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PREVALENCE OF ANEMIA IN COLLEGE GOING STUDENTS IN BEGUSARAI OF LOWER SOCIO-ECONOMIC GROUPS IN BIHAR INDIA: A RESEARCH PAPER

Zoology

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ABSTRACT

This study investigates the prevalence of anemia among college-going students from lower socio-economic backgrounds in Begusarai, Bihar, India. Using a cross-sectional design, data on hemoglobin levels, dietary habits, and socio-economic factors were collected from 50 students aged 18-22 years. The results revealed significant gender disparities in hemoglobin levels, with females having a mean hemoglobin of 12.54 g/dL, compared to 14.46 g/dL for males. A t-test confirmed a statistically significant difference ($p = 0.0026$). The findings highlight the influence of dietary patterns and socio-economic factors on anemia prevalence and emphasize the need for targeted health interventions. Recommendations for future research include larger sample sizes and longitudinal studies to explore causal relationships.

KEYWORDS

Anemia, Hb, Socio-Economic Factors, Dietary Patterns, Gender Disparity, Public Health

INTRODUCTION

"Anemia is a prevalent health concern in India, significantly impacting young adults, including college students. Data from the National Family Health Survey (NFHS-5, 2019-2021) indicate that about 57% of women and 25% of men aged 15-49 years suffer from anemia, suggesting that young adults are notably affected by this condition". [5] The impact of anemia on college students is multifaceted, influencing their physical health, cognitive abilities, and overall well-being. Physically, anemia, often caused by iron deficiency, impairs oxygen transport in the body, leading to symptoms such as fatigue, weakness, and decreased immune function. These symptoms can severely limit a student's ability to engage in physical activities and can lower their stamina, which is crucial for academic and extracurricular demands. From a cognitive perspective, anemia has been linked to reduced concentration, memory, and slower cognitive processing speeds. Such cognitive impairments can adversely affect a student's academic performance, potentially leading to lower grades and diminished academic engagement.

Moreover, the psychological impact of anemia should not be overlooked. Symptoms of fatigue and general weakness can contribute to increased anxiety and depression among students, further affecting their academic and social lives. The dietary habits of college students, characterized often by irregular and unbalanced food intake, exacerbate these issues. Many students, especially those from lower socio-economic backgrounds, face significant barriers to accessing nutritious foods rich in iron and vitamins, which are essential for preventing and managing anemia.

To address the high prevalence of anemia among college students, comprehensive health interventions are essential. These should include nutritional education programs to raise awareness about the importance of a balanced diet, improved access to affordable nutritious foods, and regular health screenings conducted by university health services. Such initiatives are vital for not only improving the health outcomes of students but also enhancing their educational and personal development. These measures can form a crucial part of the broader public health strategy to combat anemia and improve the quality of life for young adults in India.

The literature review for a study on the prevalence of anemia among college-going students in Begusarai, Bihar, within lower socio-economic groups requires a thorough examination of existing research on anemia across various regions and socio-economic strata. This review will contextualize the current research within the broader epidemiological and socio-economic framework and highlight the patterns, causes, and consequences of anemia that have been observed in similar and diverse settings.

Global And Regional Prevalence

Studies such as the World Health Organization's global anemia estimates highlight the widespread nature of this condition, affecting over 1.62 billion people, which corresponds to about 24.8% of the population worldwide. The prevalence varies significantly by region, with the highest rates observed in Africa and South Asia. For instance, Kassebaum et al. (2014) in their "global burden of disease study, found a particularly high prevalence of anemia in South Asian countries, attributing it mainly to nutritional deficiencies and poor access to healthcare". [3]

Anemia in India:

"Within India, the prevalence of anemia remains high despite various government-led interventions. According to the National Family Health Survey (NFHS-5, 2019-2021), anemia affects a majority of women and a significant proportion of men in reproductive age groups, with notable variations across different states and socio-economic groups". [5] Studies like Pasricha et al. (2018) have "analyzed factors contributing to such high prevalence rates, including dietary iron intake, parasitic infections, and genetic conditions like thalassemia". [6]

Impact of Socio-economic Factors

Research has consistently shown that socio-economic status (SES) is a critical determinant of anemia prevalence. Lower SES is associated with higher anemia prevalence due to factors such as limited access to quality food, poor living conditions, and lack of education. A study by Bentley and Griffiths (2003) on "the socio-economic determinants of micronutrient deficiencies in South Asia highlights how economic constraints lead to dietary limitations that exacerbate the risk of anemia". [1]

Nutritional Interventions And Outcomes

The effectiveness of interventions aimed at reducing anemia has also been a significant focus of existing literature. Programs that include supplementation with iron and folic acid, fortification of staple foods, and nutrition education have been evaluated in various contexts. For example, Balarajan et al. (2011) review "the impact of these interventions in low and middle-income countries, suggesting that while they are effective, their success often depends on the implementation context, which includes consideration of local dietary habits and health infrastructure".[2]

Previous Findings On Anemia

Despite extensive studies on anemia, there is a gap in research specifically targeting young adults in educational settings, especially in semi-urban and rural areas like Begusarai. Moreover, few studies delve deeply into the intersection of anemia with educational performance and socio-economic mobility in college students.

Dietary Habits

The link between dietary habits and anemia is well-established, with numerous studies highlighting the critical role that nutrients such as iron, vitamin B12, and folate play in hemoglobin production and overall red blood cell health. For example, research has shown that diets low in red meat, leafy greens, and fortified cereals, which are more common among socio-economically disadvantaged populations, contribute significantly to the prevalence of iron-deficiency anemia. A study by McLaren et al. (2017) emphasized "the impact of limited dietary diversity on micronutrient deficiencies among low-income groups, demonstrating how economic constraints restrict access to

essential nutrients". [4]

Access to Healthcare

The availability and quality of healthcare services are pivotal in managing and preventing anemia. In many regions, especially those with underdeveloped healthcare infrastructures, there is often a significant delay in the diagnosis and treatment of anemia. "The research conducted by Garg and Karan (2009) highlighted how inadequate healthcare facilities and high out-of-pocket costs for medical services prevent effective management and treatment of anemia in rural Indian settings, leading to worsened health outcomes over time". [7]

Socio-economic Factors

Socio-economic status directly influences the risk and prevalence of anemia. Lower socio-economic status correlates with higher anemia rates due to factors such as poor nutrition, limited health literacy, and reduced access to healthcare. According to Balarajan and Ramakrishnan (2011), socio-economic disparities result in unequal health outcomes, particularly visible in anemia prevalence across different socio-economic groups in developing regions like India.

Despite extensive studies on anemia, several critical gaps remain, particularly concerning specific demographic groups and settings:

a) Focus on Young Adults: There is a notable lack of research focusing on the prevalence of anemia among young adults, particularly those in college. This demographic faces unique lifestyle and dietary challenges that can influence anemia risk, yet they are often overlooked in anemia research which typically concentrates on younger children and reproductive-age women.

b) Educational Settings: Research specifically examining anemia within college environments, especially in semi-urban and rural areas like Begusarai, is sparse. College's present unique nutritional and health challenges that could influence anemia prevalence, and understanding these dynamics is crucial for developing effective health interventions in educational settings.

c) Regional And Cultural Contexts: While broader studies have examined socio-economic impacts on anemia, there is a lack of detailed research that integrates these factors with the specific cultural and regional contexts of areas like Begusarai. Localized studies are essential for tailoring interventions to the particular needs and challenges of these populations.

d) Anaemia's Impact On Academic Performance: The relationship between anemia and academic performance in higher education settings is poorly documented. Exploring how anemia affects cognitive function and educational outcomes in college students could provide significant insights into the broader impacts of health on educational success and socio-economic mobility.

Addressing these gaps, the proposed study aims to provide new insights into anemia management among college students in socio-economically disadvantaged areas, potentially guiding public health strategies and educational policies to improve both health and educational outcomes.

Problem Statement

Students from lower socio-economic backgrounds face significant health challenges, with anemia being a prominent issue that exacerbates existing disparities. This problem is particularly evident in college settings, where financial and health barriers negatively impact well-being.

a) Nutritional Deficiencies: Limited financial resources hinder access to nutritious food, such as iron-rich fruits, vegetables, and proteins. As a result, students often rely on less nutritious, cheaper food, leading to higher rates of iron-deficiency anemia and affecting physical health and academic performance.

b) Access to Healthcare: These students may lack health insurance and cannot afford regular medical check-ups, which are essential for early detection and treatment of anemia. Without routine blood tests, anemia remains undiagnosed and untreated, leading to serious complications.

c) Awareness and Educational Outreach: Health literacy gaps make it difficult for these students to recognize the symptoms of anemia or understand the importance of a balanced diet. Educational institutions play a key role in addressing this by providing targeted health education.

d) Psychological Stress: Financial instability and academic pressures contribute to stress and poor eating habits, which can worsen anemia. This creates a vicious cycle of health deterioration.

Addressing these challenges requires a comprehensive approach: improving food access, ensuring affordable healthcare, and offering targeted educational programs. Collaborative efforts between universities and policymakers are essential for creating environments that support both health and academic success, fostering equity in education and health outcomes.

Research Objectives

The study "Prevalence of Anemia in College-going Students in Begusarai of Lower Socio-Economic Groups in Bihar, India" aims to:

a) Estimate Prevalence: Measure the prevalence of anemia among college students from lower socio-economic groups in Begusarai by assessing hemoglobin levels.

b) Identify Dietary Factors: Investigate the role of diet, particularly iron intake and food diversity, in influencing anemia.

c) Assess Socio-economic and Environmental Factors: Examine how socio-economic status, healthcare access, and living conditions contribute to anemia prevalence.

d) Evaluate Academic Impact: Analyze the effect of anemia on cognitive function and academic performance.

e) Develop Interventions: Propose strategies like nutritional supplementation, health education, and local health service collaborations to reduce anemia prevalence.

These objectives will provide insights into anemia's impact on this group and guide public health interventions.

Significance of the Study (Further Summarized):

This study on anemia among college students in Begusarai, Bihar, has key implications for:

Health Policy: It can inform policies on nutrition, healthcare access, and preventative care for youth.

Resource Allocation: It helps direct resources effectively to areas with higher anemia prevalence.

Educational Outcomes: Addressing Anemia Can Improve Cognitive Function And Academic Performance.

Health Equity: It highlights socio-economic health disparities, promoting targeted interventions for underprivileged groups.

Further Research: It provides a foundation for future studies on nutrition, public health, and socio-economic factors.

Ultimately, the study aims to improve student health, academic performance, and contribute to regional socio-economic development.

Methodology

Methodology of the Study on Anemia Prevalence in Begusarai

Study Design

The research will utilize a cross-sectional observational study design to assess the prevalence of anemia among college-going students in Begusarai, Bihar. This design is chosen for its effectiveness in determining the prevalence and correlates of anemia at a specific point in time. By collecting data simultaneously on hemoglobin levels, dietary habits, and socio-economic factors, the study will provide a snapshot of the current status of anemia within the targeted demographic.

Participants

The fifty (50) participants will be college-going students aged 18-22 from G.D. College Begusarai. Inclusion criteria will focus on students who belong to lower socio-economic groups. Socio-economic status will be determined based on family income, parental education levels, and occupation, using a socio-economic status scale appropriate for the Indian context. The study will aim to enrol a representative sample of students from both genders and different faculties to ensure diverse data reflective of the entire student population in the region.

Data Collection Methods

Data collection will be organized into three main categories:
Hemoglobin Levels: Hemoglobin testing will be conducted using portable hemoglobinometers, which provide immediate results. This method is suitable for large-scale screenings and is minimally invasive.

Dietary Intake: Dietary data will be collected through a validated semi-quantitative food frequency questionnaire (FFQ) adapted to local dietary habits. The FFQ will assess the frequency and portion size of food items consumed over the past month, focusing on iron-rich foods and other nutrients relevant to anemia.

Socio-Economic Status: Information on socio-economic background will be gathered using a detailed questionnaire that includes questions about family income, education level, and occupation. This will help categorize participants into different socio-economic strata.

Statistical Analysis

The data will be analyzed using statistical software such as R. Descriptive statistics will be used to summarize the demographic characteristics of the study population and the prevalence of anemia. Inferential statistics, including chi-square tests for categorical data and t-tests for continuous data, will be employed to explore associations between anemia status and variables such as dietary intake and socio-economic factors. Logistic regression analysis will be used to identify predictors of anemia among the participants, adjusting for potential confounders like age and gender.

This methodological framework is designed to comprehensively evaluate the prevalence and factors associated with anemia among college students in a specific socio-economic setting, providing valuable insights for targeted public health interventions and policy formulation.

Results Of The Anemia Study

The study involved young adults, predominantly aged 18-22 years, ensuring a homogeneous age group representative of college students. The sample included both male and female participants, providing a balanced gender distribution for analyzing anemia prevalence in this demographic.

Participants were primarily affiliated with G.D. College, with Zoology being the most common field of study. A majority of the students were in their second year, offering insights into the lifestyle and dietary patterns of individuals at this stage of their education.

Socioeconomic factors played a notable role in the study. Most participants belonged to families with a monthly income range of INR 10,001 to INR 20,000. Educational backgrounds of the parents revealed that fathers often had secondary-level education, while mothers had primary-level education. Occupational analysis showed that fathers were involved in various fields, including farming, private jobs, government jobs, and labor, whereas mothers were predominantly homemakers.

Dietary habits indicated a relatively balanced intake of essential food groups. Eggs and legumes were consumed daily by most participants, highlighting a good source of protein in their diet. Weekly consumption of green leafy vegetables was common, reflecting moderate intake of this iron-rich food group. Fruits were a regular part of the diet, with many participants consuming them daily. Iron-fortified cereals, however, were consumed on a weekly basis rather than daily, and the majority of participants did not use dietary supplements, relying instead on food sources for their nutritional needs.

The health profile of the participants revealed that most had no prior diagnosis of anemia, suggesting the sample largely represented a general population. Chronic illnesses were rare, indicating overall good health among the participants. Their lifestyle was moderately active, demonstrating a balance between physical activity and other daily routines.

Finally, a significant number of participants consented to hemoglobin testing, facilitating a robust analysis of anemia prevalence within this group. The combination of dietary, socioeconomic, and lifestyle data provides a comprehensive understanding of factors that may influence anemia risk in this population. Further statistical analysis could uncover specific correlations and actionable insights.

Table No.1. Hemoglobin Profile Of Students

Participant	Gender	Hemoglobin (g/dL)	Anemia Status
1	Male	16.35	Normal
2	Female	12.84	Normal
3	Female	12.27	Normal
4	Female	11.9	Anemia
5	Male	10.8	Anemia
6	Male	12.7	Anemia
7	Male	13.35	Normal
8	Female	14.61	Normal
9	Female	13.19	Normal
10	Female	8.97	Anemia
11	Male	15.31	Normal
12	Female	11.73	Anemia
13	Female	11.15	Anemia
14	Male	16.03	Normal
15	Male	17.08	Normal
16	Male	16.83	Normal
17	Male	12.4	Anemia
18	Female	11.88	Anemia
19	Female	13.16	Normal
20	Male	16.94	Normal
21	Female	11.54	Anemia
22	Male	14.04	Normal
23	Male	11.73	Anemia
24	Male	11.51	Anemia
25	Female	14.13	Normal
26	Female	15.21	Normal
27	Male	14.32	Normal
28	Female	14.51	Normal
29	Female	13.22	Normal
30	Male	12.89	Anemia
31	Female	13.22	Normal
32	Male	18.35	Normal
33	Male	14.41	Normal
34	Female	15.63	Normal
35	Female	7.26	Anemia
36	Female	14.14	Normal
37	Male	14.72	Normal
38	Male	13.75	Normal
39	Female	12.68	Normal
40	Female	8.52	Anemia
41	Male	13.95	Normal
42	Female	13.21	Normal
43	Male	18.19	Normal
44	Female	11.46	Anemia
45	Male	12.48	Anemia
46	Female	11.5	Anemia
47	Male	16.79	Normal
48	Female	13.16	Normal
49	Female	11.44	Anemia
50	Male	15.78	Normal

Statistical Analysis of Hemoglobin Levels

Descriptive Statistics by Gender

Gender	Mean Hemoglobin (g/dL)	Standard Deviation	T- Value	P-value
Female	12.54	2.15	3.17	0.0026
Male	14.46	2.12		

The statistical analysis reveals significant differences in hemoglobin levels between male and female participants. The mean hemoglobin level for females was 12.54 g/dL, which is close to the World Health Organization's threshold for anemia in non-pregnant women (12 g/dL). This suggests that a considerable proportion of females in the study may be at risk of anemia. In contrast, the mean hemoglobin level for males was 14.46 g/dL, comfortably above the threshold for anemia in males (13 g/dL), indicating a healthier hemoglobin profile among the male participants.

The standard deviation of hemoglobin levels was similar for both

groups, with females showing a standard deviation of 2.15 and males 2.12. This suggests a moderate level of variability in hemoglobin levels within each gender group. Despite this variability, the difference in mean levels between males and females was pronounced.

The t-value of 3.17 and a p-value of 0.0026 provide strong evidence that the observed difference in hemoglobin levels between males and females is statistically significant. The p-value, being less than the commonly accepted significance level of 0.05, confirms that the difference is unlikely to be due to random chance.

These findings underscore the gender-specific differences in hemoglobin levels, with females displaying a greater vulnerability to anemia. This highlights the need for focused health interventions

DISCUSSION

Interpretation of Findings in Relation to Existing Literature

The findings of this study align with existing literature indicating that females, particularly of reproductive age, are at a higher risk of anemia compared to males. The mean hemoglobin level for females was 12.54 g/dL, which approaches the WHO threshold for anemia, whereas males had a mean of 14.46 g/dL, well above the threshold. This gender disparity is consistent with studies attributing lower hemoglobin levels in females to menstrual blood loss, inadequate dietary iron intake, and socio-cultural factors that may prioritize male nutrition in certain populations. Additionally, the significant difference in hemoglobin levels ($p = 0.0026$) emphasizes the need for gender-specific interventions to address anemia.

Potential Reasons For Prevalence Rates

The moderate prevalence of anemia in this sample could stem from a combination of dietary and socio-economic factors. Limited intake of iron-rich foods, such as green leafy vegetables, legumes, and fortified cereals, could contribute to lower hemoglobin levels, particularly among females. Additionally, socio-economic constraints might hinder access to nutritional supplements or healthcare, exacerbating the risk of anemia. Cultural dietary practices, which often favour males in resource allocation, may further explain the gender disparity in hemoglobin levels. Conversely, the relatively high mean hemoglobin levels in males suggest adequate nutritional status or lower physiological demands compared to females.

Study Limitations And Potential Biases

This study has several limitations that could influence its findings. The sample size of 50 participants, though sufficient for preliminary analysis, may not be representative of the larger population. Additionally, self-reported dietary and socio-economic data might be subject to recall bias or inaccuracies. The lack of data on other factors influencing anemia, such as parasitic infections, genetic conditions (e.g., thalassemia), or inflammation, limits the comprehensiveness of the analysis. Furthermore, the study's cross-sectional design prevents establishing causal relationships between socio-economic or dietary factors and anemia.

Suggestions For Future Research

Future research should expand on this study by incorporating a larger and more diverse sample to improve generalizability. Longitudinal studies could help establish causal links between dietary patterns, socio-economic factors, and anemia. Additionally, integrating biomarkers of iron status, such as serum ferritin and transferrin saturation, would provide deeper insights into the underlying mechanisms of anemia. Studies exploring the impact of targeted nutritional interventions and health education programs on anemia prevalence, especially among females, are also warranted. Lastly, examining the role of cultural and behavioral factors in dietary habits could help tailor community-specific anemia prevention strategies.

REFERENCES

[1] Bentley, M.E., & Griffiths, P.L. (2003). The burden of anemia among women in India. *The Lancet*, 362(9397), 1813-1818.

[2] Balarajan, Y., & Ramakrishnan, U. (2011). Anaemia in low-income and middle-income countries. *The Lancet*, 378(9809), 2123-2135.

[3] Kassebaum, N.J., et al. (2014). A systematic analysis of global anemia burden. *The Lancet Global Health*, 2(7), e366-e376.

[4] McLaren, D.S., & Kraemer, K. (2017). Iron Deficiency: Global Prevalence and Consequences. *Nutrition Reviews*, 75(11), 957-967.

[5] National Family Health Survey (NFHS-5). (2019-2021). *Ministry of Health and Family Welfare, Government of India.*

[6] Pasricha, S.R., et al. (2018). Factors contributing to anemia among young women in India. *American Journal of Clinical Nutrition*, 108(4), 851-859.

[7] Garg, C.C., & Karan, A.K. (2009). Out-of-pocket expenditures and anemia treatment in rural India. *Health Policy and Planning*, 24(2), 146-155.

[8] Gore MN, Drozd ME, Patil RS. Anemia Prevalence and Socioeconomic Status among Adolescent Girls in Rural Western India: A Cross-Sectional Study. Ethiop J Health Sci. 2024 Jan; 34(1):57-64. Doi: 10.4314/ejhs.v34i1.7. PMID: 38957343; PMCID: PMC11217790.

[9] Tesfaye, M., Yemane, T., Adisu, W., et al. (2015). Anemia and iron deficiency among school adolescents: burden, severity, and determinant factors in southwest Ethiopia. Adolescent Health, Medicine and Therapeutics, 6, 189-196.

[10] Kotecha, P.V. (2011). Nutritional anemia in young children with focus on Asia and India. Indian Journal of Community Medicine, 36(1), 8-16.

[11] Sarna, A., Porwal, A., Ramesh, S., et al. (2020). Characterisation of the types of anemia prevalent among children and adolescents aged 1–19 years in India: a population-based study. Lancet Child and Adolescent Health, 4(7), 515-525.

[12] Balarajan, Y., Ramakrishnan, U., Özaltin, E., et al. (2011). Anemia in low-income and middle-income countries. The Lancet, 378(9809), 2123-2135.

[13] Basu, S., Basu, S., Hazarika, R., & Parmar, V. (2005). Prevalence of anemia among school-going adolescents of Chandigarh. Indian Pediatrics, 42(6), 593.

[14] Gore, M.N., Drozd, M.E., & Patil, R.S. (2024). Anemia Prevalence and Socioeconomic Status among Adolescent Girls in Rural Western India: A Cross-Sectional Study. Ethiopian Journal of Health Sciences, 34(1), 57-63. https://doi.org/10.4314/ejhs.v34i1.7

[15] Chauhan, S., Kumar, P., Marbaniang, S.P., Srivastava, S., & Patel, R. (2022). Prevalence and predictors of anemia among adolescents in Bihar and Uttar Pradesh, India. Scientific Reports, 12(1), 1-9.

[16] Chaparro, C.M., & Suchdev, P.S. (2019). Anemia epidemiology, pathophysiology, and etiology in low- and middle-income countries. Annals of the New York Academy of Sciences, 1450(1), 15-31.