



CLINICO-HAEMATOLOGICAL PROFILE OF ANAEMIA IN ELDERLY HOSPITALISED PATIENTS A Hospital-Based Cross-Sectional Observational Study.

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Abstract

Background: Anaemia is a highly prevalent condition in the geriatric population, associated with significant morbidity, reduced functional capacity, and poor quality of life. Despite its high burden, it often remains underdiagnosed as symptoms are attributed to normal ageing. **Objectives:** To evaluate the clinico-haematological profile, morphological pattern, and aetiological distribution of anaemia in elderly hospitalised patients. **Methods:** A hospital-based cross-sectional observational study was conducted in the Department of General Medicine over 18 months. A total of 146 elderly patients (age ≥ 60 years) with anaemia were enrolled by consecutive sampling. Clinical examination, haematological investigations, and aetiological workup were performed. **Results:** The mean age was 73.77 ± 7.48 years with slight female predominance (52.05%). The prevalence of anaemia among screened patients was 31.9%. Easy fatigability (91.10%) and breathlessness on exertion (72.60%) were the commonest symptoms. Conjunctival pallor was the predominant clinical sign (78.77%). Moderate anaemia was most common (44.52%), followed by severe anaemia (41.10%). Normocytic anaemia predominated (67.81%). Chronic kidney disease was the leading aetiology (45.21%), followed by iron deficiency anaemia (19.86%). Severity of anaemia increased significantly with advancing age ($p < 0.001$). **Conclusion:** Anaemia in elderly hospitalised patients is a clinically significant condition with multifactorial aetiology, predominantly chronic kidney disease and iron deficiency. Early systematic evaluation and targeted management are essential to reduce morbidity and improve outcomes.

Keywords: Anaemia, Elderly, Geriatric, Clinico-haematological, Chronic kidney disease, Iron deficiency, Normocytic anaemia.



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INTRODUCTION

Anaemia is a highly prevalent condition in the geriatric population, with its occurrence increasing progressively with advancing age.¹ It is associated with significant adverse outcomes, including increased morbidity and mortality, and has a substantial negative impact on functional status, cognitive performance, and overall quality of life in elderly individuals, irrespective of the underlying aetiology.^{2,3} According to the World Health Organization (WHO) criteria, anaemia is defined as a haemoglobin level of less than 13 g/dL in males and less than 12 g/dL in females.

Based on these criteria, the reported prevalence of anaemia in older adults ranges widely from 8% to 44%, with the highest prevalence observed among individuals aged 85 years and above.^{4,5} Epidemiological data suggest that more than 3 million individuals aged 65 years and older in the United States are affected by anaemia. Several studies have consistently reported prevalence rates between 10% and 44% in the elderly population. Importantly, the prevalence of anaemia shows a steady increase with each advancing decade of life, reflecting the cumulative effects of nutritional deficiencies, chronic diseases, bone marrow dysfunction, and age-related physiological changes.^{6,7} The aetiology of anaemia in the elderly is often complex and multifactorial. Unlike younger individuals, geriatric anaemia typically results from a combination of nutritional deficiencies, chronic illnesses, age-related physiological changes, and, in some cases, unexplained mechanisms. Epidemiological studies have demonstrated that nutritional deficiencies account for approximately 34% of anaemia cases in the elderly, while anaemia of chronic disease contributes an additional 33%. Interestingly, approximately one-third of elderly patients with anaemia remain categorised as unexplained despite thorough evaluation.^{8,9}

Despite its high prevalence, anaemia in the elderly is frequently under-recognised and underdiagnosed in clinical practice. Its symptoms—such as easy fatigability, generalised weakness, reduced exercise tolerance, and shortness of breath—are

often mistakenly attributed to normal ageing or other comorbid conditions. Untreated anaemia has been consistently associated with cardiovascular disease, chronic kidney disease, frailty, decreased functional capacity, impaired cognitive function, increased incidence of falls, and higher risk of hospitalisation and mortality.¹⁰

A systematic approach to the investigation of anaemia in the elderly is therefore essential and should include detailed clinical assessment, laboratory evaluation, and appropriate diagnostic procedures to identify underlying causes. Early detection and targeted treatment not only help in correcting haemoglobin levels but also play a crucial role in improving functional status, reducing morbidity, and enhancing quality of life in this vulnerable population.

AIM AND OBJECTIVES

Aim

To study the clinico-haematological profile of anaemia in elderly hospitalised patients.

Objectives

- To evaluate the clinical profile of anaemia in elderly hospitalised patients.
- To assess the haematological parameters of anaemia in elderly hospitalised patients.
- To determine the etiological types of anaemia among elderly hospitalised patients.
- To analyse the distribution of different morphological patterns of anaemia in the study population.
- To correlate clinical presentation with haematological findings in elderly hospitalised patients with anaemia.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based cross-sectional observational study conducted in the Department of General Medicine, Mahatma Gandhi Medical College & Hospital, over a period of 18 months from April 2024 to September 2025.

Sample Size and Sampling Method

Consecutive sampling was employed. The sample size of 146 patients was calculated using the formula $n = Z^2pq/d^2$, where $Z = 1.96$ (95% confidence interval), $p = 10.63\%$ (prevalence), $q = 100 - p$, and $d = 5\%$ (allowable error).

Eligibility Criteria

Inclusion Criteria

- Male patients aged ≥ 60 years with haemoglobin < 13 g/dL.
- Female patients aged ≥ 60 years with haemoglobin < 12 g/dL.
- Patients willing to participate and provide written informed consent.

Exclusion Criteria

- Patients aged less than 60 years.
- Patients unwilling to participate or refusing consent.
- Patients already receiving haematopoietic supplements or treatment for anaemia prior to admission.
- Patients with incomplete records or inadequate investigations for aetiological workup.

Study Procedure

After admission, all eligible patients underwent detailed clinical evaluation including history taking, physical examination, and relevant laboratory investigations. A thorough history was obtained regarding presenting complaints, dietary history, addiction and drug history, past history of chronic diseases, and history of gastrointestinal or other blood loss. General physical examination assessed pallor, icterus, clubbing, koilonychia, lymphadenopathy, organomegaly, oedema, and other signs of systemic disease.

Laboratory Investigations

Investigations performed included complete blood count with red cell indices (MCV, MCH, MCHC, RDW), peripheral blood smear, reticulocyte count, iron studies (serum iron, ferritin, TIBC, transferrin saturation), serum vitamin B12 and folate levels, liver and renal function tests, thyroid profile, ESR/CRP, stool for occult blood, urine microscopy, and additional imaging or bone marrow examination as clinically indicated.

Classification of Anaemia

Anaemia was classified morphologically based on red cell indices and peripheral smear into microcytic hypochromic, normocytic normochromic, macrocytic, and dimorphic anaemia. Aetiological classification was made based on combined clinical and laboratory findings.

Ethical Considerations

Prior approval from the Institutional Ethics Committee was obtained before commencement of the study. Written informed consent was taken from all participants or their legally authorised attendants. Confidentiality of patient data was strictly maintained throughout the study.

Statistical Analysis

Data were entered in Microsoft Excel and analysed using SPSS version 29.0. Quantitative variables were expressed as mean $\pm$ SD or median (IQR). Qualitative variables were expressed as frequency and percentages. Chi-square test / Fisher's exact test was used for categorical variables. A p-value <0.05 was considered statistically significant.

RESULTS

Table 1: Prevalence of Anaemia in the Study Population

Parameter	Number
Total Patients	800
Screening Done	457 (57.1%)
Anaemia Present	146
Prevalence of Anaemia	31.9%

A total of 800 patients were included in the study, of which 457 (57.1%) underwent screening for anaemia. Among those screened, 146 patients were found to have anaemia, corresponding to a prevalence of 31.9%. Nearly one-third of the screened elderly patients were affected by anaemia, highlighting a considerable burden of the condition in this cohort.

Table 2: Age-wise Distribution of Patients

Age Group (Years)	No. of Patients	Percentage (%)
60–69	45	30.82%
70–79	56	38.36%
80–89	45	30.82%
Total	146	—
Mean $\pm$ SD	73.77 $\pm$ 7.48 years	—

The highest number of patients belonged to the 70–79 years age group (38.36%). The 60–69 years and 80–89 years age groups each comprised 45 patients (30.82%). The mean age of the study population was 73.77 $\pm$ 7.48 years, with a concentration in the seventh and eighth decades of life.

Table 3: Gender-wise Distribution of Patients

Gender	No. of Patients	Percentage (%)
Female	76	52.05%
Male	70	47.95%
Total	146	—

A slight female predominance was observed, with 76 patients (52.05%) being female and 70 patients (47.95%) male. This distribution indicates a nearly equal representation of both genders.

Table 4: Clinical Examination Findings in Geriatric Patients with Anaemia

Clinical Sign	No. of Patients	Percentage (%)
Conjunctival Pallor	115	78.77%
Loss of Papillae	24	16.44%
Splenomegaly	12	8.22%
Hepatomegaly	11	7.53%
Icterus	10	6.85%
Lymphadenopathy	9	6.16%
Oedema	8	5.48%
Ascites	8	5.48%
Engorged Neck Veins	4	2.74%

Conjunctival pallor was the most common clinical sign, observed in 115 patients (78.77%), emphasising its strong clinical association with anaemia. Loss of papillae was the next most frequent finding, present in 24 patients (16.44%), suggesting underlying nutritional deficiencies. Organomegaly (splenomegaly 8.22%, hepatomegaly 7.53%) and icterus (6.85%) indicated possible haemolytic states or chronic liver involvement in a subset of patients.

Table 5: Distribution of Clinical Symptoms

Symptom	No. of Patients	Percentage (%)
Easy Fatigability	133	91.10%
Breathlessness on Exertion	106	72.60%
Difficulty in Walking	85	58.22%
Palpitations & Anorexia	71	48.63%
Giddiness	38	26.03%

Easy fatigability was the most common symptom, reported in 133 patients (91.10%), followed by breathlessness on exertion in 106 patients (72.60%). Difficulty in walking was present in 85 patients (58.22%), indicating significant impact on mobility and functional independence. Palpitations and anorexia were reported in 71 patients (48.63%), while giddiness was the least common symptom, seen in 38 patients (26.03%).

Table 6: Anaemia Grading Distribution

Anaemia Grade	Haemoglobin (g/dL)	No. of Patients	Percentage (%)
Mild	10–12	21	14.38%
Moderate	8–9.9	65	44.52%
Severe	<8	60	41.10%
Total	—	146	—

The majority of patients had moderate anaemia, accounting for 65 patients (44.52%), followed closely by severe anaemia in 60 patients (41.10%). Mild anaemia was observed in only 21 patients (14.38%). The predominance of moderate to severe anaemia reflects delayed presentation and higher burden of comorbid illnesses in the hospitalised elderly population.

Table 7: Morphological Distribution of Anaemia

Type of Anaemia	No. of Patients	Percentage (%)
Normocytic	99	67.81%
Microcytic	35	23.97%
Macrocytic	12	8.22%
Total	146	—

Normocytic anaemia was the most common morphological pattern, observed in 99 patients (67.81%), likely reflecting the high prevalence of chronic kidney disease and other chronic systemic illnesses. Microcytic anaemia accounted for 23.97% of cases, predominantly attributable to iron deficiency. Macrocytic anaemia was the least common (8.22%), mainly due to vitamin B12 deficiency.

Table 8: Distribution of Broad Causes of Anaemia

Broad Cause	No. of Patients	Percentage (%)
Blood Loss	23	15.75%
Nutritional Anaemia	17	11.64%
Chronic Liver Disease	5	3.42%
Drug-Induced Anaemia	4	2.74%
Autoimmune Disorder	4	2.74%

Table 9: Aetiology of Anaemia

Aetiology	No. of Patients	Percentage (%)
Chronic Kidney Disease	66	45.21%
Iron Deficiency Anaemia	29	19.86%
Other Chronic Diseases	16	10.96%
Haematological Disorders	16	10.96%
Megaloblastic Anaemia	12	8.22%
Haemolytic Anaemia	3	2.05%
Unexplained	2	1.37%
Dimorphic Anaemia	1	0.68%
Hypothyroidism	1	0.68%
Total	146	—

Chronic kidney disease (CKD) emerged as the single most common cause, affecting 66 patients (45.21%), of whom 80.30% had CKD alone and 19.70% had CKD associated with iron deficiency anaemia. Iron deficiency anaemia was the second most frequent aetiology (n=29; 19.86%), of which 55.17% were nutritional in origin and 44.83% due to blood loss. Among

haematological disorders (n=16), leukaemia was the most common subtype (31.25%), followed by lymphoma (25%) and autoimmune haemolytic anaemia (18.75%). All 12 cases of megaloblastic anaemia were attributable to vitamin B12 deficiency.

Table 10: Descriptive Statistics of Key Study Parameters

Parameter	Minimum	Maximum	Mean $\pm$ SD
Age (Years)	60	89	73.77 $\pm$ 7.48
Haemoglobin (g/dL)	5.0	12.8	8.28 $\pm$ 1.84
MCV (fL)	65.3	120.3	86.46 $\pm$ 11.42
PCV (%)	22.1	31.0	27.15 $\pm$ 2.64
Platelet (/ μ L)	39,764	330,190	209,661 $\pm$ 64,483
TLC (/ μ L)	3,672	9,684	6,635 $\pm$ 1,812
Serum Creatinine (mg/dL)	1.0	5.0	2.85 $\pm$ 1.12

Table 11: Age-wise Distribution of Severity of Anaemia

Age Group (Years)	Mild (10–12 g/dL)	Moderate (8–9.9 g/dL)	Severe (<8 g/dL)	Total
60–69	21 (100%)	24 (36.92%)	0 (0%)	45
70–79	0 (0%)	41 (63.08%)	15 (25.00%)	56
80–89	0 (0%)	0 (0%)	45 (75.00%)	45
Total	21	65	60	146
p-Value	<0.001 (Significant)			

A statistically highly significant association was found between advancing age and severity of anaemia ($p < 0.001$). Mild anaemia was observed exclusively in the 60–69 years age group. Moderate anaemia was predominantly seen in the 70–79 years group (63.08%), while severe anaemia was most prevalent in the 80–89 years group, contributing to 75.00% of all severe cases. These findings indicate that anaemia becomes progressively more severe with advancing age.

DISCUSSION

Anaemia in the elderly is a common clinical condition associated with increased morbidity, prolonged hospital stay, reduced functional capacity, and poor quality of life. It often remains underdiagnosed because symptoms such as fatigue, weakness, and decreased appetite may be attributed to normal ageing. The present study was conducted to assess the clinico-haematological profile of anaemia in elderly hospitalised patients at a tertiary care institution over an 18-month period.

Age and Gender Distribution

Among the 146 elderly patients enrolled, the highest number belonged to the 70–79 years age group (38.36%). The mean age was 73.77 ± 7.48 years. Gender-wise distribution showed a slight female predominance (52.05%). These findings are comparable to Duri A. et al.¹¹, where the majority of patients (58%) belonged to the 65–<75 years age group, and Vaidya T. et al.¹², who reported 165 males and 135 females in a study of 300 cases. Kin H.¹³ et al. also demonstrated that the maximum number of anaemic patients belonged to the 60–69 years age group (50%).

Clinical Presentation

Easy fatigability (91.10%) and breathlessness on exertion (72.60%) were the predominant presenting symptoms. Difficulty in walking (58.22%), palpitations and anorexia (48.63%), and giddiness (26.03%) were also observed. Conjunctival pallor was the most prevalent clinical sign (78.77%). These findings are strikingly similar to those reported by Deuri A.¹¹ et al., who found easy fatigability in 91%, breathlessness on exertion in 72%, difficulty in walking in 56%, palpitations and anorexia in 48%, and giddiness in 26% of geriatric anaemic patients. Guralnik et al.¹⁴ and Penninx et al.¹⁵ similarly reported significant associations between anaemia and reduced physical performance, decreased mobility, and fatigue in elderly patients.

Severity of Anaemia

Moderate anaemia was the most common grade (44.52%), followed by severe anaemia (41.10%) and mild anaemia (14.38%). Comparable findings were reported by Talib SH et al.¹⁶, where moderate anaemia was seen in 45.10% and severe anaemia in 39.14% of cases. In contrast, Vaidya Tejas H.¹² et al. and Ramya et al.¹⁷ reported mild anaemia as the predominant grade. The higher proportion of moderate and severe anaemia in the present study may be related to the hospitalised setting, where patients tend to present with more advanced disease and multiple comorbidities.

Age and Anaemia Severity

A statistically significant increase in anaemia severity with advancing age was demonstrated ($p < 0.001$). Mild anaemia was confined to the 60–69 years group, while severe anaemia was predominantly observed in the 80–89 years group

(75.00%). These findings align with Guralnik et al.¹⁴, who noted marked increases in the prevalence and severity of anaemia among persons older than 75 years, and Patel K.V. et al.¹⁸, who found that individuals aged ≥ 80 years had the highest burden of anaemia. Increasing age is linked to reduced bone marrow reserve, diminished erythropoietin response, nutritional deficiencies, chronic inflammation, renal impairment, and multiple comorbidities, all of which contribute to greater severity.

Morphological Pattern

Normocytic anaemia was the dominant morphological pattern (67.81%), reflecting the high burden of chronic kidney disease and other chronic systemic illnesses. Microcytic anaemia (23.97%) was largely related to iron deficiency, while macrocytic anaemia (8.22%) was mainly attributable to vitamin B12 deficiency. These findings are consistent with Deuri A. et al.¹¹, Vaidya Tejas H. et al.¹², Talib SH et al.¹⁶, and Raina A. et al.¹⁹, all of whom reported normocytic anaemia as the predominant morphological pattern in elderly patients, with microcytic and macrocytic changes as secondary patterns.

Aetiological Distribution

Chronic kidney disease was the leading cause of anaemia (45.21%), a finding consistent with Talib et al.¹⁶ (44.56%) and widely reported in the international literature. The predominance of CKD-related anaemia in hospitalised elderly patients can be explained by reduced erythropoietin production, chronic inflammation, impaired iron utilisation, and the high prevalence of renal dysfunction in this age group. Iron deficiency anaemia was the second most common aetiology (19.86%), due to both nutritional deficiency (55.17%) and blood loss (44.83%). This finding is corroborated by Thyagaraja K. et al.²⁰, who identified gastrointestinal blood loss—including drug-induced mucosal injury from aspirin and NSAIDs—as a significant contributory mechanism. Megaloblastic anaemia, all cases attributable to vitamin B12 deficiency, was observed in 8.22% of patients.

CONCLUSION

Anaemia in elderly hospitalised patients is a clinically significant condition with varied presentations and multifactorial aetiology. Easy fatigability, breathlessness on exertion, and conjunctival pallor were the most common clinical features, reflecting the substantial impact on functional status and quality of life. Most patients presented with moderate to severe anaemia. Normocytic anaemia was the predominant morphological pattern, and chronic kidney disease was the leading aetiological cause, followed by iron deficiency anaemia and haematological disorders.

The study confirms that severity of anaemia increases significantly with advancing age ($p < 0.001$), underscoring the need for early screening in the oldest elderly. Anaemia in the elderly should not be dismissed as a normal consequence of ageing, but rather recognised as a marker of underlying disease requiring thorough evaluation. A systematic diagnostic approach—incorporating renal evaluation, nutritional assessment, and screening for occult blood loss or malignancy—is essential to guide timely management and reduce morbidity, functional decline, and hospitalisation in this vulnerable population.

LIMITATIONS

- This was a single-centre hospital-based study in a tertiary care institution; findings may not be fully generalisable to the community or primary care settings.
- Nutritional assessment and dietary recall were based partly on patient history, which may be subject to recall bias.
- Multiple coexisting illnesses in elderly patients made it difficult to attribute anaemia to a single definitive cause in some cases.
- Follow-up data regarding treatment response, long-term outcomes, rehospitalisation, and mortality were not assessed.
- Socioeconomic, functional, and quality-of-life parameters were not evaluated in detail.

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