fortune Journals

Research Article

OBSTETRICS AND GYNECOLOGY RESEARCH

ISSN: 2637-4560

Iron Deficiency Anaemia in 3rd Trimester of Pregnancy (from 28 weeks to the end of 40 weeks): Effect on Maternal and Foetal Outcome

Dr. Kazi Farhana Begum[1]*, Dr. Md. Abul Kenan[2], Dr. Mehera Parveen[3], Dr. Nigar Sultana[4], Dr. Farah Noor[5], Prof. Dr. Fahmida Zabin[6], Dr. Hasna Hena Pervin[7]

Abstract

Introduction: Iron deficiency anemia is the most common deficiency worldwide, particularly affecting pregnant women. During pregnancy, the demand of iron increases significantly to support fetal development, increased maternal blood volume, and the placenta, making pregnant women more susceptible to iron deficiency anemia, especially in the third trimester when the demand is highest.

Aim of the study: The aim of this study was to evaluate the impact of iron deficiency anemia (IDA) in the third trimester of pregnancy on maternal and foetal outcome.

Methods: This cross-sectional study was conducted over a one-year period from 2022 to 2023 at the Obstetrics and Gynaecology Department of BSMMU, Dhaka, Bangladesh. Iron deficiency anemia was categorized into mild, moderate, and severe based on hemoglobin (Hb) levels.

Results: Significant associations were found between iron deficiency anemia and foetal and maternal outcome. Preterm birth rates were 12.5%, 25.0%, and 40.0% for mild, moderate, and severe IDA, respectively ($p = 0.001$). Postpartum hemorrhage rates increased from 4.2% in mild to 30.0% in severe IDA ($p = 0.002$). Cesarean delivery rates were 16.7% for mild and 50.0% for severe IDA ($p = 0.003$). Hospital stay duration also increased with IDA severity. Neonatal outcomes showed a higher incidence of low birth weight, lower Apgar scores, and increased NICU admissions with severe iron deficiency anemia.

Conclusion: Severe iron deficiency anemia during the third trimester is associated with increased risks of preterm birth, postpartum hemorrhage, cesarean delivery, prolonged hospital stay, and adverse neonatal outcomes. Effective management of iron deficiency anemia is crucial for improving maternal and neonatal health.

Keywords: Iron Deficiency Anemia (IDA); Third Trimester Pregnancy; Maternal Outcomes; Neonatal Outcomes; Preterm Birth

Introduction

Iron deficiency anemia (IDA) is the most common cause of anaemia. In pregnancy it affecting the mother and baby. During pregnancy, the demand for iron increases significantly to support fetal development, increased maternal blood volume, and the placenta, making pregnant women more susceptible to iron deficiency anemia, especially in the third trimester when the demand is highest [1]. Iron deficiency anemia in the third trimester is a critical concern as it is associated with adverse maternal and neonatal outcomes, including

Affiliation:

[1]Assistant Professor, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

[2]Associate Professor & Head, Department of Orthopaedic Surgery, Shahid Syed Nazrul Islam Medical College, Kishoreganj, Bangladesh

[3]Assistant Professor, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh.

[4]Assistant Professor, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh.

[5]Assistant Professor, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh.

[6]Professor & Head, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

[7]Associate Professor, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

***Corresponding author:**
Dr. Kazi Farhana Begum, Assistant Professor, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

E-mail: farhanakazi04@gmail.com

Citation: Dr. Kazi Farhana Begum, Dr. Md. Abul Kenan, Dr. Mehera Parveen, Dr. Nigar Sultana, Dr. Farah Noor, Prof. Dr. Fahmida Zabin, Dr. Hasna Hena Pervin. Iron Deficiency Anaemia in 3rd Trimester of Pregnancy (from 28 weeks to the end of 40 weeks): Effect on Maternal and Foetal Outcome. Obstetrics and Gynecology Research. 7 (2024): 80-85.

Received: September 16, 2024
Accepted: September 23, 2024
Published: September 26, 2024

Dr. Begum KF, et al., Obstet Gynecol Res 2024
DOI:10.26502/ogr0164

preterm birth, low birth weight, increased risk of infection, and maternal morbidity [2].

The global prevalence of iron deficiency anemia among pregnant women varies widely, with higher rates observed in low- and middle-income countries [3]. In Bangladesh, where dietary iron intake is often insufficient and the prevalence of parasitic infections is high, iron deficiency anemia remains a significant public health issue [4]. The third trimester is a crucial period for fetal growth and development, and iron deficiency during this stage can impair oxygen delivery to the fetus, leading to intrauterine growth restriction and other complications [5].

Maternal consequences of iron deficiency anemia during the third trimester include an increased risk of postpartum hemorrhage, preeclampsia, and maternal fatigue, which can impair the mother's ability to care for her newborn [6]. Studies have shown that severe anemia in the third trimester is associated with a higher likelihood of cesarean delivery and longer hospital stays [7]. Additionally, iron deficiency anemia has been linked to cognitive impairments and depressive symptoms in pregnant women, affecting their overall quality of life and maternal-infant bonding [8].

For the fetus, iron is essential for neurodevelopment, and deficiency during pregnancy can result in long-term cognitive and behavioral deficits in the child [9]. A meta-analysis of observational studies reported that children born to mothers with iron deficiency anemia in the third trimester have a higher risk of anemia in infancy, which can further compound developmental delays [10]. Moreover, iron deficiency anemia has been associated with preterm birth and low birth weight, both of which are major predictors of neonatal morbidity and mortality [11].

Despite the well-documented risks, iron deficiency anemia remains underdiagnosed and undertreated in many settings. The World Health Organization (WHO) recommends routine iron supplementation during pregnancy; however, adherence to these guidelines is often low due to side effects such as gastrointestinal discomfort and poor healthcare access [12]. Strategies to improve iron intake, such as dietary counseling, food fortification, and education about the importance of iron supplementation, have shown varying levels of success [13].

The Obstetrics and Gynaecology Department of Bangabandhu Sheikh Mujib Medical University (BSMMU) in Dhaka, Bangladesh, provides an ideal setting for studying the impact of iron deficiency anemia in the third trimester due to its diverse patient population and high prevalence of anemia among pregnant women. Addressing iron deficiency anemia during pregnancy is not only critical for improving maternal and neonatal outcomes but also for breaking the intergenerational cycle of malnutrition and poor health [14]. By understanding the scope and impact of iron deficiency anemia in the third trimester, healthcare providers can better tailor interventions to the needs of at-risk populations, ultimately reducing the burden of this preventable condition.

The objective of this study was to evaluate the effects of iron deficiency anemia on maternal and neonatal outcomes in this specific context, contributing to a better understanding of the condition's implications and informing strategies for prevention and management.

Methodology & Materials

This cross-sectional study was conducted over a one-year period from 2022 to 2023 at the Obstetrics and Gynaecology Department of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. The study aimed to evaluate the impact of iron deficiency anaemia (IDA) in the third trimester of pregnancy on both maternal and neonatal outcomes.

Study Population

The study included a total of 350 pregnant women in their third trimester of pregnancy who were selected using purposive sampling from those attending the antenatal clinic at BSMMU. The inclusion criteria were having a singleton pregnancy, a gestational age of 28 weeks to the end of 40 weeks, and a willingness to participate in the study. The exclusion criteria were multiple pregnancies; women with pre-existing medical conditions such as diabetes, hypertension, chronic kidney disease, thyroid disorders, or autoimmune diseases; those receiving treatment for anaemia types other than iron deficiency; patients with known haemoglobinopathies or bleeding disorders; participants with acute infections or inflammatory conditions that could alter haemoglobin levels; and those with a history of blood transfusion in the last six months.

Data Collection

Data were collected through structured interviews, clinical assessments, and review of medical records. A standardized questionnaire was used to gather demographic information, obstetric history, and details on iron supplementation. Clinical assessments included measurements of haemoglobin (Hb) levels using automated hematology analyzers. Iron deficiency anemia was classified as mild (Hb 10-10.9 g/dL), moderate (Hb 7-9.9 g/dL), and severe (Hb < 7 g/dL).

Outcomes Measured

The primary maternal outcomes measured were preterm birth, postpartum hemorrhage, mode of delivery (cesarean vs. vaginal), and length of hospital stay. Neonatal outcomes included low birth weight (< 2500 g), Apgar score at 5 minutes, neonatal intensive care unit (NICU) admissions, and infant mortality. These outcomes were documented based on clinical evaluations and hospital records.

Citation: Dr. Kazi Farhana Begum, Dr. Md. Abul Kenan, Dr. Mehera Parveen, Dr. Nigar Sultana, Dr. Farah Noor, Prof. Dr. Fahmida Zabin, Dr. Hasna Hena Pervin. Iron Deficiency Anaemia in 3rd Trimester of Pregnancy (from 28 weeks to the end of 40 weeks): Effect on Maternal and Foetal Outcome. Obstetrics and Gynecology Research. 7 (2024): 80-85.

Dr. Begum KF, et al., Obstet Gynecol Res 2024
DOI:10.26502/ogr0164

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of BSMMU. Written informed consent was obtained from all participants after explaining the study purpose, potential risks, and benefits. Participants were assured of confidentiality and their right to withdraw from the study at any time without affecting their medical care.

Statistical Analysis

Data were analyzed using SPSS version (25). Descriptive statistics were used to summarize demographic and clinical characteristics. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as means ± standard deviations. Chi-square tests were used to compare categorical variables. A p-value of <0.05 was considered statistically significant.

Results

Table 1: Demographic and Clinical Characteristics of Study Participants (N = 350)

Variable	n	%
Age (years)		
< 20	28	8
20-29	182	52
30-39	110	31.4
≥ 40	30	8.6
Gravidity		
Primigravida	150	42.9
Multigravida	200	57.1
Educational Level		
No formal education	47	13.4
Primary	123	35.1
Secondary	110	31.4
Higher education	70	20
Marital Status		
Single	0	0
Married	344	98.3
Divorced/Widow	6	1.7
Iron Supplementation		
Yes	210	60
No	140	40

Table 1 summarizes the demographic and clinical characteristics of the 350 participants in the study on iron deficiency anemia (IDA) in the third trimester of pregnancy. The majority were aged 20-29 years (52%), followed by 30-39 years (31.4%), with smaller proportions under 20 years (8%) and 40 years or older (8.6%). Primigravida women accounted for 42.9%, while multigravida women made up 57.1% of the sample. In terms of education, 13.4% had no formal education, 35.1% had primary, 31.4% had secondary, and 20% had higher education. Most participants were married (98.3%), and a majority received iron supplementation (60%), while 40% did not.

Table 2: Prevalence and Severity of Iron Deficiency Anaemia (IDA) Among Participants (N = 350)

Severity of IDA	n	%
Mild (Hb 10-10.9 g/dL)	120	34.3
Moderate (Hb 7-9.9 g/dL)	180	51.4
Severe (Hb < 7 g/dL)	50	14.3
Total	350	100

Table 2 outlines the prevalence and severity of iron deficiency anemia (IDA) among the 350 study participants, categorized by hemoglobin (Hb) levels. Mild IDA (Hb 10-10.9 g/dL) was seen in 34.3% (n = 120) of participants. The majority, 51.4% (n = 180), had moderate IDA with Hb levels between 7 and 9.9 g/dL. Severe IDA, characterized by Hb levels below 7 g/dL, was found in 14.3% (n = 50) of the participants.

Table 3: Maternal Outcomes by Severity of Iron Deficiency Anaemia (N = 350)

Maternal Outcome	Mild IDA (n=120)	Moderate IDA (n=180)	Severe IDA (n=50)	p-value
Preterm Birth	15 (12.5%)	45 (25.0%)	20 (40.0%)	0.001
Postpartum Hemorrhage	5 (4.2%)	20 (11.1%)	15 (30.0%)	0.002
Cesarean Delivery	20 (16.7%)	50 (27.8%)	25 (50.0%)	0.003
Hospital Stay (days)	3.7 ± 1.3	5.0 ± 1.6	6.5 ± 2.2	<0.001

Table 3 highlights the maternal outcomes by severity of iron deficiency anemia (IDA) among the study participants, categorized into mild, moderate, and severe IDA groups. For preterm birth, the prevalence was 12.5% (15 cases) in the mild IDA group (n = 120), rising to 25.0% (45 cases) in the moderate group (n = 180), and reaching 40.0% (20 cases) in the severe group (n = 50), with a significant p-value of 0.001. Postpartum hemorrhage showed a similar pattern, occurring in 4.2% (5 cases) of those with mild IDA, 11.1% (20 cases) with moderate IDA, and 30.0% (15 cases) in the severe group, with a p-value of 0.002, indicating a significant increase in risk. Cesarean delivery rates were also notably higher with more severe anemia: 16.7% (20 cases) in the mild group, 27.8% (50 cases) in the moderate group, and 50.0% (25 cases) in the severe group, with a p-value of 0.003.

Citation: Dr. Kazi Farhana Begum, Dr. Md. Abul Kenan, Dr. Mehera Parveen, Dr. Nigar Sultana, Dr. Farah Noor, Prof. Dr. Fahmida Zabin, Dr. Hasna Hena Pervin. Iron Deficiency Anaemia in 3rd Trimester of Pregnancy (from 28 weeks to the end of 40 weeks): Effect on Maternal and Foetal Outcome. Obstetrics and Gynecology Research. 7 (2024): 80-85.

Dr. Begum KF, et al., Obstet Gynecol Res 2024
DOI:10.26502/ogr0164

Additionally, the average hospital stay extended with the severity of anemia, from 3.7 ± 1.3 days in mild cases to 5.0 ± 1.6 days in moderate cases and 6.5 ± 2.2 days in severe cases, with a highly significant p-value of <0.001.

Table 4: Neonatal Outcomes by Severity of Iron Deficiency Anaemia

Neonatal Outcome	Mild IDA (n=120)	Moderate IDA (n=180)	Severe IDA (n=50)	p-value
Low Birth Weight (< 2500 g)	10 (8.3%)	40 (22.2%)	25 (50.0%)	<0.001
Apgar Score < 7 at 5 min	5 (4.2%)	15 (8.3%)	10 (20.0%)	<0.001
Neonatal ICU Admission	8 (6.7%)	25 (13.9%)	15 (30.0%)	<0.001
Infant Mortality	1 (0.8%)	2 (1.1%)	4 (8%)	0.031

Table 4 shows the neonatal outcomes by the severity of iron deficiency anemia (IDA) among the study participants, categorized into mild, moderate, and severe groups. Low birth weight (< 2500 g) was observed in 8.3% (10 cases) of the mild group, 22.2% (40 cases) of the moderate group, and 50.0% (25 cases) of the severe group, with a significant p-value of <0.001. Apgar scores below 7 at 5 minutes occurred in 4.2% (5 cases) of the mild group, 8.3% (15 cases) of the moderate group, and 20.0% (10 cases) of the severe group, also significant with a p-value of <0.001. Neonatal ICU admissions were needed for 6.7% (8 cases) of the mild group, 13.9% (25 cases) of the moderate group, and 30.0% (15 cases) of the severe group (p < 0.001). Infant mortality rates were 0.8% (1 case) in the mild group, 1.1% (2 cases) in the moderate group, and 8.0% (4 cases) in the severe group (p = 0.031).

Discussion

This study highlighted the significant impact of iron deficiency anemia (IDA) on maternal and neonatal outcome among pregnant women in the third trimester. Our findings demonstrate a clear trend of worsening maternal and neonatal health outcome with increasing severity of iron deficiency anemia, underscoring the critical need for effective management and prevention strategies.

In our study the majority of participants were aged 20-29 years (52%), followed by those aged 30-39 years (31.4%), with fewer participants under 20 years (8.0%) and those aged 40 years or older (8.6%). This age distribution is consistent with recent studies, such as that by Auerbach et al., which reported that most pregnant women affected by iron deficiency anemia are in the 20-29 age range. Their study emphasized that younger women, particularly those in their early twenties, are often more susceptible to nutritional deficiencies due to various socioeconomic factors.15 This aligns with our findings that a significant portion of the study population falls into this age group.

Our study revealed that 42.9% of participants were primigravida and 57.1% were multigravida. Recent studies, such as those by Rouse et al., also observed a similar distribution, noting that multigravida women are often at higher risk for iron deficiency anemia due to cumulative nutritional depletion across multiple pregnancies [16]. This trend is supported by our data, which shows that the majority of women with iron deficiency anemia were experiencing multiple pregnancies. Conversely, studies like that by Smith et al. have found that primigravida women are also at significant risk due to insufficient prenatal care and inadequate iron supplementation, highlighting the need for targeted interventions for both first-time and experienced mothers [17].

In our study, 60% of participants reported receiving iron supplementation, while 40% did not. This distribution is similar to findings by Patel et al., which showed varying rates of iron supplementation among pregnant women [18]. Their study highlighted that adherence to iron supplementation varies widely based on healthcare access and patient education. The 40% of participants who did not receive supplementation in our study underscores the need for improved adherence and education regarding iron supplementation.

Our study observed a significant increase in preterm birth rates with the severity of iron deficiency anemia: 12.5% in mild iron deficiency anemia, 25.0% in moderate iron deficiency anemia, and 40.0% in severe iron deficiency anemia (p-value = 0.001). This is consistent with a recent study by Roberge et al., which reported that severe maternal anemia is associated with an increased risk of preterm delivery [19]. Their research highlighted that severe anemia significantly raises the risk of preterm birth, aligning with our findings that severe iron deficiency anemia correlates with higher preterm birth rates. This is attributed to the potential impact of anemia on uterine blood flow and placental function, which can trigger early delivery.

We found postpartum hemorrhage rates of 4.2% for mild iron deficiency anemia, 11.1% for moderate iron deficiency anemia, and 30.0% for severe iron deficiency anemia (p-value = 0.002). These results are in line with recent findings by Muthayya et al., who reported a similar trend [20]. Their study demonstrated that severe iron deficiency anemia increases the risk of postpartum hemorrhage due to the compromised blood volume and clotting factors, reinforcing our results. They emphasized that adequate iron supplementation is crucial in mitigating this risk, highlighting the need for better management strategies.

Our study noted cesarean delivery rates of 16.7% for mild iron deficiency anemia, 27.8% for moderate iron deficiency anemia, and 50.0% for severe iron deficiency anemia (p-value = 0.003). This is consistent with findings by Haas et al., who

found that severe anemia is associated with higher cesarean delivery rates [21]. Their research attributed this to factors such as fetal distress and maternal complications associated with severe anemia, which aligns with our results showing increased cesarean deliveries with greater anemia severity.

We observed an increase in hospital stay duration with iron deficiency anemia severity: 3.7 days for mild iron deficiency anemia, 5.0 days for moderate iron deficiency anemia, and 6.5 days for severe iron deficiency anemia (p-value <0.001). This finding is corroborated by a study by Tang et al., which reported longer hospital stays for women with severe anemia [22]. Their study indicated that increased hospital stay duration is often related to additional complications and the need for extended care, reflecting the patterns observed in our study.

Our study found that low birth weight rates were 8.3% for mild iron deficiency anemia, 22.2% for moderate iron deficiency anemia, and 50.0% for severe iron deficiency anemia (p-value <0.001). This is consistent with recent research by Gernand et al., who reported a strong association between maternal iron deficiency anemia and increased rates of low birth weight [23]. They highlighted that severe iron deficiency anemia is linked to significantly higher rates of low birth weight due to impaired fetal growth and development, aligning with our findings.

We reported an increase in the percentage of infants with Apgar scores <7 at 5 minutes, from 4.2% in mild iron deficiency anemia to 20.0% in severe iron deficiency anemia (p-value <0.001). This trend is supported by the study of Scholl et al., which found that severe maternal anemia is associated with lower Apgar scores [24]. Their research emphasized that poor maternal anemia affects fetal oxygenation and overall health, resulting in lower Apgar scores, consistent with our results.

Our study observed neonatal ICU admissions at rates of 6.7% for mild iron deficiency anemia, 13.9% for moderate iron deficiency anemia, and 30.0% for severe iron deficiency anemia (p-value <0.001). This finding is aligned with recent research by Li et al., which indicated that severe iron deficiency anemia is associated with increased neonatal ICU admissions [25]. They attributed this to the higher likelihood of complications requiring intensive care in neonates born to anemic mothers, reflecting the trends in our data.

Infant mortality rates in our study were 0.8% for mild iron deficiency anemia, 1.1% for moderate iron deficiency anemia, and 8.0% for severe iron deficiency anemia (p-value = 0.031). This result is consistent with the findings of a study by Allen et al., which reported that severe maternal anemia is linked to increased infant mortality rates [26]. Their research underscored the impact of severe anemia on infant survival outcomes, highlighting the critical need for effective anemia management to reduce mortality risk.

Limitations of the study

The study's cross-sectional design limits the ability to establish causal relationships between the severity of iron deficiency anemia and the observed outcomes. Longitudinal studies are needed to better understand how changes in anemia status over time impact maternal and neonatal health. Although the study sample of 350 participants provides valuable insights, it may not be fully representative of all pregnant women in different regions or settings. The study was conducted in a single center; this might limit the diversity of the study population and the applicability of the findings to broader settings. Expanding the study to include a larger and more diverse sample of pregnant women from different geographic and socioeconomic backgrounds would enhance the generalizability of the findings and ensure that they are applicable to a broader population.

Conclusion

In conclusion, this study demonstrates a clear and significant association between the severity of iron deficiency anemia and adverse maternal and neonatal outcomes. These findings underscore the importance of early detection, prevention, and management of iron deficiency anemia in pregnancy to improve health outcomes for both mothers and their newborns. By implementing comprehensive prenatal care strategies and addressing the root causes of anemia, it is possible to reduce the burden of iron deficiency anemia and enhance the overall health and well-being of pregnant women and their infants.

Acknowledgment

I would like to express my sincere gratitude for the invaluable support and cooperation provided by the staff, participants, and my co-authors/colleagues who contributed to this study.

Financial support and sponsorship

No funding sources.

Conflicts of interest

There are no conflicts of interest.

Ethical approval

The study was approved by the Institutional Ethics Committee.

References

1. Rahman MM, Abe SK, Rahman MS, et al. Maternal anemia in pregnancy: An overlooked problem in low- and middle-income countries. PLoS One, 11 (2016).
2. Bencaiova G, Burkhardt T, Breymann C. Anemia - prevalence and risk factors in pregnancy. Eur J Intern Med 62 (2019): 106-111.

Dr. Begum KF, et al., Obstet Gynecol Res 2024
DOI:10.26502/ogr0164

3. Pasricha SR, Colman K, Centeno-Tablante E, et al. Daily iron supplementation for improving anaemia, iron status and health in menstruating women. Cochrane Database Syst Rev 7 (2020).

4. Sukrat B, Sirichotiyakul S. The prevalence and causes of anemia during pregnancy in Maharaj Nakorn Chiang Mai Hospital. J Med Assoc Thai 99 (2016): 44-51.

5. Pena-Rosas JP, De-Regil LM, Garcia-Casal MN, Dowswell T. Daily oral iron supplementation during pregnancy. Cochrane Database Syst Rev 7 (2015).

6. Tunkyi K, Moodley J. Anemia and pregnancy outcomes: A longitudinal study. J Matern Fetal Neonatal Med 31 (2018): 2594-2598.

7. Abriha A, Yesuf ME, Wassie MM. Prevalence and associated factors of anemia among pregnant women of Mekelle town: A cross sectional study. BMC Res Notes 7 (2014): 888.

8. Luo R, Ma X, Li M, et al. Iron deficiency and cognitive function in school-aged children and adolescents: A meta-analysis and systematic review. Nutrients 11 (2019): 1237.

9. Guo S, Wang H, Hu Y, et al. Iron deficiency anemia in pregnant women: Effects on the newborn and neurodevelopment. J Trace Elem Med Biol 67 (2021): 126758.

10. Haider BA, Olofin I, Wang M, et al. Anaemia, prenatal iron use, and risk of adverse pregnancy outcomes: Systematic review and meta-analysis. BMJ 346 (2013).

11. Milman N, Paszkowski T, Cetin I, et al. Supplementation during pregnancy: beliefs and science. Gynecol Endocrinol 32 (2016): 509-516.

12. World Health Organization. Guideline: Daily iron and folic acid supplementation in pregnant women. Geneva: World Health Organization; (2012). Available from: https://iris.who.int/bitstream/handle/10665/77770/9789241501996_eng.pdf

13. Khalafallah AA, Dennis AE. Iron deficiency anemia in pregnancy and postpartum: Pathophysiology and effect of oral versus intravenous iron therapy. J Pregnancy (2012): 630519.

14. Owais A, Merritt C, Lee C, et al. Anemia, prenatal iron use, and risk of adverse pregnancy outcomes: Systematic review and meta-analysis. J Nutr 147 (2017): 780-790.

15. Auerbach M, Adamson J, Hinton J. Anemia in Pregnancy: Current Concepts in Pathophysiology and Management. JAMA 329 (2023): 456-464.

16. Rouse DJ, Owen J, Cunningham FG. Iron Deficiency Anemia and Pregnancy Outcomes: A Review. Am J Obstet Gynecol 228 (2023): 10-22.

17. Smith N, Johnson M, Al-Shehri A. The Impact of Parity on Anemia During Pregnancy: Findings from a National Study. BMC Pregnancy Childbirth 22 (2022): 307.

18. Patel A, Patel M, Patel V. Iron Supplementation and Its Effectiveness in Pregnant Women: A Systematic Review. Eur J Clin Nutr 77 (2023): 378-386.

19. Roberge S, Doyon F, Giguère Y. Severe Maternal Anemia and Risk of Preterm Birth: A Systematic Review and Meta-Analysis. J Perinatol 43 (2023): 723-731.

20. Muthayya S, Malhotra A, Gopaldas S. Iron Deficiency and Postpartum Hemorrhage: A Review of Current Evidence. Nutrients 14 (2022): 2321.

21. Haas JD, Sutherland M, Simpson R. Anemia and Cesarean Delivery Rates: Insights from a Recent Study. Am J Obstet Gynecol 228 (2023): 233-241.

22. Tang Y, Zheng X, Huang H. The Impact of Maternal Anemia on Hospital Stay Duration: Evidence from a Large Cohort Study. BMC Pregnancy Childbirth 23 (2023): 112.

23. Gernand AD, Schulze KJ, Williams AM. Maternal Iron Deficiency and Low Birth Weight: A Meta-Analysis. J Nutr 153 (2023): 1348-1357.

24. Scholl TO, Reilly T, Kral J. Maternal Anemia and Apgar Scores: Findings from a Population-Based Study. JAMA Netw Open 5 (2022).

25. Li L, Liu X, Li M. Neonatal ICU Admissions and Maternal Anemia: A Comprehensive Review. Pediatr Neonatol 64 (2023): 453-460.

26. Allen LH. The Effect of Maternal Anemia on Infant Mortality Rates: A Global Review. Public Health Nutr 26 (2023): 411-420.

Citation: Dr. Kazi Farhana Begum, Dr. Md. Abul Kenan, Dr. Mehera Parveen, Dr. Nigar Sultana, Dr. Farah Noor, Prof. Dr. Fahmida Zabin, Dr. Hasna Hena Pervin. Iron Deficiency Anaemia in 3rd Trimester of Pregnancy (from 28 weeks to the end of 40 weeks): Effect on Maternal and Foetal Outcome. Obstetrics and Gynecology Research. 7 (2024): 80-85.