ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

The incidence of anemia among patients visiting the outpatient department of a tertiary care hospital in Northern Bihar

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ABSTRACT

Background: Anemia, a condition characterized by reduced red blood cells or hemoglobin levels, continues to be an important aspect of public health challenge globally, particularly in emerging nations like India. Northern Bihar, marked by socioeconomic challenges and limited healthcare access, exhibits a high prevalence of anemia.

Aim: The purpose of this study is to investigate the prevalence of anemia and related risk factors among patients presenting to a tertiary care hospital's outpatient department (OPD) in North Bihar.

Methods: A cross-sectional observational study was conducted with 100 participants aged 18 and above who visited the OPD. Data were collected through structured questionnaires covering demographics, medical history, and dietary habits. Hemoglobin levels were measured using a calibrated automated hematology analyzer. Statistical analysis was performed applying SPSS version 23.0, with logistic regression used to identify significant predictors of anemia.

*Results:*Anemia's general frequency was discovered to be 45%, with a higher prevalence in females (60%) compared to males (27.1%). The mean hemoglobin level was 12.3 g/dL. Significant factors associated with anemia included gender, age, socioeconomic status, and dietary habits. Females had 3.5 times higher probabilities of anaemiathan males, and individuals from lower socioeconomic backgrounds had 2.8 times higher odds of anemia. Poor dietary habits were also strongly associated with higher anemia prevalence.

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Conclusion: Anemia remains highly prevalent among patients in North Bihar, with significant gender and socioeconomic disparities. The findings underscore the necessity for targeted interventions focusing on improving nutrition and addressing socioeconomic determinants to mitigate anemia.

Recommendations: Public health strategies should integrate nutrition education, socioeconomic support, and accessible healthcare services to effectively address anemia in North Bihar. Further research is recommended to explore specific local factors contributing to anemia and to evaluate the effectiveness of targeted intervention programs.

Keywords: Anemia, Prevalence, North Bihar, Socioeconomic Factors, Nutritional Deficiencies

INTRODUCTION

Reduced red blood cell count or haemoglobin concentration are the hallmarks of anaemia and a major worldwide health issue, particularly in nations with limited resources. It impairs oxygen delivery to tissues, leading to symptoms such as fatigue, weakness, and compromised cognitive and physical performance. Severe anemia can result in increased morbidity and mortality, especially among vulnerable populations like children, pregnant women, and the elderly. The condition has multifactorial etiologies, including nutritional deficiencies (particularly iron, vitamin B12, and folate), chronic diseases, and genetic disorders.

The global burden of anemia is staggering, with recent estimates indicating that approximately 1.74 billion people are affected worldwide [1]. In India, the prevalence remains alarmingly high, with significant disparities across different states and demographic groups. According to the National Family Health Survey (NFHS-5) conducted between 2019 and 2020, about 57% of women and 52% of children under five years of age are anemic in India, reflecting a slight increase from previous years [2]. Northern Bihar, a region characterized by socio-economic challenges and limited access to healthcare, presents a particularly concerning scenario for anemia prevalence.

Recent studies emphasize the critical need for understanding local epidemiology and determinants of anemia to formulate effective public health interventions. For instance, a study by Sinha [3] highlighted the high prevalence of anemia among women in rural Bihar, attributing it to poor dietary practices, frequent pregnancies, and limited healthcare access. Additionally,

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Mishra [4] found that socioeconomic status and education levels significantly influenced anemia prevalence among adolescents in the region.

Public health strategies to combat anemia have traditionally focused on iron supplementation and fortification programs. However, the persistence of high anemia rates suggests that these measures alone are insufficient. Integrating broader approaches that address underlying social determinants, such as poverty, education, and gender inequality, is crucial. For example, Garg [5] demonstrated that community-based nutrition education programs significantly improved hemoglobin levels among women in Bihar, indicating the potential of holistic approaches.

The purpose of this study is to ascertain the predominance of anemia among patients visiting a North Bihar tertiary care hospital's outpatient department (OPD). This study aims to give insights that might guide healthcare practices and policy choices targeted at reducing the burden of anemia in this region by assessing the prevalence and possible risk factors.

METHODOLOGY

Study Design:

This study employs a cross-sectional observational design to assess the prevalence of anemia amongstPatients coming to a North Bihar tertiary care hospital's outpatient department (O.P.D)

Study Setting:

The study was done in the (OPD) of a tertiary care hospital located in Purnea,a City of North Bihar. The study duration was from July 2023 to March 2024.

Participants:

The study comprised all patients who visited the (OPD) throughout the research period, who were at least 18 years old. The estimated prevalence of anaemia and the resources available were taken into consideration while determining the sample size.

Inclusion Criteria:

1. Patients who are at least 18 years old.
2. Individuals who gave their informed consent to take part in the research.

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3. Individuals seeking care in the outpatient department (OPD) for a range of health issues, except those with established hematological illnesses.

Exclusion Criteria:

1. Patients with a prior diagnosis of any hematological disorder.

2. Pregnant women.

3. Patients currently undergoing treatment for anemia.

4. Patients who declined to provide informed consent.

Bias:

To minimize selection bias, patients were randomly selected from the OPD register. Information bias was addressed by training the data collection team and ensuring standardized procedures for data collection. Potential confounding factors were identified and adjusted for during the statistical analysis.

Data Collection:

A standardized questionnaire was utilized to gather data, encompassing demographic details, medical background, dietary practices, and symptoms suggestive of anaemia. A calibrated automated haematologyanalyser was used to measure the amounts of haemoglobin.

Procedure:

Participants were invited to participate after being notified about the study by OPD patients.Participants who volunteered gave their written, informed permission. To get pertinent information from the participants, a standardized questionnaire was given out. Blood samples were collected aseptically for hemoglobin estimation. Hemoglobin levels were recorded and classified based on the World Health Organization (WHO) criteria for anemia.

Statistical Analysis:

Using SPSS version 23.0, data were examined. In order to compare categorical variables, chi-square tests were utilised to quantify the prevalence of anaemia. The variables connected to

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

anaemia were found using logistic regression analysis. For statistical significance, a p-value of less than 0.05 was used.

RESULTS

Table 1: Participant Demographics

Of the 100 individuals included in the research, 48 were found to be male and 52 to be female. Participants' ages varied from 18 to 75 years old, with a mean age of 36.8 years. Of the participants, sixty percent lived in rural regions and forty percent in urban areas.

Prevalence of Anemia:

Among research participants, the total prevalence of anaemia was found to be 45%. The prevalence was higher among females (60%) compared to males (27.1%). Anemia prevalence also varied significantly with age, socioeconomic status, and dietary habits.

Hemoglobin Levels:

With a standard variation of 1.8 g/dL, the individuals' haemoglobin level was 12.3 g/dL on average. Males had a mean haemoglobin level of 13.5 g/dL and females 11.2 g/dL.

Table 1: Demographic Characteristics of Participants

Characteristic	**Total (N=100)**	**Males (N=48)**	**Females (N=52)**
Age (years)	36.8 ± 12.5	35.2 ± 11.8	38.4 ± 13.2
Rural (%)	60	55	65
Urban (%)	40	45	35
Socioeconomic Status			
- Low (%)	45	40	50
- Middle (%)	35	38	32

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- High (%)	20	22	18

Table 2: Gender distribution

Gender	Total Participants	Anemic Participants	Prevalence (%)
Male	48	13	27.1
Female	52	31	60.0
Total	100	45	45.0

Table 3: Hemoglobin Levels by Gender

Gender	Mean Hemoglobin (g/dL)	Standard Deviation (g/dL)
Male	13.5	1.5
Female	11.2	1.2
Total	12.3	1.8

Factors Associated with Anemia:

Several variables were shown to be substantially linked with anaemia through the use of logistic regression analysis. These included food preferences, age, gender, and socioeconomic level.

Gender: Compared to men, women were considerably higher likelihood of anaemia

(OR = 3.5, 95% CI: 1.5-8.1, p = 0.003).

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Age: The frequency of anaemia was greater in participants between the ages of 18 and 35 than in those between the ages of 36 and 75 (OR = 2.2, 95% CI: 1.1-4.6, p = 0.029).

Socioeconomic Status: Individuals with lower socioeconomic status had a higher probability of becoming anaemic than individuals with higher socioeconomic status (OR = 2.8, 95% CI: 1.3-6.1, p = 0.009).

Dietary Practices: Anaemia prevalence was greater in participants with poor dietary practices (OR = 2.5, 95% CI: 1.2-5.2, p = 0.015).

Table 4: Logistic Regression Analysis of Factors Associated with Anemia

Factor	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Gender (Female vs Male)	3.5	1.5-8.1	0.003
Age (18-35 vs 36-75)	2.2	1.1-4.6	0.029
Low Socioeconomic Status	2.8	1.3-6.1	0.009
Poor Dietary Habits	2.5	1.2-5.2	0.015

DISCUSSION

The study found a 45% prevalence of anemia among 100 outpatient department attendees, with a significant gender disparity: 60% of females were anemic compared to 27.1% of males. The mean hemoglobin levels were 12.3 g/dL overall, 13.5 g/dL for males, and 11.2 g/dL for females.

Key factors associated with anemia included gender, age, socioeconomic status, and dietary habits. Females had 3.5 times higher odds of being anemic than males, younger participants

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(aged 18-35)were prone to anaemia, and backgrounds had 2.8 persons of lesser socioeconomic status times higher odds of anemia. Poor dietary habits also increased the risk of anemia by 2.5 times. Recent studies have consistently highlighted the high prevalence of anemia among various patient groups in Northern Bihar and similar regions. In a Bihar institute of training for urban health, a research evaluating the prevalence of anaemia among patients revealed that 64.3% of the screened patients had anaemia overall. Prevalence rates were greater in teenage girls (62.5) In pregnant women (62.4%), and women of reproductive age (71.1%) than in males (32.3%), to the research. The study also highlighted significant associations with socio-demographic factors, including illiteracy, non-consumption of non-vegetarian diets, and lack of iron and folic acid supplementation [6].

Anaemia was found to be prevalent in 77% of pregnant patients at a tertiary care hospital in Gaya, Bihar, according to another study. This study emphasised the relationship between the occurrence of anaemia and gestational age, literacy, and socioeconomic level. With a 9.2 g/dL average for haemoglobin among research participants, there is a serious public health risk [7].

In a tertiary care hospital's paediatric outpatient department, 14% of elementary school students who visited for anaemia were determined to be anaemic. The study underscored significant associations with socioeconomic factors and dietary habits, with children from lower socioeconomic origins having a greater frequency of anaemia [8].

These results highlight the need for targeted interventions focusing on women, younger adults, and individuals from lower socioeconomic backgrounds to address anemia through improved nutrition and healthcare access.

CONCLUSION

The study at a tertiary care hospital in North Bihar found a 45% prevalence of anemia, with 60% of females and 27.1% of males affected. Key predictors were gender, age, socioeconomic status, and dietary habits. Females had 3.5 times higher odds of anemia. Younger adults and those from lower socioeconomic backgrounds were more at risk. Poor dietary habits also increased anemia risk by 2.5 times. Targeted interventions are essential, focusing on improving nutrition, healthcare access, and education on healthy dietary practices, especially for women and

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 05, 2024

economically disadvantaged groups. Comprehensive strategies are necessary to reduce anemia and enhance overall health.

Limitations: The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

Recommendation: Public health strategies should integrate nutrition education, socioeconomic support, and accessible healthcare services to effectively address anemia in North Bihar. Further research is recommended to explore specific local factors contributing to anemia and to evaluate the effectiveness of targeted intervention programs.

Acknowledgement: We are thankful to the patients; without them the study could not have been done. We are thankful to the supporting staff of our hospital who were involved in patient care of the study group.

List of Abbreviations:

OPD: Outpatient Department

SPSS: Statistical Package for the Social Sciences

WHO: World Health Organization

CI: Confidence Interval

OR: Odds Ratio

NFHS: National Family Health Survey

IIPS: International Institute for Population Sciences

ICMR: Indian Council of Medical Research

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