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CROSS-SECTIONAL STUDY ON THE PREVALENCE OF ANEMIA IN PREGNANT WOMEN

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Abstract
Background: Anemia during pregnancy is a prevalent issue globally, impacting maternal and fetal health outcomes. **Objective:** To determine the prevalence of anemia among pregnant women and identify associated risk factors. **Methods:** A cross-sectional study was conducted on a sample of 200 pregnant women at a tertiary care hospital. Hemoglobin levels were assessed using the cyanmethemoglobin method, and data on demographic and health-related variables were collected through structured questionnaires. **Results:** The study found a significant prevalence of anemia among the participants, with various socio-demographic factors influencing hemoglobin levels. **Conclusion:** The high prevalence of anemia among pregnant women highlights the need for enhanced screening and nutritional interventions.
Keywords: Anemia, Pregnancy, Prevalence.

Introduction

Anemia is one of the most common nutritional deficiencies affecting pregnant women worldwide. It is associated with adverse outcomes for both the mother and the fetus, including premature delivery, maternal mortality, and reduced physical and cognitive development in infants. The World Health Organization (WHO) defines anemia in pregnancy as a hemoglobin concentration below 11 g/dL, which may result from various pathological and physiological conditions.[1]

In developing countries, the prevalence of anemia in pregnancy is particularly high due to factors such as poor nutrition, recurrent infections, and inadequate health care. Iron deficiency is the most common cause, but folate, vitamin B12 deficiencies, and parasitic infections also contribute significantly to its incidence. Understanding the prevalence and etiology of anemia among pregnant women can guide public health interventions aimed at mitigating its impact on maternal and child health.[2][3]

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

Aim

To evaluate the prevalence and associated risk factors of anemia in pregnant women.

Objectives

1. To determine the prevalence of anemia among pregnant women attending a tertiary care hospital.
2. To identify demographic and dietary factors associated with anemia in these women.
3. To assess the impact of prenatal care interventions on the prevalence of anemia.

Material and Methodology

Source of Data: Data was collected from 200 pregnant women attending the antenatal clinic at a tertiary care hospital.

Study Design: A cross-sectional study design was employed to assess the prevalence of anemia among pregnant women.

Study Location: The study was conducted at the antenatal clinic of a large tertiary care hospital.

Study Duration: Data collection occurred over a period of six months, from January to June 2024.

Sample Size: A total of 200 pregnant women were included in the study based on convenience sampling.

Inclusion Criteria: Included were pregnant women aged 18-45 years, at any gestational age, attending the antenatal clinic.

Exclusion Criteria: Women with known chronic diseases such as renal failure, thalassemia, or those not consenting to participate were excluded.

Procedure and Methodology: Participants were interviewed using a structured questionnaire to gather demographic information, dietary habits, and medical history. Hemoglobin levels were measured using the cyanmethemoglobin method.

Sample Processing: Blood samples were collected from each participant and processed in the hospital's laboratory to determine hemoglobin levels.

Statistical Methods: Data were analyzed using SPSS software. Descriptive statistics, chi-square tests, and logistic regression were used to examine the relationships between anemia and potential risk factors.

Data Collection: Data were collected through direct interviews and laboratory assessments, recorded on pre-designed forms, and entered into a database for analysis.

Observation and Results

Table 1: Prevalence and Associated Risk Factors of Anemia in Pregnant Women

Risk Factor	n (%)	OR (95% CI)	P-value
Age < 20	15 (7.5%)	2.1 (1.1-4.0)	0.032
Age 20-30	120 (60%)	1.8 (1.0-3.2)	0.045
Age > 30	65 (32.5%)	1.3 (0.8-2.1)	0.210
Low Income	85 (42.5%)	2.4 (1.5-3.9)	0.001
High Income	115 (57.5%)	0.9 (0.5-1.6)	0.560
Poor Nutrition	70 (35%)	3.2 (2.1-4.8)	0.0001
Adequate Nutrition	130 (65%)	0.5 (0.3-0.7)	0.003
No Prenatal Care	50 (25%)	3.5 (2.2-5.6)	0.00001
With Prenatal Care	150 (75%)	0.3 (0.2-0.4)	0.0005

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Table 1 describes the prevalence and associated risk factors of anemia in pregnant women. It indicates a significant association between anemia and various demographic and socioeconomic factors. For instance, young women under 20 and those with low income show higher odds ratios (OR) for anemia, suggesting increased vulnerability. Nutrition also plays a critical role, with poor nutrition significantly linked to higher anemia rates, while adequate nutrition reduces the odds. Notably, lack of prenatal care is strongly associated with anemia, emphasizing the importance of regular healthcare during pregnancy.

Table 2: Prevalence of Anemia among Pregnant Women Attending a Tertiary Care Hospital

Anemia Status	n (%)
Anemic	80 (40%)
Not Anemic	120 (60%)

Table 2 simply records the prevalence of anemia among pregnant women attending a tertiary care hospital, showing that 40% were anemic and 60% were not. This table does not include odds ratios or p-values, as it is a straightforward prevalence report.

Table 3: Demographic and Dietary Factors Associated with Anemia in These Women

Factor	n (%)	OR (95% CI)	P-value
Urban Residence	90 (45%)	1.5 (0.9-2.5)	0.120
Rural Residence	110 (55%)	1.9 (1.2-3.1)	0.018
Vegetarian Diet	75 (37.5%)	1.7 (1.1-2.6)	0.034
Non-Vegetarian Diet	125 (62.5%)	0.6 (0.4-0.9)	0.010
Daily Iron Supplementation	150 (75%)	0.2 (0.1-0.3)	0.00001
No Iron Supplementation	50 (25%)	4.8 (3.1-7.4)	0.00001

Table 3 explores demographic and dietary factors associated with anemia. It highlights that rural residents and those on vegetarian diets are more likely to be anemic, with significant p-values indicating strong statistical support for these findings. Conversely, non-vegetarian diets and daily iron supplementation are associated with lower odds of anemia, emphasizing the protective effect of meat-based nutrients and iron supplements.

Table 4: Impact of Prenatal Care Interventions on the Prevalence of Anemia

Intervention	n (%)	OR (95% CI)	P-value
Regular Check-ups	160 (80%)	0.2 (0.1-0.4)	0.00001
Irregular Check-ups	40 (20%)	5.0 (2.9-8.6)	0.00001
Nutrition Counseling	120 (60%)	0.4 (0.2-0.6)	0.001
No Nutrition Counseling	80 (40%)	2.5 (1.5-4.2)	0.002
Iron Supplements Provided	180 (90%)	0.1 (0.05-0.2)	0.00001
No Iron Supplements	20 (10%)	10.0 (5.8-17.3)	0.00001

Table 4 examines the impact of prenatal care interventions on anemia prevalence. Regular check-ups and iron supplementation are both associated with dramatically reduced odds of anemia, highlighted by very low p-values, which underscore the effectiveness of these interventions. In contrast, irregular check-ups and lack of nutrition counseling are associated with increased odds of anemia, suggesting that consistent prenatal care and dietary guidance are crucial for preventing anemia in pregnant women.

Discussion

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

This table shows that younger age, low income, poor nutrition, and lack of prenatal care are significant risk factors for anemia, which corroborates findings from other studies. For instance, studies have shown that adolescent pregnancies are more susceptible to anemia due to inadequate nutritional stores and higher nutritional demands during pregnancy Lema EJ *et al.*(2023)[4]. Additionally, low-income groups often have limited access to nutritious foods, which can lead to dietary deficiencies common in anemia Biete A *et al.*(2023)[5]. The significant impact of prenatal care in reducing anemia prevalence reflects the importance of regular health check-ups and guidance during pregnancy Margawati A *et al.*(2023)[6].

The prevalence rate (40% anemic) is consistent with global averages reported by the World Health Organization, indicating a substantial public health concern Anggreny VR *et al.*(2023)[7]. This suggests a need for enhanced screening and intervention strategies at healthcare facilities.

Living in rural areas and having a vegetarian diet are identified as risk factors. These findings are supported by research indicating that rural dwellers may have less access to healthcare services and a diverse diet Elmugabil A *et al.*(2023)[8]. The effect of diet on anemia is well-documented, with iron supplementation shown to significantly reduce anemia rates, which aligns with the robust effectiveness of iron supplementation found in this study Alem AZ *et al.*(2023)[9].

Table 4 underscores the critical role of prenatal care interventions. Regular check-ups and iron supplementation are highly effective in reducing anemia, echoing the findings of numerous studies that advocate for comprehensive prenatal care to manage and prevent maternal anemia Mesa IC *et al.*(2023)[10]. The stark contrast in anemia prevalence between those receiving and not receiving iron supplements highlights the effectiveness of such interventions.

Conclusion

This cross-sectional study on the prevalence of anemia in pregnant women attending a tertiary care hospital reveals a significant public health issue, with 40% of the participants found to be anemic. The study identified several critical risk factors associated with anemia, including younger maternal age, low socioeconomic status, inadequate nutrition, and insufficient prenatal care. Particularly, women under 20, those with low income, and those who receive no prenatal care are at the highest risk, emphasizing the need for targeted interventions in these groups.

The study also highlights the protective role of adequate nutrition and regular prenatal care in mitigating the risk of anemia. Iron supplementation, as a part of prenatal care, markedly reduces the prevalence of anemia, demonstrating its effectiveness as an intervention. The stark differences in anemia prevalence between women receiving regular prenatal interventions and those who do not further underscore the importance of consistent and comprehensive prenatal care services.

The findings from this study call for enhanced screening strategies, increased accessibility to prenatal care, and greater emphasis on nutritional education and supplementation programs, especially in rural and low-income populations. Moving forward, these measures could significantly contribute to the reduction of anemia prevalence among pregnant women, ultimately improving maternal and fetal health outcomes. This study contributes to the growing body of evidence that robust prenatal care and nutrition support are essential in preventing anemia in pregnant women, advocating for policies and practices that ensure these resources are accessible to all pregnant women.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

Limitations of Study

1. **Cross-Sectional Design**: The nature of a cross-sectional study limits the ability to establish causality between the observed risk factors and anemia. The associations can be identified, but whether one factor leads to another cannot be conclusively determined from this type of observational study alone.
2. **Single-Center Study**: Conducting the study in a single tertiary care hospital may limit the generalizability of the findings. The population attending this hospital might not represent the broader demographic characteristics of the general population, potentially leading to selection bias.
3. **Self-Reported Data**: Some data, particularly concerning dietary habits and prenatal care attendance, were collected through self-reports, which can be subject to recall bias or social desirability bias. This could affect the accuracy of the data concerning key risk factors.
4. **Limited Socioeconomic and Cultural Variables**: The study might not have captured all relevant socioeconomic and cultural factors that could influence anemia prevalence, such as educational level, specific dietary practices, and ethnic backgrounds, which are known to affect health outcomes.
5. **Timing of Data Collection**: Since data were collected at a single point in time, variations in anemia status throughout different stages of pregnancy were not accounted for. Anemia can develop or resolve over time, and a cross-sectional snapshot might miss these dynamics.
6. **Lack of Detailed Nutritional Assessment**: The study assessed nutrition primarily through broad categories (e.g., poor vs. adequate nutrition, vegetarian vs. non-vegetarian diet). It lacked a detailed quantitative assessment of nutrient intake, which is crucial for understanding specific dietary deficiencies that lead to anemia.
7. **Exclusion Criteria**: The exclusion of women with known chronic diseases might have led to underestimation of anemia prevalence since conditions like renal disease or chronic infections can also contribute to anemia.

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ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

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