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Iron Deficiency Anemia and Risk of Maternal Antenatal Depression

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Abstract

Objective: To determine the frequency of IDA in pregnant females and its association with antenatal depression.
Methodology: This cross-sectional study, including 200 pregnant women, was conducted in department of OBGYN. Fauji Foundation Hospital Rawalpindi from November 2023 to May 2025. Pregnant women of age 18-45 years presenting in their 2nd to 3rd trimester of pregnancy were included. Frequency of IDA and its association with antenatal depression was determined.
Results: The average age of participants was 30.7 (±6.1) years, with the gestational age averaging 31.6 (±5.3) weeks. Out of 200, 63 individuals (31.5%) were found to have anemia. The severity of IDA was classified as mild in 23 individuals (11.5%), moderate in 29 (14.5%), and severe in 11 (5.5%). Regarding the Edinburgh Postnatal Depression Scale (EPDS) results, 84 participants (42.0%) screened positive for antenatal depression. Of the women with antenatal depression, 33, representing 52.4%, had IDA. Among the women without antenatal depression, 51 (37.2%) had IDA [OR; 1.85 (1.01 to 3.39), p-value 0.04].
Conclusion: There is a strong link between iron deficiency anemia (IDA) and depression. Women with IDA are at an increased risk of experiencing antenatal depression. The lack of screening programs for depression during pregnancy in Pakistan has likely played a significant role in the elevated rates of antenatal depression.
Keywords: Antenatal depression, iron deficiency anemia.

Introduction

Pregnancy marks a profound stage in a woman's life, accompanied by significant psychological and physical changes. These transformations can increase the likelihood of expecting mothers experiencing new or recurring mental health issues.[1, 2] Antenatal depression is a common mental health issue that poses serious risks to both mothers and their babies. Women dealing with this condition face a heightened likelihood of encountering various adverse effects, such as substance use disorders, edema, preeclampsia, early rupture of membranes, postpartum depression, excessive bleeding, and severe headaches. Additionally, antenatal depression can, have harmful implications for newborns, potentially resulting in premature delivery, low birth weight, and enduring negative impacts on their behavioral, emotional and neurological health.[3-6]

Clinical practice guidelines are crucial for identifying and managing prenatal depression, yet they are often neglected as an important component of antenatal care.It is important to acknowledge that isolated prenatal depression seldom exists alone; instead, it is typically associated with various medical conditions, as well as lifestyle factors that can exacerbate both physical and emotional wellbeing.[7] Research indicates that iron deficiency is significantly associated with both the onset and management of depression. Various studies have demonstrated that not only is there a potential connection between low iron levels and development and manifestation of depression among the general population, but also that supplementing with iron may alleviate depressive symptoms.[8, 9] Several factors have been suggested to account for the higher likelihood of depression in individuals with anemia. These include the role of iron levels in the brain and their influence on neurotransmitter production, complications arising from postpartum hemorrhage, and challenges associated with breastfeeding.[10]

Iron deficiency frequently occurs during pregnancy, affecting approximately 22% of women in the later stages of gestation. Since this deficiency is common among expectant mothers and can significantly influence the development, progression, and treatment of depression, it's crucial to explore the connection between iron levels

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and depression during this critical time. Understanding this relationship is essential for effective management of pregnant women facing these challenges. Therefore, the aim of the proposed study is to determine the frequency of iron deficiency anemia in pregnant women and to assess its association with antenatal depression.

Methodology

This cross-sectional study, including 200 pregnant women, was conducted in the department of OBGYN. Fauji Foundation Hospital Rawalpindi from November 2023 to May 2025. Pregnant women of age 18-45 years presenting in their 2nd to 3rd trimester of pregnancy were included. Patients with current major medical illnesses that could alter serum ferritin levels, e.g., autoimmune diseases, or those with the diagnosis of depression prior to pregnancy were excluded.

After inclusion in the study, venous blood samples were collected from each patient and sent to the hospital laboratory to determine hemoglobin and serum ferritin levels. Females with hemoglobin levels <10.5 g/dl and serum ferritin levels <12 g/L were classified as having IDA. Each patient was asked to complete the EPDS questionnaire carefully. The total EPDS score was calculated to assess the frequency of depression. The EPDS is a 10-item self-report questionnaire specifically designed to evaluate depression during the perinatal period. Antenatal depression was defined as a score of ≥12 on the EPDS.

Data was entered and analyzed using SPSS v25. Mean and standard deviation were used to present age and BMI. Frequency and percentage were used to present parity, residential, educational, and occupational status, IDA, and depression. The association of IDA with depression was determined using the Chi-square test, and the odds ratio was calculated.

Results

The baseline study characteristics indicate that the average age of participants was 30.7 (±6.1) years, with a gestational age averaging 31.6 weeks (±5.3) weeks and a body mass index (BMI) of 24.1(±4.8) kg/m². In terms of residence, 148 participants (74.0%) lived in rural areas, while 52 participants (26.0%) were residents of urban settings. Regarding socioeconomic status, 67 participants (33.5%) were categorized as poor, 56 participants (28.0%) as middle class, 46 participants (23.0%) as upper middle class, and 31 participants (15.5%) as rich. As for educational attainment, 45 participants (22.5%) were illiterate, 90 participants (45.0%) completed primary to middle education, 35 participants (17.5%) achieved secondary education, and 30 participants (15.0%) completed higher secondary education. In occupational terms, 114 participants (57.0%) were housewives, while 86 participants (43.0%) were working women. The study also highlights parity among participants, with 155 being primiparous (77.5%) and 45 being multiparous (22.5%).

Table I: Baseline Study Characteristics.	
Age (Y)	30.7±6.1
Gestational Age (Weeks)	31.6±5.3
BMI (Kg/m^2)	24.1±4.8
Residence (%)	
Rural	148 (74.0%)
Urban	52 (26.0%)
Socioeconomic Status (%)	
Poor	67 (33.5%)
Middle Class	56 (28.0%)
Upper Middle Class	46 (23.0%)
Rich	31 (15.5%)
Educational Status (%)	
Illiterate	45 (22.5%)
Primary to middle	90 (45.0%)
Secondary Class	35 (17.5%)
Higher Secondary Class	30 (15.0%)
Occupation (%)	
House Wife	114 (57.0%)
Working Women	86 (43.0%)
Parity	
Primiparous	155 (77.5%)
Multiparous	45 (22.5%)

In our study, a total of 200 participants were assessed for iron deficiency anemia (IDA) and psychological distress as measured by the Edinburgh Postnatal Depression Scale (EPDS). Among these participants, 63 individuals (31.5%) were found to have anemia, while 137 (68.5%) did not. The severity of IDA was classified as mild in 23 individuals (11.5%), moderate in 29 (14.5%), and severe in 11 (5.5%). Regarding the EPDS results, 84 participants (42.0%) screened positive for depressive symptoms, whereas 116 individuals (58.0%) did not exhibit signs of depression (Table II).

Our study examining the relationship between iron deficiency anemia (IDA) and antenatal depression yielded significant results. Of the women with antenatal depression, 33, representing 52.4%, had IDA. In contrast,

30 women with antenatal depression (47.6%) did not have IDA. Among the women without antenatal depression, 51 (37.2%) had IDA, while 86 (62.8%) did not. The odds ratio was calculated to be 1.85 (1.01 to 3.39), and the results were statistically significant, with a p-value of 0.04. This shows a significant association between IDA and antenatal depression (Table III).

Table II: Frequency of IDA and EPDS.	
Anemia (%)	
Yes	63 (31.5%)
No	137 (68.5%)
Severity of IDA (%)	
Mild	23 (11.5%)
Moderate	29 (14.5)
Severe	11 (5.5%)
EPDS (%)	
Yes	84 (42.0%)
No	116 (58.0%)

Table III: Association of IDA with Antenatal Depression.

Antenatal Depression (%)	IDA		Odds Ratio (95% CI)	P-value
	Yes (%) [N=63]	No (%) [N=137]		
Yes (%)	33 (52.4%)	51 (37.2%)	1.85 (1.01-3.39)	0.04
No (%)	30 (47.6%)	86 (62.8%)		

Discussion

This research focusing on women in their second and third trimester of pregnancy indicates that there is a significant connection between iron deficiency anemia and antenatal depression. Our findings suggest that iron deficiency could be a significant risk factor for the onset of depression during pregnancy. The women involved in this study indicated that it might be beneficial for healthcare providers to assess women with iron deficiency for signs of depression during the later stages of their pregnancy. In present study, we found that 42.0% of our study population was diagnosed with antenatal depression.

The significant prevalence of depression during pregnancy is likely linked to the lack of routine screening for this condition. A report by the United States Preventative Services Task Force highlighted that implementing screenings for both antenatal and postnatal depression can lead to improved outcomes. These improvements not only help manage depressive symptoms but also contribute to overall lower rate of depression among pregnant women.[11]

Dama et al. conducted a study on the frequency of iron deficiency anemia and its association with antenatal depression and reported IDA in 31% of pregnant females. The authors reported antenatal depression in 45% of women with IDA and in 25% of women without IDA (Odds ratio 2.51 and p-value 0.02).[12] The meta-analysis by Kang et al. also reported similar results.[13] These results are similar to the results of our study, as we also found significant association of IDA with antenatal depression.

While a study by Kemppinen et al. reported IDA in 23.6% pregnant females, this study did not find any significant association between IDA and antenatal depression; they reported antenatal depression in 14.8% IDA and in 13.6% non-IDA patients (Odds ratio 0.96, p-value 0.88).[10] This study results were contrary to the results of our study and the above mentioned studies.

A recent study by Leung et al. on association of IDA with depression in young adults reported that IDA is significantly associated with increased risk of depression in both young males and females. The study recommended that depression and iron screening should be performed in young adults to diagnose and treat these conditions early.[14]

Considering the significant prevalence of iron deficiency observed among depressed women in this group, it may be valuable to assess serum ferritin levels in women experiencing antenatal depression. Detecting iron deficiency in pregnant women who are depressed can facilitate the appropriate iron supplementation, bringing benefits not only to the mother but also to her developing fetus. Furthermore, addressing this deficiency could enhance the overall management of depression. Previous research on iron supplementation in iron-deficient women, including those in the postpartum phase, has indicated that such supplementation might alleviate depressive symptoms.[15] Moreover, a study that followed participants over time found that iron supplementation might be correlated with better outcomes and a faster recovery rate in women dealing with postpartum depression.[16] Future studies should investigate how iron supplementation affects antenatal depression in women with iron deficiency, as this could provide valuable insights for improving perinatal mental health care.

While this study has notable strengths, it also presents some limitations. The primary limitation is that the sample comprised women referred for mental health issues,

indicating that the findings may not be applicable to all pregnant women.

Conclusion

There is a strong link between iron deficiency anemia (IDA) and depression in pregnant women. Women with IDA are at an increased risk of experiencing antenatal depression. The lack of screening programs for depression during pregnancy in Pakistan has likely played a significant role in the elevated rates of antenatal depression.

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