ORIGINAL ARTICLE

Clinico-Pathological Profile of Anaemia in Adult Males at a Hospital in Uttar Pradesh

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Abstract

Introduction: Every fourth person in the world (27%) has anaemia, with developing countries alone accounting for more than 89% of the burden. Population-based studies on anaemia in India have mostly focused on women and children, with men anaemia receiving much less attention despite anaemia having adverse effect on their health, wellbeing, and economic productivity.

Aims and objectives: To study the various determinants and co-morbid conditions associated with anemia in males aged 18 - 49 years.

Methods: A cross-sectional study on anaemic male patients aged 18 - 49 years attending SVBP Hospital, Meerut, Uttar Pradesh.

Results: Majority of participants belonged to the 46 - 49 years age group. Nutritional issues were the most prevalent condition, affecting 43.08% of patients. Chronic liver disease (CLD) followed, with a prevalence of 20.0%. Our study revealed a notable association between co-morbid conditions and the severity of anaemia.

Conclusion: Anaemia in adult males is intricate and multifaceted, necessitating personalised interventions.

Key words: Anaemia in males, anaemia severity, co-morbidities in anaemia.

Introduction

Anaemia is a condition in which the number of red blood cells or the haemoglobin concentration within them is lower than normal. The optimal haemoglobin concentration needed to meet physiologic needs varies by age, sex, altitude of residence, smoking habits and pregnancy status. WHO defines anaemia in children aged under 5 years and pregnant women as a haemoglobin concentration <11 g/dL at sea level, and anaemia in non-pregnant women as a haemoglobin concentration section defines as <13g/dL. Anaemia is further classified depending upon the level of Hb into mild (Hb 11 - 12.9 g/dL), moderate (Hb 8 - 10.9 g/dL) and severe (Hb <8 g/dL)¹. Every fourth person in the world (27%) has anaemia, with the developing countries alone accounting for more than 89% of the burden².

According to NFHS-5 survey, fifty-seven per cent of women and 25 per cent of men age 15 - 49 years have anaemia in India³. Anaemia is an important global health problem affecting men and women of reproductive age group. Various factors contribute to the prevalence of anaemia in males, encompassing socio-economic conditions, health status, behavioural factors and more (Fig. 1). These determinants collectively influence the likelihood of an individual developing anaemia and underscore the multifaceted nature of this health condition. Populationbased studies on anaemia in India have mostly focused on women and children, with men with anaemia receiving much less attention despite anaemia having adverse effect on their health, wellbeing, and economic productivity⁴.

Aim and Objectives

- 1. To study various aetiologies of anaemia in males aged 18-49 years attending a tertiary care hospital in Western Uttar Pradesh.
- 2. To study co-morbid conditions associated with anaemia in these adult males.

Material and Methods

This was a cross-sectional study of anaemic male patients attending SVBP Hospital, Meerut. During the study period of 3 months from 2023 May to 2023 July, in which all eligible patients who visited Medicine OPD were included in this study. So a sample size of of 65 patients was selected for study . Clinically, biochemically, and pathologically, all patients were evaluated. All male anaemic patients aged 18 - 49 years attending SVBP Hospital were interviewed using a pre-designed and pre-tested questionnaire. Relevant

*Professor, **Junior Resident, Department of Medicine, ***Associate Professor, Department of Community Medicine, ***Assistant Professor, Department of Pathology, LLRM Medical College, Meerut - 252 002, Uttar Pradesh. Corresponding Author: Dr Remesh Rajappan, Junior Resident, Department of Medicine, LLRM Medical College, Meerut - 252 002, Uttar Pradesh. Tel: 6238365719, E-mail: remeshrajappan 123@gmail.com investigations were conducted and clinical data along with laboratory parameters were collected from patients' medical records. The collected information was analysed.

Eligiblity Criteria

Inclusion Criteria

- 1. Male patients attending SVBP Hospital, Meerut, aged 18 49 years.
- 2. Hb less than 13 g/dL.

Exclusion Criteria

- 1. Patients aged less than 18 years and more than 49 years.
- 2. Patients denying consent.
- 3. Patients at advanced stages of chronic illness.

Observations

The study evaluated a total of 65 anaemic male patients. Table I shows age distribution in which majority of participants were in the 46 - 49 years age group, accounting for 21.53% of the total. Following closely was the 26 - 30 years age group, comprising 18.46% of the participants. The 18 - 25 years and 36 - 40 years age groups had the lowest representation, with each group accounting for 13.84% of the total number of patients evaluated.

Table I: Age distribution of study participants.

Age Group (in years)	No. of Patients (%)
18 - 25	9 (13.84%)
26 - 30	12 (18.46%)
31 - 35	10 (15.38)
36 - 40	9 (13.84%)
41 - 45	11 (16.92%)
46 - 49	14 (21.53%)

Table II shows the occupational distribution of anaemic males, revealing that out of 65 participants, the largest group consisted of semi-skilled workers (30.77%), including farmers. Skilled workers made up 24.61% of the sample, while 18.46% were either unemployed or students, with 8 individuals specifically noted as unemployed. Unskilled workers, such as those in construction, accounted for 16.92% of the participants. Both semi-professional and professional workers each represented 4.61% of the sample. This distribution indicates that the majority of anaemic males are engaged in semi-skilled and skilled work, with a significant portion also being unemployed or students.

The Table II also illustrates the educational status of male anaemic participants, with individuals who completed only primary education being the majority of anaemic study population (36.46%), contrasting sharply with those educated beyond secondary level, who demonstrated the lowest prevalence (6.15%). Approximately 32.31% of participants attained a secondary education level. Furthermore, men lacking any formal education accounted for a significant portion, comprising approximately a quarter (24.61%) of the study cohort.

Table II: Occupational and educational status of study participants.

Occupation	Number of participants (%)		
Unskilled	11 (16.92%)		
Semi skilled	20 (30.77%)		
Skilled	16 (24.61%)		
Semi Professional	3 (4.61%)		
Professional	3 (4.61%)		
Unemployed and Students	12 (18.46%)		
Educational Status			
Illiterate	16 (24.61%)		
Primary	25 (38.46%)		
Secondary	20 (30.77%)		
Higher	4 (6.15%)		



Fig. 1: Factors affecting anaemia among men.

Fig. 2 illustrates the distribution of socio-economic status among male anaemic participants, as assessed by the modified Kuppuswamy scale⁵. The highest percentage, 57.62%, falls under the lower-middle class category, indicating a significant portion of participants with moderate economic means. The upper-middle class accounted for 23.08% of patients, while the upper-lower class had 13.55%. A smaller percentage, 3.07%, was classified as upper class, while there were no participants classified



Fig. 2: Socio-ecnomic status of study participants.

under the lower class. This data provides insights into the socio-economic backgrounds of male anaemic participants in the study, highlighting diversity within the sample.

Table III presents the severity of anaemia among adult male patients in our study, classified according to the World Health Organisation (WHO) criteria⁶. It shows that 9.23% of patients (6 individuals) had mild anaemia with haemoglobin levels between 11 - 12.9 g/dL. Moderate anaemia, with haemoglobin levels ranging from 8 - 10.9 g/dL, affected 36.92% of the patients (24 individuals). The majority, 53.85% (35 individuals), had severe anaemia with haemoglobin levels below 8 g/dL. Notably, the majority of participants exhibited microcytic hypochromic anaemia (53.84%), followed by normocytic anaemia (3.07%), and a smaller proportion had macrocytic anaemia (3.07%).

Table III: Haemoglobin concentration of study participants.

Severity of Anaemia (g/dL)	No of patients (Percentage)		
Mild (Hb 11 - 12.9)	6 (9.23%)		
Moderate (Hb - 8 - 10.9)	24 (36.92%)		
Severe (Hb <8)	35 (53.85%)		

Table IV shows symptoms in 65 individuals with mild-tomoderate and severe anaemia. Generalised weakness was the most common symptom, affecting 60% of participants (21 mild-to-moderate, 18 severe). Dyspnoea on exertion (DOE) affected 32.03 % (8 mild-to-moderate, 13 severe), and gastrointestinal (GI) symptoms, including nausea, vomiting, or diarrhoea, affected 27.69% (8 mild-tomoderate, 10 severe). Bleeding history was noted in 26.15% (10 mild-to-moderate, 7 severe), and fever in 10.77% (1 mild-to-moderate, 6 severe). The chi-square statistic was 5.4101 with a p-value of 0.24, indicating no significant difference in symptom distribution between the two groups (p < 0.05). Regarding symptom duration, a considerable number experienced symptoms for 7 days to 1 month (59.32%), hinting at potentially acute conditions. Interestingly, a minority reported symptoms lasting less than 7 days (3.38%), possibly indicating transient issues.

Table IV: Symptoms reported by participants.

	Mild-to-moderate anaemia group n (%)	Severe anaemia group n (%)	Total n (%)	p value
Generalised weakness	21 (18.35)	18 (20.65)	39 (60%)	
Dyspnoea on exertion	8 (9.88)	13 (11.12)	21 (32.03%)	0.2477
Gastrointestinal symptom	s 8 (8.47)	10 (9.53)	18 (27.69%)	
Bleeding history	10 (8.00)	7 (9.00)	17 (26.15%)	
Fever	1 (3.29)	6 (3.71)	7 (10.77%)	

Chi square value = 5.4101

In our study, the majority of participants followed a mixed diet (42.05%), while only 16.95% adhered to a vegetarian regimen. Anaemia prevalence appeared higher among tobacco and alcohol consumers, with over half engaging in alcohol consumption (52.54%) and smoking (50.85%). Additionally, BMI distribution revealed a predominantly normal BMI (70.76%), but 18.46% fell below the healthy range, signaling potential nutritional deficiencies. A small fraction were overweight (7.69%) or obese (1.53%), highlighting varied metabolic health. These findings underscore the complex relationship between dietary habits, lifestyle factors, and anaemia, necessitating multifaceted interventions in clinical care and public health. Furthermore, hepatomegaly was observed in approximately 28.81% of participants, while splenomegaly was present in 18.64% of participants. These findings shed light on the diverse hematological profiles and associated clinical manifestations among our study cohort.

Table V: Causes of anaemia and associated conditions of study participants.

	Patients with Mild- to-moderate anaemia	Patients with Severe anaemia	Total
	(n)	(n)	n (%)
Nutritional Anaemia	17	11	28 (43.02%)
Chronic liver disease	6	7	13 (20%)
Renal dysfunction	5	6	11 (16.92%)
Hypertension	2	5	7 (10.77%)
Diabetes Mellitus	3	5	8 (12.31%)
Infections including T	B 4	4	8 (12.31%)
Malignancy	2	0	2 (3.07%)
Congestive hart failure	e 1	0	2 (3.07%)
Thalassaemia	1	0	1(1.54%)
Hypothyroidism	1	1	2 (3.07%)
Haemorrhoids	4	0	4 (6.15%)

Table V outlines the causes of anaemia in 65 adult males, divided by severity (mild-to-moderate versus severe). Nutritional anaemia was the most prevalent, affecting 28 patients (43.02%), with 17 having mild-to-moderate anaemia and 11 having severe anaemia. Chronic liver disease (CLD) was the second most common cause, accounting for 13 patients (20%), split between 6 mildto-moderate and 7 severe cases. Renal dysfunction affected 11 patients (16.92%), with a near-even distribution between mild-to-moderate (5) and severe (6) anaemia. Hypertension (HTN) and diabetes mellitus (DM) each accounted for 8 cases (12.31%), with HTN predominantly severe (5 severe versus 2 mild-tomoderate) and DM evenly split. Infections, including tuberculosis (TB), also affected 8 patients (12.31%), evenly distributed between both severities. Malignancy, hypothyroidism, and congestive heart failure (CHF) each caused anaemia in 2 patients (3.07%), with malignancy and CHF cases being mild-to-moderate and hypothyroidism cases split equally. Thalassaemia was the least comman cause, affecting only 1 patient (1.54%) with mild-to-moderate anaemia. Haemorrhoids caused anaemia in 4 patients (6.15%), all mild-to-moderate. This data highlights nutritional anaemia as the leading cause, followed by chronic liver disease and renal dysfunction.

Table VI: Association	of co-morbid	conditions	with
severity of anaemia.			

	Mild-to-moderate anaemia group n (%)	Severe anaemia group n (%)	Total n (%)	p value
Patients with co-morbidity	13 (17.08)	24(19.92)	37 (56.92%)	0.04
Patients without any co-morbid condition	17 (12.92)	11 (15.08)	28 (43.07%)	
Marginal Column Totals	30	35	65	

Chi-square value = 4.1962

Table VI examines anaemia severity in 65 patients, comparing those with and without co-morbid conditions. Among patients with co-morbidities, 13 had mild-to-moderate anaemia and 24 had severe anaemia. For patients without co-morbidities, 17 had mild-to-moderate anaemia and 11 had severe anaemia. The chi-square statistic was 4.1962 with a p-value of 0.04, indicating a significant association (p <0.05) between co-morbid conditions and the severity of anaemia. Patients with co-morbidities were more likely to have severe anaemia than those without.

Discussion

Age distribution findings in our study highlight the prevalence of anaemia among males, with substantial

representation in the 41 - 49 years age group. Conversely, the notable presence of participants in the 26 - 30 years age group suggests possible influencey by distinct physiological, lifestyle, or socio-economic factors. The lower representation in the 18 - 25 years and 36 - 40 years age groups underscores the need for further exploration of anaemia prevalence across different age cohorts. Older men above 40 years are more vulnerable to anaemia, possibly due to chronic co-morbid conditions such as diabetes, renal dysfunction, and uncontrolled blood pressure. A survey conducted by Adithya Singh *et al* on prevalance and determinants of anaemia in rural India also yielded similar results⁷. These findings emphasize the importance of tailored approaches to management and prevention that consider age-specific factors.

The data indicates that anaemia was prevalent across various occupational groups among males. The highest proportion of anaemic males were in semi-skilled and skilled occupations, which might suggest occupational factors contributing to anaemia, such as physical demands or limited access to healthcare. Physically demanding occupations may increase the risk of anaemia due to heightened nutrient requirements and dietary challenges. Conversely, the limited representation of professionals suggests better access to healthcare and a healthier diet, potentially lowering anaemia prevalence within this group. The significant percentage of unemployed participants underscores the potential impact of socio-economic factors on anaemia prevalence. This distribution highlights the need for targeted interventions addressing both occupational and socio-economic determinants of anaemia among males.

The study highlights significant impact of education on anaemia prevalence among men, with lower education levels correlating with higher vulnerability. Those completing only primary education had the highest prevalence (36.46%), while those educated beyond secondary level had the lowest (6.15%). This underscores education's pivotal role in disease awareness and advocating for essential health practices. Approximately 32.31% attained secondary education, while 24.61% lacked formal education, highlighting the need for interventions to improve educational opportunities and health literacy among vulnerable populations to combat anaemia effectively.

In our study, the majority of participants belonged to the lower middle class (57.62%), followed by the upper middle class (23.08%), and upper lower class (13.55%). A mere 3.07% were categorised as belonging to the upper class, while none fell into the lower socio-economic status category (Fig. 2). Previous research on anaemia consistently demonstrates a correlation between lower socio-economic status and a heightened prevalence of the condition. This association is often attributed to restricted access to nutritious diets, which can lead to malnutrition and subsequent anaemia, compounded by limited access to healthcare services. Additionally, factors such as substandard living conditions, heightened exposure to diseases, and unhealthy lifestyle habits further exacerbate the development of anaemia within lower socio-economic strata.

The study revealed a higher prevalence of anaemia among individuals who consumed tobacco and alcohol, with over half of the participants engaging in alcohol consumption (52.54%) and smoking (50.85%). Lifestyle interventions are crucial for this group due to the adverse hematopoietic effects of chronic alcohol intake⁸. Additionally, while most participants had a normal BMI (70.76%), a notable percentage fell below the healthy range (18.46%), indicating potential nutritional deficiencies contributing to anaemia. These findings underscore the complex interplay between dietary habits, lifestyle factors, and physiological parameters in anemia development.

Anaemia in males presents with a spectrum of clinical features, often reflecting underlying causes⁹. Generalised weakness emerged as the most prevalent symptom, affecting 60% of participants, followed by dyspnoea on exertion (32.03%) and gastrointestinal symptoms (27.69%). Bleeding history was noted in 26.15% of cases, while fever affected 10.77% of individuals. Importantly, the chi-square statistic of 5.4101 with a p-value of 0.24 indicated no significant difference in symptom distribution between mild-to-moderate and severe anaemia cases (p < 0.05). The relatively high proportion of severe anaemia (29.23%) in our study is attributable to the tertiary care setup. Conducted in such a facility, our study inherently biases the participant pool towards more severe cases. As the facility primarily caters to patients with complex and critical conditions, including severe anaemia cases, it underscores the gravity of the findings.

Nutritional deficiency emerged as the primary cause behind anaemia in 43.08% of our study participants, underscoring the importance of addressing dietary inadequacies in combating this condition. Moreover, the high prevalence of co-morbidities (56.92%) highlights the complex interplay between anaemia and various underlying health conditions. Chronic liver disease, affecting 20.0%, deranged renal function in 16.92%, and infections in 12.31%, represent significant contributors to the anaemia burden, necessitating comprehensive management approaches. The identification of malignancy in a subset of participants (2 cases, 3.07%) underscores the importance of thorough evaluation in diagnosing underlying causes of anaemia. Furthermore, the co-existence of diabetes (12.31%) and hypertension (10.77%) emphasizes the interconnected nature of chronic diseases and their impact on haematological health^{10,11}.

Our study demonstrates a significant association between co-morbid conditions and the severity of anaemia. Patients with co-morbidities were more likely to have severe anaemia, as evidenced by 24 cases compared to 11 cases among those without co-morbidities. The chi-square statistic of 4.1962 with a p-value of 0.04 confirms this association, signifying that the difference in anaemia severity between the two groups is statistically significant (p <0.05). This highlights the potential impact of co-morbidities on exacerbating the severity of anaemia in patients.

In a study conducted in a rural area of Haryana by Shashi Kant *et al* approximately 27.2% of participants reported the presence of a co-morbidities and among them, 6.5% has renal disorders, liver disorders, malignancies, or external bleeding¹². The relatively higher occurrence of comorbidities in the study group may be attributed to the tertiary care settings where severe cases were admitted and thoroughly evaluated. These findings underscore the multifactorial nature of anaemia and emphasize the need for a holistic approach to its management, addressing both nutritional deficiencies and underlying health conditions to effectively mitigate its impact on patient health.

Conclusion

In conclusion, our study provides a comprehensive understanding of anaemia in adult males, emphasizing its multifactorial nature and significant health impact. Lifestyle factors such as diet, alcohol consumption, and smoking habits are closely linked to anaemia prevalence. In this study nutritional deficiency was a predominant cause, along with co-morbidities like chronic liver disease, deranged renal function and infections. Additionally, clinical factors like haemorrhoids, diabetes, hypertension, malignancy, hypothyroidism, and cardiac failure underscore the complexity of anaemia management and the need for tailored interventions. The findings of our study reveal a notable association between co-morbid conditions and the severity of anaemia among patients. Our findings emphasize the critical importance of comprehensive evaluation and management strategies, addressing both nutritional deficiencies and underlying health conditions, to effectively mitigate the impact of anaemia on the health and well-being of adult males. These insights underscore the need for multidisciplinary collaboration and targeted interventions to address the diverse range of factors contributing to anaemia in this specific population.

Limitations of study

The study's limitations include the inclusion of more severe cases due to the tertiary care center setting and a relatively small sample size thus limiting the generalisability of the study findings. Additionally, the cross-sectional design limits causal relationships, and reliance on self-reported data may introduce bias. Despite these constraints, the study provides insights into anaemia among adult males, highlighting the need for further research to address these limitations.

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