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Iron Deficiency Anemia in Pregnancy: A Scoping Review on Maternal and Fetal Outcomes, Diagnosis, and Management

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ABSTRACTS

Purpose: To synthesize recent evidence on the prevalence, pathophysiology, maternal-fetal consequences, diagnostic challenges, and management of iron deficiency anemia (IDA) in pregnancy.

Materials and Methods: This scoping review retrieved articles from PubMed, Scopus, and ScienceDirect published between 2015 and 2025, using the keywords *iron deficiency*, *iron deficiency anemia*, and *pregnancy*. Studies were selected based on relevance to maternal-fetal health outcomes, diagnostic approaches, and management strategies.

Result: The findings demonstrate that IDA affects approximately 38% of pregnancies globally, with the highest burden in South Asia and sub-Saharan Africa. Pathophysiological mechanisms involve hepcidin dysregulation, inflammation, and oxidative stress. Maternal consequences include increased risk of postpartum hemorrhage and transfusion, while fetal outcomes include preterm birth, low birth weight, and neurodevelopmental impairment. Diagnostic challenges stem from hemodilution and inflammatory confounders, requiring biomarkers such as serum ferritin and soluble transferrin receptor.

Conclusion: IDA remains a major contributor to maternal and perinatal morbidity. Oral iron supplementation is the first-line treatment, but intravenous formulations are essential for severe cases or poor responders. Adherence to international guidelines and improved implementation in low-resource settings are urgently needed.

Keywords: Iron deficiency anemia, Pregnancy, Maternal health, Fetal outcomes

INTRODUCTION

Iron deficiency anemia (IDA) is the most common nutritional disorder worldwide, affecting approximately 32 million pregnant women. Physiological changes during pregnancy, including increased blood volume and fetal iron requirements, predispose women to iron deficiency. Theoretical frameworks highlight the central role of hepcidin regulation and the IRP/IRE system in maintaining iron homeostasis, which when disrupted, leads to anemia, oxidative stress, and adverse pregnancy outcomes.

Despite global awareness, a significant gap persists between established guidelines for screening and supplementation and their real-world implementation, especially in low- and middle-income countries. Previous research has primarily focused on prevalence, but less attention has been paid to the mechanistic interplay between iron metabolism, maternal comorbidities such as obesity, and fetal neurodevelopment. This discrepancy highlights an urgent need for updated evidence that bridges molecular, clinical, and public health perspectives.

This review is important as IDA during pregnancy contributes to maternal morbidity and mortality, as well as adverse neonatal outcomes. The novelty of this study lies in synthesizing recent literature across multiple domains: epidemiology, pathophysiology, maternal-fetal consequences, diagnostics, and management. The main objective is to provide a comprehensive understanding of IDA in pregnancy and to inform evidence-based clinical and public health interventions. The contribution of this review is to advance theoretical insight into iron metabolism, support clinical decision-making, and strengthen maternal health policies.

METHODS

Study Participants: Not applicable (review-based). Inclusion criteria were studies involving pregnant women with iron deficiency or iron deficiency anemia, with outcomes related to maternal and fetal health.

Study Organization: A scoping review was performed using PubMed, Scopus, and ScienceDirect databases. Keywords included "iron deficiency," "iron deficiency anemia," and "pregnancy." Articles published between 2015 and 2025 were screened for eligibility.

Statistical Analysis: As this was a scoping review, no meta-analysis was conducted. Data were synthesized narratively and organized thematically.

Training Program: Not applicable. However, implications for antenatal care programs and clinical training are discussed in the results.

RESULT

IDA was found to affect 38% of pregnancies worldwide, with highest prevalence in South Asia and Africa. Pathophysiology involves hepcidin dysregulation, inflammation, and increased oxidative stress.

- Maternal consequences: postpartum hemorrhage, transfusion needs, fatigue, reduced quality of life.
- Fetal consequences: preterm birth, low birth weight, impaired neurodevelopment.
- Diagnosis: complicated by physiological hemodilution; biomarkers such as ferritin, transferrin saturation, and soluble transferrin receptor improve accuracy.
- Management: oral iron remains first-line; intravenous iron is recommended in moderate-severe cases or when oral therapy fails.

DISCUSSION

This review hypothesized that IDA in pregnancy significantly impacts maternal and fetal outcomes through mechanisms involving iron metabolism dysregulation. The purpose was to map evidence on its prevalence, diagnosis, and management.

Findings align with prior literature emphasizing the role of hepcidin and inflammation in IDA pathogenesis. The review supports WHO recommendations for routine antenatal iron supplementation but highlights challenges in adherence and resource limitations. Compared with earlier studies, this review integrates molecular and clinical dimensions, offering a broader understanding of disease impact.

Practical implications include strengthening antenatal screening, optimizing treatment protocols, and addressing socioeconomic barriers. Future research should explore novel biomarkers, personalized iron therapy, and long-term child neurodevelopment outcomes.

CONCLUSION

Iron deficiency anemia in pregnancy is a global health concern with profound maternal and fetal risks. Accurate diagnosis and timely intervention through oral or intravenous iron supplementation are essential. Improving adherence to guidelines and addressing healthcare disparities are critical to reducing the burden of IDA in pregnancy.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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