

Geriatric Anemia in A Tertiary Care Centre: A Cross-Sectional Study

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Abstract

Background: Older adults often suffer from anemia, and yet it remains an underestimated health issue that is linked to considerable morbidity, function impairment, diminished quality of life and death. Anemia's burden among the geriatric population continues to be significant, especially in developing countries where the prevalence of chronic diseases and nutrition deficiency is high. There was an objective of the present study to find out the prevalence, severity and morphological pattern of anemia among geriatric patients visiting tertiary care centre. **Material and Methods:** This cross-sectional observational study was conducted in a tertiary care teaching hospital from January 2025 to June 2025. A total of 302 geriatric patients aged ≥ 60 years attending outpatient and inpatient departments were included. Detailed demographic and clinical data were collected after obtaining informed consent. Complete blood count and peripheral smear examination were performed for all participants. Anemia was defined and graded according to World Health Organization criteria and morphologically classified into normocytic, microcytic, and macrocytic types. Data were analyzed using descriptive statistics and expressed as frequencies and percentages. **Results:** Among the 302 participants, 226 were found to be anemic, yielding an overall prevalence of 74.83%. The majority of participants belonged to the 60–69-year age group (40.40%), and females constituted 55.63% of the study population. Moderate anemia was the most common severity category, accounting for 46.90% of cases, followed by mild anemia (37.17%) and severe anemia (15.93%). Normocytic anemia was the predominant morphological type (49.55%), followed by microcytic (40.70%) and macrocytic anemia (9.73%). Female patients accounted for 75.66% of anemia cases. Hypertension (42.92%), diabetes mellitus (35.84%), and chronic kidney disease (30.08%) were the most common associated comorbidities. **Conclusion:** Anemia is highly prevalent among geriatric patients attending a tertiary care centre. Moderate anemia and normocytic anemia were the most frequently observed patterns. Early screening and comprehensive evaluation of anemia, particularly in elderly patients with chronic comorbidities, may facilitate timely intervention and improve clinical outcomes.

Keywords: Anemia; Geriatric population; Normocytic anemia; Prevalence; Comorbidities.

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INTRODUCTION

The global population is aging rapidly, making health issues affecting older adults an important public health concern.^[1] Traditionally, the geriatric population is defined as individuals aged 60 years and above, with those aged 60–74 years categorized as the “early elderly” and those aged 75 years and above as the “late elderly”.^[2] Aging is associated with physiological changes and an increased burden of chronic diseases, both of which contribute significantly to morbidity and mortality in this age group.^[3] Among the various health problems encountered in the elderly, anemia is one of the most common yet frequently under-recognized conditions.^[4]

Anemia in older adults is a multifactorial disorder resulting from nutritional deficiencies, chronic kidney disease, chronic inflammatory states, infections, malignancies, and age-related decline in bone marrow reserve.^[5] Although often considered a benign condition, anemia has substantial clinical implications in the geriatric population.^[6] It is associated with symptoms such as fatigue, generalized weakness, reduced exercise tolerance, dyspnea, and diminished physical performance.^[7] These manifestations

adversely affect functional independence and quality of life, leading to increased healthcare utilization and hospital admissions.^[8]

Several studies have demonstrated that anemia in the elderly is associated with adverse outcomes, including impaired cognitive function, depression, frailty, falls, reduced muscle strength, decreased bone mineral density, and increased risk of cardiovascular complications.^[9,10] Furthermore, anemia has been identified as an independent predictor of hospitalization and mortality among older adults.^[11] Despite these consequences, anemia in the geriatric age group often remains undiagnosed or inadequately investigated, as it is frequently misinterpreted as a

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normal consequence of aging rather than a potentially treatable clinical condition.^[12,13]

With the increasing life expectancy and growing proportion of elderly individuals in developing countries such as India, understanding the burden and characteristics of anemia in this population has become increasingly important. Assessment of the prevalence, severity, and morphological patterns of anemia can facilitate early diagnosis, appropriate etiological evaluation, and timely management. Therefore, the present study aimed to determine the prevalence of anemia among geriatric patients attending a tertiary care centre and to evaluate its severity and morphological patterns.

MATERIALS AND METHODS

This cross-sectional observational study was conducted in the Department of Pathology of a tertiary care teaching hospital over a period of six months, from January 2025 to June 2025. The study aimed to determine the prevalence, severity, and morphological patterns of anemia among elderly individuals attending the hospital. A total of 302 geriatric patients aged 60 years and above who attended the outpatient and inpatient departments during the study period were enrolled after obtaining written informed consent. The study was approved by the Institutional Ethics Committee before the study was started.

This study involved all patients, irrespective of sex, who had attended the hospital, either as outpatients or inpatients, who had a routine haematological examination, and were 60yrs or older. Written informed consent was obtained and considered as eligibility for inclusion. Patients less than 60 years old, those who declined to participate, individuals with current acute bleeding disorders, those who had received blood transfusions in the last three months, and haematological malignancy patients/those taking chemotherapy were not included in this study.

Detailed demographic and clinical data such as age, sex, place of residence, socioeconomic status and pertinent medical history were recorded with a predesigned data collection proforma after obtaining informed consent. All

participants had venous blood samples taken under aseptic conditions. An automated haematology analyser was used to analyze parameters of complete blood count (CBC). Haemoglobin concentration, Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Haemoglobin Concentration (MCHC) were noted. Additionally, peripheral blood smear was examined morphologically for confirmation of anemia sub type.

Anemia diagnosis and classification was performed using the standards set by the World Health Organization (WHO). Hemoglobin levels < 13 g/dL for men and < 12 g/dL for women were the cut-off points for the anemia diagnosis. Anemia was defined as mild (Hb <11g/dl), moderate (Hb 8-11g/dl) and severe (Hb <8g/dl). Haemoglobin < 11.0 g/dL was defined as mild anaemia; haemoglobin 8.0–10.9 g/dL was defined as moderate anaemia; and haemoglobin < 8.0 g/dL as severe anaemia. Morphological classification of Anemia was done by the analyses of Red Blood Cell Indices such as MCV, MCH, MCHC and peripheral blood smear. Using these parameters, this anemia type was divided into normocytosis, microcytosis and macrocytosis.

All the collected data were coded and analyzed by using the statistical software package, the IBM Statistical Package for Social Sciences (SPSS) version 26.0 (Armonk, NY, USA). Data on demographic and clinical variables were summarized and reported as frequencies and percentages using descriptive statistics. Data were reported as mean \pm SEM for continuous variables, as appropriate. Data were analysed to assess statistical significance through appropriate tests and a p-value < 0.05 was deemed statistically significant.

RESULTS

A total of 302 geriatric patients aged ≥ 60 years were included in the study. The majority belonged to the 60–69 years age group (40.40%), followed by 70–79 years (35.10%) and ≥ 80 years (24.50%). Females constituted 55.63% of the study population, while males accounted for 44.37%. Most participants were from urban areas (62.25%), and nearly half belonged to the lower socioeconomic class (47.02%), followed by middle (41.05%) and higher socioeconomic groups (11.92%). [Table 1]

Table 1: Baseline Demographic Characteristics of the Study Population (N = 302)

Variable	Subgroup	Number (%)
Age Group (years)	60–69	122 (40.40)
	70–79	106 (35.10)
	≥ 80	74 (24.50)
Gender	Male	134 (44.37)
	Female	168 (55.63)
Residence	Urban	188 (62.25)
	Rural	114 (37.75)
Socioeconomic Status	Low	142 (47.02)
	Middle	124 (41.05)
	High	36 (11.92)

A total of 226 out of 302 participants were found to be anemic, yielding an overall prevalence of 74.83%, while 25.17% had normal haemoglobin levels. The findings indicate that anemia is highly prevalent among the geriatric population attending the tertiary care centre. [Figure 1] Among the 226 anemic participants, moderate anemia was

the most common severity category, observed in 106 (46.90%) patients. Mild anemia was present in 84 (37.17%) individuals, whereas severe anemia was identified in 36 (15.93%) patients. Thus, nearly half of the anemic elderly population had moderate anemia at presentation. [Figure 2]

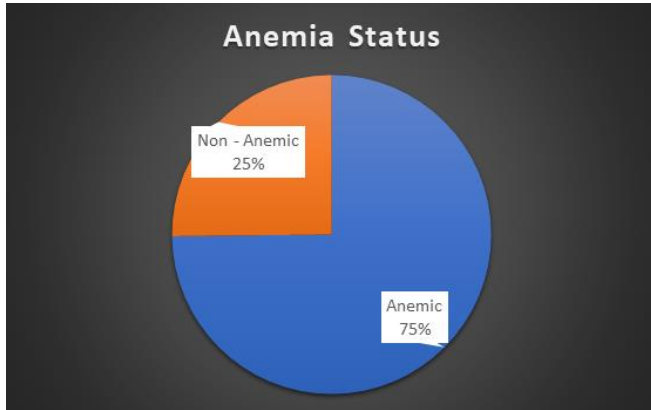


Figure 1: Prevalence of Anemia among the Study Population

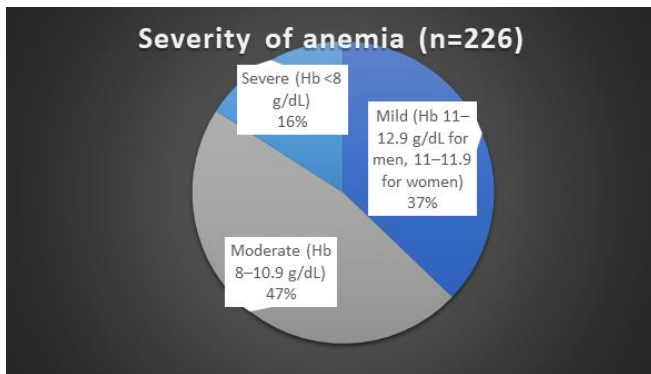


Figure 2: Severity of Anemia among Anemic Participants (n = 226)

Morphological evaluation revealed that normocytic anemia

was the predominant type, accounting for 112 (49.55%) cases. Microcytic anemia was observed in 92 (40.70%) patients, while macrocytic anemia constituted only 22 (9.73%) cases. These findings suggest that normocytic and microcytic patterns together accounted for the vast majority of anemia cases in the study population. [Figure 3]

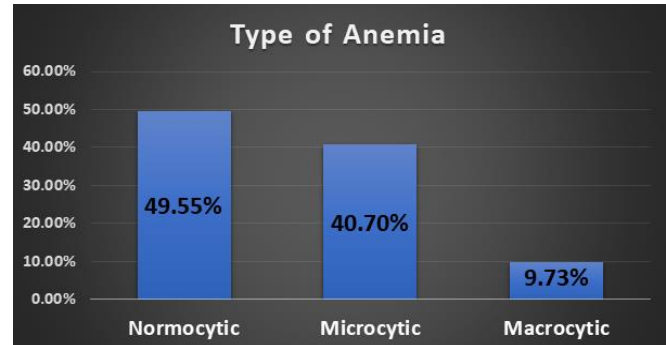


Figure 3: Morphological Types of Anemia (n = 226)

Gender-wise analysis of the 226 anemic participants showed that females constituted the majority of anemia cases (75.66%), whereas males accounted for 24.33%. Among males, normocytic anemia was the most frequent morphological subtype (50.91%), followed by microcytic (38.18%) and macrocytic anemia (10.91%). Similarly, among females, normocytic anemia was the predominant type (49.12%), followed by microcytic (41.52%) and macrocytic anemia (9.36%). The distribution of morphological patterns was comparable between both genders. [Table 2]

Table 2: Gender-wise Distribution of Morphological Types of Anemia (n = 226)

Gender	Total Cases (%)	Normocytic n (%)	Microcytic n (%)	Macrocytic n (%)
Male	55 (24.33)	28 (50.91)	21 (38.18)	6 (10.91)
Female	171 (75.66)	84 (49.12)	71 (41.52)	16 (9.36)

Evaluation of associated causes and comorbidities among anemic patients demonstrated that hypertension was the most common condition, affecting 97 (42.92%) patients, followed by diabetes mellitus in 81 (35.84%) and chronic kidney disease in 68 (30.08%). Nutritional deficiency-related

anemia was observed in 52 (23.01%) individuals. Chronic liver disease and malignancy were less frequent, accounting for 7.96% and 3.98% of cases, respectively. Notably, 15.04% of patients had no identifiable comorbidity. [Table 3]

Table 3: Associated Causes and Comorbidities among Anemic Patients (n = 226)

Cause/Comorbidity	Number (%)
Hypertension	97 (42.92)
Diabetes Mellitus	81 (35.84)
Chronic Kidney Disease	68 (30.08)
Nutritional Deficiency (Iron/B12)	52 (23.01)
No Known Comorbidities	34 (15.04)
Chronic Liver Disease	18 (7.96)
Malignancy	9 (3.98)

DISCUSSION

The present study demonstrated a high prevalence of anemia among geriatric patients, with 74.83% of the study population being affected. This prevalence is higher than that reported by Jain et al., who observed anemia in 68.67% of elderly patients, and Shrivastava et al., who reported a

prevalence of 68.5%. [14,15] Similar observations have been made in other hospital-based studies, highlighting anemia as a major health problem among older adults. [15,16] The high burden observed in the present study may be attributable to the increased prevalence of chronic diseases, nutritional deficiencies, and age-related physiological changes affecting haematopoiesis in elderly individuals. Alsaeed et al. also emphasized that anemia remains

highly prevalent among hospitalized older adults and is associated with adverse clinical outcomes, increased morbidity, and prolonged healthcare utilization.^[16]

In the present study, females constituted the majority of anemic patients (75.66%), whereas males accounted for 24.33% of cases. A similar female predominance was reported by Hassan et al., where females comprised approximately 60% of anemic elderly patients, and by Gupta et al., who identified female gender as an important risk factor for anemia among older adults.^[17,18] The higher prevalence among women may be explained by cumulative nutritional deficiencies, lower iron reserves, socioeconomic disadvantages, and the long-term effects of repeated pregnancies and menstrual blood loss during earlier life. These findings suggest that elderly women represent a particularly vulnerable group requiring targeted screening and preventive strategies.

Morphological evaluation in the present study revealed normocytic anemia as the most common subtype (49.55%), followed by microcytic anemia (40.70%) and macrocytic anemia (9.73%). These findings are consistent with those reported by Jain et al., who found normocytic normochromic anemia in approximately 47% of elderly patients, and Hassan et al., who reported normocytic anemia as the predominant morphological pattern in nearly half of the study population.^[14,17] Agravat et al. similarly observed normocytic normochromic anemia as the commonest subtype among geriatric patients.^[19] The predominance of normocytic anemia in these studies suggests that anemia of chronic disease and anemia associated with chronic comorbid conditions contribute substantially to the burden of anemia in older adults. In the present study, hypertension (42.92%), diabetes mellitus (35.84%), and chronic kidney disease (30.08%) were common associated conditions, supporting this observation. Chronic kidney disease is a well-recognized cause of anemia in the elderly due to impaired erythropoietin production, as highlighted by Hu et al.^[20]

Regarding severity, moderate anemia was the most common category in the present study, accounting for 46.90% of cases, followed by mild anemia (37.17%) and severe anemia (15.93%). Comparable findings were reported by Hassan et al., who observed moderate anemia in approximately 44% of patients, and by Agravat et al., where moderate anemia represented the largest proportion of cases.^[17,19] The predominance of moderate anemia is clinically important because even modest reductions in haemoglobin levels in elderly individuals have been associated with impaired physical performance, reduced cognitive function, frailty, falls, and increased mortality. The findings of the present study therefore reinforce the need for routine screening and comprehensive evaluation of anemia in geriatric patients, particularly those with chronic medical illnesses, to facilitate early diagnosis and timely intervention.

CONCLUSION

Anemia is highly prevalent among geriatric patients attending a tertiary care centre, affecting nearly three-fourths of the study population. Moderate anemia was the most

common severity category, while normocytic anemia was the predominant morphological type, suggesting a substantial contribution of chronic disease-related anemia in this age group. Female patients were disproportionately affected, and common associated comorbidities included hypertension, diabetes mellitus, and chronic kidney disease. These findings highlight the importance of routine screening, early diagnosis, and appropriate evaluation of anemia in older adults to reduce morbidity, improve functional status, and enhance quality of life.

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Conflicts of interest

There are no conflicts of interest.

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