results.

**Table 2: Stratification of fetomaternal outcomes concerning Gestational Hypertension and Preeclampsia.**

Age (years)	Gestational Hypertension		p-value
	Yes	No	
18-30	45(46.4%)	52(53.6%)	0.736
31-40	14(50%)	14(50%)	
Gestational age (weeks)	Gestational Hypertension		p-value
	Yes	No	
21-30	30(45.5%)	36(54.5%)	0.679
>30	29(49.2%)	30(50.8%)	
Parity	Gestational Hypertension		p-value
	Yes	No	
0-2	43(45.3%)	52(54.7%)	0.440
3-4	16(53.3%)	14(46.7%)	
Age	Preeclampsia		p-value
	Yes	No	
18-30	57(58.8%)	40(41.2%)	0.385
31-40	19(67.9%)	9(32.1%)	
Gestational age (weeks)	Preeclampsia		p-value
	Yes	No	
21-30	38(57.6%)	28(42.4%)	0.435
>30	38(64.4%)	21(35.6%)	
Parity	Preeclampsia		p-value
	Yes	No	
0-2	55(57.9%)	40(42.1%)	0.236
3-4	21(70%)	9(30%)	

Table 3 illustrates the stratification of prolonged labour and low Apgar score with age, gestational age (weeks), and parity level at p-value>0.05 which depicts that there is no significant association between these variables. Stratification of low birth weight concerning age and parity level shows a significant association at p-value<0.05 except gestational age (weeks).

Table 4 illustrates the stratification of low birth weight with a parity level at p-value>0.05 which shows that there is no significant association, it also shows the

stratification of preterm delivery concerning gestational age and parity level at p-value>0.05 with a non-significant association, early neonatal death concerning age and parity level also shows a non-significant association at p-value>0.05

**Table 3: Stratification of Prolonged Labour Concerning Age**

Age (years)	Prolonged Labour		p-value
	Yes	No	
18-30	40(41.2%)	57(58.8%)	0.599
31-40	10(35.7%)	18(64.3%)	
Prolonged Labour concerning Gestational age (weeks)	Prolonged Labour		p-value
	Yes	No	
21-30	27(40.9%)	39(59.1%)	0.826
>30	23(39%)	36(61%)	
Prolonged Labour concerning parity	Prolonged Labour		p-value
	Yes	No	
0-2	40(42.1%)	55(57.9%)	0.275
3-4	10(33.3%)	20(66.7%)	
Low Apgar Score concerning age	Low Apgar score		p-value
	Yes	No	
18-30	52(53.6%)	45(46.4%)	0.182
31-40	11(39.3%)	17(60.7%)	
Low Apgar Score concerning gestational age (weeks)	Low Apgar Score		p-value
	Yes	No	
21-30	31(47%)	35(53%)	0.417
>30	32(54.2%)	27(45.8%)	
Low Apgar Score concerning parity	Low Apgar Score		p-value
	Yes	No	
0-2	52(54.7%)	43(45.3%)	0.084
3-4	11(36.7%)	19(63.3%)	
Low Birth Weight concerning age	Low Birth Weight		p-value
	Yes	No	
18-30	25(25.8%)	72(74.2%)	0.036
31-40	13(46.4%)	15(53.6%)	
Low Birth Weight concerning gestational age (weeks)	Low Birth Weight		p-value
	Yes	No	
21-30	23(34.8%)	43(65.2%)	0.253
>30	15(25.4%)	44(74.6%)	
Low Birth Weight concerning parity	Low Birth Weight		p-value
	Yes	No	
0-2	23(24.2%)	72(75.8%)	0.007
3-4	15(50%)	15(50%)	

**Table 4: Stratification of Low Birth Weight Concerning parity**

Parity	Low Birth Weight		p-value		
	Yes	No			
0-2	23(24.2%)	72(75.8%)	0.007		
3-4	15(50%)	15(50%)			
<b>Preterm Delivery concerning gestational age.</b>					
Gestational age (weeks)	Preterm Delivery		0.69		
	Yes	No			
21-30	18(27.3%)	48(72.7%)			
>30	18(30.5%)	41(69.5%)			
<b>Preterm Delivery concerning parity</b>					
Parity	Preterm Delivery		0.275		
	Yes	No			
0-2	25(26.3%)	70(73.7%)			
3-4	11(36.7%)	19(63.3%)			
<b>Early Neonatal Death concerning age</b>					
Age (years)	Early Neonatal Death		0.164		
	Yes	No			
18-30	6(6.2%)	91(93.8%)			
31-40	4(14.3%)	24(85.7%)			
<b>Early Neonatal Death concerning parity</b>					
Parity	Early Neonatal Death		0.127		
	Yes	No			
0-2	6(6.3%)	89(93.7%)			
3-4	4(13.3%)	26(86.7%)			
No	2(5.3%)	36(94.7%)			
<b>Early Neonatal Death concerning educational level.</b>					
Educational level	Early Neonatal Death		Total	p-value	
	Yes	No			
Uneducated	Yes	2(3.4%)	37(56%)	39 (31.2%)	0
	No	57(96.6%)	29(44%)		
Primary	Yes	6(10%)	39(59%)	45(36%)	0
	No	53(90%)	27(41%)	80(64%)	
Secondary	Yes	0(0%)	19(28.8%)	19(15.2%)	0
	No	59(100%)	47(71.2%)	106(84.8%)	
Graduate	Yes	1(1.7%)	16(24.2%)	17(13.6%)	0
	No	58(98%)	50(75%)	108(86.4%)	
Higher	Yes	1(1.6%)	4(6%)	5(4%)	0.213

#### 4. Discussion

Anaemia is a global health issue that affects individuals worldwide, including females of reproductive age. Our study focused on the fetomaternal outcomes of anaemia in a developing country. However, the findings in our study are specific to the population and setting studied and cannot be generalized to other regions. The study revealed that maternal anaemia was associated with various adverse outcomes. Among the patients included

in the study, 47.2% experienced gestational hypertension, 60.8% had preeclampsia, 33.6% suffered from postpartum haemorrhage, 40% had prolonged labour, 50.4% had a low Apgar score, 30.4% gave birth to low birth weight babies, 28.8% experienced preterm delivery, and 8% had early neonatal death. These findings are consistent with previous studies conducted by Mahmood et al. and Adnan et al., which reported similar rates of adverse outcomes associated with iron deficiency anaemia during pregnancy.<sup>9</sup> These outcomes include gestational hypertension, preeclampsia, postpartum haemorrhage, prolonged/obstructed labour, low birth weight, preterm delivery, and early neonatal death. Studies from other developing South Asian countries have also reported comparable trends, with adverse neonatal outcomes including low placental weight, low birth weight/very low birth weight, poor Apgar score, small for gestational age, fetal anaemia, birth asphyxia, stillbirth, and preterm delivery.<sup>7,8</sup> The adverse maternal outcomes include preeclampsia, postpartum haemorrhage, infections, and cesarean delivery. While in developed countries the incidence of nutritional anaemia in pregnancy is declining, it still poses risks for poor maternal outcomes. Studies conducted in Scotland and Finland have shown that maternal anaemia increases the risk of, severe obstetric haemorrhage, antepartum haemorrhage, the need for blood transfusion, preterm delivery, postpartum infection, maternal death, small for gestational age, and neonatal intensive care unit admission.<sup>10,11</sup> Currently, there are no standard guidelines for the management of labour and delivery in women with moderate-to-severe anaemia. Further research is needed to assess the value of treating anaemia as an independent risk factor in predicting pregnancy outcomes, particularly through interventional studies with larger sample sizes and focusing on anaemia of various etiologies.

Early neonatal death with educational level shows a significant association at p-value <0.05 except for higher education level. Another study showed that the median overall prevalence of low back pain was higher among females than males across all age groups, contradicting our findings.<sup>23</sup>

#### 5. Conclusion

In conclusion, our study highlights the association between maternal anaemia and adverse maternal and

neonatal outcomes. It emphasizes the importance of identifying at-risk women and providing them with timely and adequate care. Furthermore, awareness campaigns should be conducted to educate women about the significance of maternal nutrition and its impact on the health of both the mother and newborn. This awareness should extend beyond pregnant women to encompass all women of childbearing age.

#### CONFLICTS OF INTEREST- None

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**Potential competing interests:** None to report

#### Contributions:

S.Y - Conception of study

S.Y, M.S - Experimentation/Study Conduction

M.M.S - Analysis/Interpretation/Discussion

M.S - Manuscript Writing

S.Y, M.S, M.M.S - Critical Review

S.Y, M.S, M.M.S - Facilitation and Material analysis

#### References

- Hershko C, Hoffbrand AV, Keret D, Souroujon M, Maschler I, Monselise Y, Lahad A. Role of autoimmune gastritis, *Helicobacter pylori* and celiac disease in refractory or unexplained iron deficiency anaemia. *Haematologica*. 2005 Jan 1;90(5):585-95.
- Milman N. Anemia—is still a major health problem in many parts of the world! *Annals of haematology*. 2011 Apr;90:369-77.
- Joshi M, Gumashta R. Weekly iron folate supplementation in adolescent girls—an effective nutritional measure for the management of iron deficiency anemia. *Global Journal of Health Science*. 2013 May;5(3):188.
- Algarin C, Karunakaran KD, Reyes S, Morales C, Lozoff B, Peirano P, Biswal B. Differences in brain connectivity in adulthood are present in subjects with iron deficiency anemia in infancy. *Frontiers in aging neuroscience*. 2017 Mar 7;9:54.
- Karshalev E, Zhang Y, Esteban-Fernández de Ávila B, Beltrán-Gastélum M, Chen Y, Mundaca-Uribe R, Zhang F, Nguyen B, Tong Y, Fang RH, Zhang L. Micromotors for active delivery of minerals toward the treatment of iron deficiency anemia. *Nano letters*. 2019 Oct 7;19(11):7816-26.
- Shafi M, Taufiq F, Mehmood H, Afsar S, Badar A. Relation between depressive disorder and iron deficiency anemia among adults reporting to a secondary healthcare facility: a hospital-based case-control study. *J Coll Physicians Surg Pak*. 2018 Jun 1;28(6):456-559.
- Tariq S, Isran BZ, Kiani SN, Shabir R. Maternal Anemia and Risk of Small for Gestational Age. *Annals of King Edward Medical University*. 2022 Aug 4;28(2):200-4.
- Sattar S, Sultana S, Shadab W, Afzal S, Salma UE, Mobeen A. Comparison of Safety and Efficacy of Ferric Carboxymaltose with Iron Sucrose for the Treatment of Iron Deficiency Anemia in Pregnancy. *InMed. Forum* 2023 Feb 16 (Vol. 34, No. 2).
- Mahmood T, Rehman AU, Tserenpil G, Siddiqui F, Ahmed M, Siraj F, Kumar B. The association between iron-deficiency anemia and adverse pregnancy outcomes: a retrospective report from Pakistan. *Cureus*. 2019 Oct 7;11(10).
- Rukuni R, Bhattacharya S, Murphy MF, Roberts D, Stanworth SJ, Knight M. Maternal and neonatal outcomes of antenatal anemia in a Scottish population: a retrospective cohort study. *Acta obstetrica et gynecologica Scandinavica*. 2016 May;95(5):555-64.
- Räisänen S, Kancherla V, Gissler M, Kramer MR, Heinonen S. Adverse Perinatal Outcomes Associated with Moderate or Severe Maternal Anaemia Based on Parity in F inland during 2006–10. *Paediatric and perinatal epidemiology*. 2014 Sep;28(5):372-80.