

Frequency and Maternal Outcomes in Women with Severe Iron Deficiency Anemia Presenting in Third Trimester

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Abstract

Objective: To determine frequency of severe iron deficiency anemia (IDA) and maternal outcome among women presenting in third trimester to a tertiary care Hospital

Methodology: A descriptive cross-sectional study was carried at department of Obs and Gynae LUMHS, from July 2025 to December 2025. Women aged 18 to 45 years, during third trimester (gestational age 25 to 37 weeks) with singleton fetus were included. A 3 cc blood sample was drawn from each case and send to the institutional laboratory to evaluate the severe iron deficiency anemia, which was defined in terms of hemoglobin level <7 gm/dl with serum ferritin <12 ng/mL. Furthermore patients were assessed for maternal outcomes. All the data was collected via study proforma and analyzed on SPSS version 20.

Results: Mean age of women was 30.4 ± 4.4 years, mean gestational age of 36.3 ± 2.6 weeks, mean BMI 24.3 ± 3.3 kg/m², and the overall mean hemoglobin level was 8.0 ± 2.2 g/dL. Around one-third of the women (29.1%) had severe IDA, followed by moderate anemia (45.5%), and mild anemia 25.5%. Gestational hypertension and prolonged labor were observed most common complications, (33.6% and 32.7%) respectively, followed by preterm births (31.8%), antepartum hemorrhage 12.7%, postpartum hemorrhage (PPH) and wound infection each affected 10.9%. Moreover the less commonly, AKI was occurred in (4.5%) cases and ICU admissions were (4.5%), while no maternal mortality was noted. However, the most of the adverse outcomes were significantly associated with severe anemia in contrast to mildly anemic patients ($p < 0.05$).

Conclusion: The severe Iron deficiency anemia was observed highly frequent among women during third trimester of pregnancy as a significant maternal health concern, predominantly affecting low-income, multiparous women with poor iron supplementation.

Keywords: Pregnancy, 3rd trimester, IDA, maternal Outcomes.

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Introduction

Iron deficiency anemia (IDA), a significant determinant of fetomaternal health, is among the most prevalent nutritional disorders, affecting around 36.5% of pregnant population around the world.^{1,2} The burden of IDA among pregnant women is disproportionately higher in resource-limited areas, as high as 50%–70% compared to 30%–40% reported from developed nation.^{2,3} IDA significantly contributes to maternal mortality and morbidity, and fetomaternal

complications, such as post-partum haemorrhage, preeclampsia, preterm birth, and low birth weight, besides poor maternal health and perinatal mortality.^{4,5}

Although a significant proportion of pregnancies are complicated by IDA, more severe forms tend to develop in trimester of pregnancy due to increased physiological demands of pregnancy. Globally, around 75% of pregnancies are affected in their third trimester.⁶

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Daily iron absorption requirement significantly increases during pregnancy. The foetus development additionally requires iron absorption of 320 mg per day besides 450 mg additionally required to support red cell mass expansion in singleton pregnancy, which may lead to iron stores depletion. Iron stores depletion during pregnancy increases the likelihood of severe anemia.⁷ Studies suggest that in third-trimester, IDA significantly increases the risk of preterm birth, postpartum hemorrhage, and cesarean delivery, contributing to increased healthcare utilization and adverse maternal and perinatal outcomes.^{7,8} IDA associated maternal outcomes are particularly concerning due to its association with depressive symptoms and cognitive impairments among pregnant mothers, which not only affects maternal-infant bond but also compromises quality of life. This condition can lead to long-term behavioral deficits and cognitive impairment among children born to mothers with IDA.⁸

During third trimester, iron deficiency anemia can result in anemia during infancy and long-term developmental delays, leading to morbidity and mortality among children born to these mothers.⁹ The severe IDA during the 3rd trimester of pregnancy represents a critical obstetric concern, as this period coincides with maximum fetal iron requirements and the physiological base of maternal hemoglobin concentrations, making both mother and baby particularly susceptible to complications. The severe IDA remains highly prevalent in the developing countries, where significant deficiencies of nutrition, antenatal care access very limited, and the high parity collectively preserves its burden. The 3rd trimester of pregnancy is of specific clinical significance, as anemia occurrence at this stage allows minimal time for management prior to the birth, significantly raising the risk of adverse maternal outcomes. Generally, the correlation between anemia and poor pregnancy outcomes is well established; however, evidence specifically characterizing maternal outcomes among women presenting with severe IDA exclusively in the third trimester remains limited. The present study was therefore conducted to explore the spectrum and magnitude of maternal complications associated with severe anemia during the third trimester, with the ultimate aim of informing timely clinical intervention, strengthening antenatal screening protocols, and reducing the preventable burden of maternal morbidity and mortality in this vulnerable population.

Methodology

A descriptive cross-sectional study was carried at department Obstetrics and Gynaecology, Liaquat University of Medical and Health Sciences, Jamshoro, Hyderabad. Study was conducted during six month after approval of synopsis from CAPS and Institutional Ethical Review Committee of LUMHS, from July 2025 to December 2025. A sample size of 110 pregnant women of third trimester was calculated using WHO sample size calculator and taking proportion of IDA in third trimester as 83.3% 12 absolute precisions as 07% and 95% confidence interval. Women aged 18 to 45 years, during third trimester (gestational age 25 to 37 weeks) assessed on LMP with singleton fetus were included. However, the women with a history of medical disorders (chronic hypertension or diabetes mellitus), thrombocytopenia, fever or foul-smelling liquor, gestational diabetes mellitus and those who were not agreeing to take a part of study were excluded.

Informed consent was obtained after explaining the purpose, procedure, and benefits of the study. After talking demographic assessment, the detailed medical history and clinical examination were done. Height and weight were measured on wall mounted scale and electronic weight scale, to calculate the BMI by the formula weight in kg divided by height in meter square. A 3 cc blood sample was drawn from each case and send to the institutional laboratory to evaluate the Serum Hemoglobin level and serum ferritin level. The severe iron deficiency anemia was defined in terms Hb level 7 gm/dl or less plus serum ferritin < 12 ng/mL.

Furthermore, patients were assessed for maternal outcomes in terms of antepartum hemorrhage (APH), postpartum Hemorrhage (PPH) (Loss of more than 500 ml or 1000 ml of blood post SVD and C section respectively), gestational hypertension and prolonged labor (delivery after 20 or more hours of contractions). All the information was collected via study proforma. Data were entered and analyzed on SPSS version 20.

Normality of data was assessed by Shapiro Wilk test. Mean and standard deviation were computed for age, BMI and gestational age. Frequency and percentages were computed for parity, IDA, APH, PPH, Gestational hypertension and prolonged labor. Effect modifiers like age, parity, gestational age and BMI were addressed through stratification. Post stratification Chi square test was applied taking significance level at 0.05.

Results

This study enrolled 110 pregnant women with a mean age of 30.4 ± 4.4 years, mean gestational age of 36.3 ± 2.6 weeks, mean BMI 24.3 ± 3.3 kg/m², and the mean hemoglobin level was 8.0 ± 2.2 g/dL. Additionally, most of the women (75.5%) were multiparous and 24.5% were primiparous. Majority of the women (75.5%), belonged to the low-income group, followed by middle (23.6%), and upper-middle class women were only (0.9%). Regarding iron supplementation, a significant part of women 43.6% had never taken iron supplements and 40.0% irregularly used, while only 16.4% regularly used. Table I

Variables	Statistical analysis	
Age	30.38±4.37 years	
Gestational age	36.28±2.60 weeks	
BMI	24.34±3.27 kg/m ²	
HB	8.05±2.16	
Parity		
Yes	27	24.5%
No	83	75.5%
SES		
Low	83	75.5%
Middle	26	23.6%
Upper-middle	1	0.9%
Iron supplementation		
Irregular	44	40.0%
Never	48	43.6%
Regular	18	16.4%

According to the severity of anemia, severe anemia was in approximately one-third women (29.1%), followed by moderate anemia (45.5%), while mild anemia was the least common among 25.5% of women, indicating a higher burden of significant anemia across the study population as shown in figure 1.

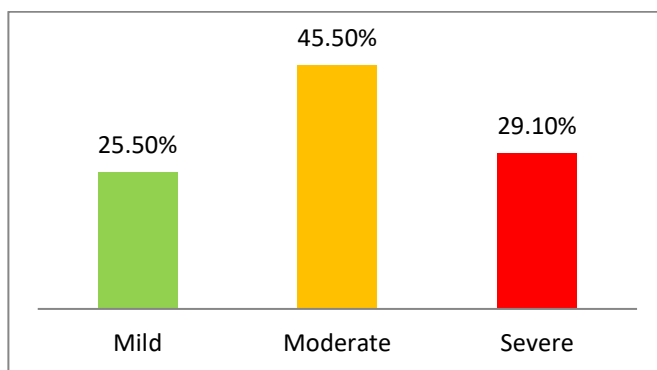


Figure 1. Severity of anemia among pregnant women. (n=110)

On the assessment of the maternal outcomes, gestational hypertension and prolonged labor were observed most common complications, affecting one-third of participants (33.6% and 32.7%, respectively). The preterm births were noted among nearly one-third of cases (31.8%), and antepartum hemorrhage was reported in 12.7% of women, while postpartum hemorrhage and wound infection each affected 10.9%. Moreover, the Less commonly, AKI was occurred in (4.5%) of the cases prolonged hospital stay was noted in 8.2% of cases, and ICU admissions were (4.5%), while no maternal mortality was noted among patients, as presented in table II.

Variables	N	%
Antepartum hemorrhage		
Yes	14	12.7
No	96	87.3
Postpartum hemorrhage		
Yes	12	10.9
No	98	89.1
Gestational hypertension		
Yes	37	33.6
No	73	66.4
Prolonged labor		
Yes	36	32.7
No	74	67.3
AKI		
No	105	95.5
Yes	5	4.5
Preterm		
No	75	68.2
Yes	35	31.8
Wound infection		
No	98	89.1
Yes	12	10.9
ICU		
No	105	95.5
Yes	5	4.5
Prolonged hospital stay		
No	101	91.8
Yes	9	8.2

Based on poststratification analysis, the parity was significantly associated with severity of anemia, as multiparous women were more likely to have moderate or severe anemia ($p = 0.006$), iron supplementation also showed a significant association as women who never used or used supplements irregularly were more concentrated in the moderate to severe anemia ($p = 0.015$), preterm birth and UTI also showed significant association with severity of anemia ($p < 0.05$). Additionally, the acute kidney injury (AKI) and prolonged hospital stay were also significantly associated to the severe anemia ($p < 0.05$), with severe

anemia accounting for the majority of prolonged stays (6.4%), while antepartum hemorrhage ($p = 0.603$), postpartum hemorrhage ($p = 0.195$), gestational hypertension ($p = 0.551$), prolonged labor ($p = 0.621$), wound infection ($p = 0.557$), socioeconomic status ($p = 0.440$), and ICU admission ($p = 0.103$) did not showed significant association with severity of anemia, as shown in table III.

Table III: Association of anemia severity with maternal complications.

Variables	Anemia Severity			P-value
	Mild	Moderate	Sever	
Parity				
Yes	13 (11.8%)	10 (9.1%)	4 (3.6%)	0.006
No	15 (13.6%)	40 (36.4%)	28 (25.5%)	
Antepartum hemorrhage				
Yes	5 (4.5%)	6 (5.5%)	3 (2.7%)	0.603
No	23 (20.9%)	44 (40.0%)	29 (26.4%)	
Postpartum hemorrhage				
Yes	3 (2.7%)	3 (2.7%)	6 (5.5%)	0.195
No	25 (22.7%)	47 (42.7%)	26 (23.6%)	
Gestational hypertension				
Yes	11 (10.0%)	18 (16.4%)	8 (7.3%)	0.551
No	17 (15.5%)	32 (29.1%)	24 (21.8%)	
Prolonged labor				
Yes	10 (9.1%)	14 (12.7%)	12 (10.9%)	0.621
No	18 (16.4%)	36 (32.7%)	20 (18.2%)	
Iron supplementation				
Irregular	15 (13.6%)	16 (14.5%)	13 (11.8%)	0.015
Never	10 (9.1%)	27 (24.5%)	11 (10.0%)	
Regular	3 (2.7%)	7 (6.4%)	8 (7.3%)	
Preterm birth				
No	24 (21.8%)	42 (38.2%)	20 (18.2%)	0.038
Yes	4 (3.6%)	8 (7.3%)	12 (10.9%)	
Wound infection				
No	25 (22.7%)	46 (41.8%)	27 (24.5%)	0.557
Yes	3 (2.7%)	4 (3.6%)	5 (4.5%)	
SES				
Low	20 (18.2%)	40 (36.4%)	23 (20.9%)	0.440
Middle	7 (6.4%)	10 (9.1%)	9 (8.2%)	
Upper-middle	1 (0.9%)	0 (0.0%)	0 (0.0%)	
UTI				
No	28 (25.5%)	48 (43.6%)	24 (21.8%)	0.001
Yes	0 (0.0%)	2 (1.8%)	8 (7.3%)	
AKI				
No	28 (25.5%)	50 (45.5%)	29 (26.4%)	0.023
Yes	0 (0.0%)	0 (0.0%)	3 (2.7%)	
ICU				
No	26 (23.6%)	50 (45.5%)	29 (26.4%)	0.103
Yes	2 (1.8%)	0 (0.0%)	3 (2.7%)	
Prolonged hospital stay				
No	26 (23.6%)	50 (45.5%)	25 (22.7%)	0.002
Yes	2 (1.8%)	0 (0.0%)	7 (6.4%)	

Discussion

The severe IDA remains a major public health challenge during pregnancy, specifically in low-resource regions like Pakistan, where it highly

complicates the pregnant women and drives the adverse outcomes. This study enrolled the 110 pregnant women, with mean age of 30.4 ± 4.4 years, mean gestational age of 36.3 ± 2.6 weeks and mean BMI 24.3 ± 3.3 kg/m². Additionally, most of the women were multiparous (75.5%) and belonging to the low-income group (75.5%). Comparable findings were documented in the study of Shi H et al¹¹ who stated mean age of women 29.42 years. Similarly, in the study of Kamlungkuea T et al¹² in IDA group, mean maternal age was 28.6 years, with mean gestational age was 37.6 ± 2.5 years, mean baseline BMI of 21.3 ± 3.3 Kg/m², and predominance of low-income (57.4%) patients.

In this study, a significant part of women had never taken iron supplements (43.6%), while irregular users were 40.0%, and only 16.4% regularly used iron supplements. Aligning with these findings, Alshumaysi AA et al¹³ noted low compliance (10.7%) to iron supplementation among women with IDA. Consistently, Fouelifack FY et al¹⁴ also reported low compliance to iron supplementation (16.4%). In developing nations higher rate of irregular or lack of iron supplementation in women during pregnancy may due to the poor compliance, limited access of proper antenatal care, lack of awareness, and socioeconomic barriers directly contributes to the higher prevalence of IDA, contributing to maternal complications and transfusion requirements.

In present study, severe anemia was found among (29.1%) of the women, followed by moderate (45.5%), indicating a higher burden of significant anemia across the study population. Corresponding to our findings, in the study conducted by Savaliya K et al¹⁵ the moderate anemia (44.28%) which was closely aligned to our study cohort, while severe anaemia (55.71%) was significantly higher in their cohort. Consistent findings were reported in a study by Tirore LL et al¹⁶ where pregnant women had a high prevalence of anemia (51.26%), with 26.8% moderate and 1.53% severe anemia. Additionally, in the study by Begum KF et al⁸ also found parallel findings where severe anemia was 14.3%, followed by 51.4% moderate anemia and mild anemia 34.3%. Overall moderate to severe anemia among pregnant women during their trimester is highly frequent and also markedly different frequencies across the studies, which may deu to the regional differences in baseline nutritional status, socioeconomic status, prenatal iron supplementation adherence, and different other risk factors.

In our study cohort, gestational hypertension (33.6%), prolonged labor (32.7%), and preterm births (31.8%) were the most frequent maternal outcomes, followed by antepartum hemorrhage 12.7% of women, PPH 10.9%, and wound infection around 10.9% with less commonly complications including AKI (4.5%), prolonged hospital stay in 8.2% of cases, and ICU admissions around (4.5%). In line with these findings, Chauhan L et al.¹⁷ reported gestational hypertension in 30% of women and postpartum hemorrhage up to 35% of women with severe anemia. Consistent findings were published in the study of Savaliya K et al¹⁵ who found that low birth weight (46.15%) and preterm birth (41.02%) were the most frequent maternal outcomes among women with severe anemia. In supporting to this study few other recent studies also reported that the severe IDA during the 3rd trimester of pregnancy is linked to high risk of preterm birth, PPH, C-section, prolonged hospital stay, and also neonatal adverse outcomes.^{8,18,19}

In current study, multiparity, irregular iron supplementation, preterm birth, UTI, acute kidney injury (AKI), and prolonged hospital stay were significantly associated with moderate or severe anemia ($p < 0.05$). Correspondingly, the study of Kumari S et al²⁰ reported significant association of anemia severity with reterm birth ($P \leq .0001$) and low birth weight ($P = .0003$). Comparably, study conducted by Eweis M et al²¹ documented that severe anemia in pregnancy is strongly associated with multiparity and irregular iron supplementation. Similarly, in the study carried out by Yadav S et al²² around 50% of pregnant women with AKI had severe anemia, suggesting a association between AKI and anemia. Overall severe IDA found highly frequent among pregnant women during third trimester due to exponentially increased demands of iron (up to 10-fold) from fetal growth, expansion of placenta, and maternal blood volume flows, often exceeding dietary intake and the absorption. However to control the rising prevalence of IDA and improve the fetomaternal outcomes, routine antenatal screening and timely identification should be improved at all healthcare levels. The supplementation of Iron and folic acid, along with dietary counseling concentrating on iron-rich foods, should be assured for all pregnant women. Furthermore, the public health initiatives should underscore education, infection control, and enhanced access to maternal healthcare services to manage and prevent the anemia effectively.

Conclusion

The severe Iron deficiency anemia was observed highly prevalent in the third trimester as a significant maternal health concern, predominantly affecting low-income, multiparous women with poor iron supplementation. The severity of anemia was significantly associated with maternal complications including UTI, AKI, preterm birth, and prolonged hospital stays, reflecting its broader systemic impact beyond hemoglobin levels. Overall findings collectively suggested the supported antenatal screening, consistent supplementation programs, consultant gynecological and obstetrics support and socioeconomic support specifically poor areas to prevent this preventable health issue yet consequential burden on maternal health.

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