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Study on Different Types of Anemia among Geriatric Patients in Tertiary Care Hospital

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KEYWORDS

Geriatric Anemia, Prevalence, Microcytic hypochromic anemia, Hemoglobin, Red blood cell indices, Peripheral smear.

ABSTRACT

Background: Anemia is a common and clinically significant condition in the elderly, associated with increased morbidity, functional decline, and mortality. Despite its impact, it is often under diagnosed in tertiary care settings. This study is aimed to evaluate the prevalence, morphological patterns in geriatric patients.

Materials and methods: At ACS Medical College and Hospital, we conducted a year-long, observational study (December 2024 - December 2025) involving patients aged 60 years and older who had anemia (Hemoglobin < 13g/dL for males, < 12g/dL for females). One hundred participants were included in this study. Blood samples were analyzed with automated hematology analyzers and microscopically examined with the Leishman stain method for this study. The descriptive and Chi-square statistical techniques were used for data analyses.

Results:The mean age of the participants in the study was 70.61 ± 7.34 years (males 71%) and the mean hemoglobin was 9.03 ± 2.05 g/dL. Sixty-nine percent of the patients had Microcytic hypochromic anemia and thirty percent had normocytic normochromic anemia. A significant relationship was found between hemoglobin and age ($p = 0.025$).

Conclusion: Anemia is highly prevalent among geriatric patients, predominantly microcytic hypochromic type. Routine haematological evaluation is crucial for early detection and appropriate management to improve outcomes in the elderly.

1. Introduction

A serious public health concern is anemia in the elderly, with increased morbidity and mortality as well as a reduced quality of life. Anemia is frequently misinterpreted as a natural part of aging, causing delays in recognizing and treating it. While anemia is not inherently tied to aging, it most frequently indicates another disorder. According to the World Health Organization, the cut-off for men is a hemoglobin level of <13 g/dL, and for women it is <12 g/dL. Even slight decreases in hemoglobin levels in older adults are associated with unfavorable outcomes. The overall rate of anemia increases as people become older; approximately 10–12% of individuals aged 60 and older are affected, whereas more than 20% of people aged 80 and older experience anemia. Elderly patients who are hospitalized experience a higher-than-expected incidence of anemia, typically due to coexisting medical conditions. Anemia in this age group can generally be attributed to malnutrition and chronic inflammation, but also by renal failure, cancer, and diseases affecting the bone marrow. Laboratory testing (CBC, red blood cell indices and a peripheral blood smear) is vital in diagnosing anemia. The purpose of this study is to establish the prevalence of anemia in geriatric patients (aged >=60 years) who present to a tertiary care center, and to evaluate whether there are any demographic factors that may aid in early identification and proper treatment.

2. Materials and Methods

The present study was hospital based observational study which was carried out at ACS Medical College and Hospital, Department of Pathology, over a 12-month period during which time we evaluated the prevalence and patterns of anaemia by use of haematological (blood) tests together with peripheral smear examination among

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geriatric patients. A total of 100 geriatric patients met the inclusion and exclusion criteria.

Inclusion Criteria

- Patients who are willing to participate and belong to age 60 years and above
- Individuals with a hemoglobin level below 13 g/dL for men, Hemoglobin level < 12 g/dL in women

Exclusion Criteria

- Patients aged below 60 years
- Known cases of haematological malignancies

3. Results :

The findings from this study have been presented using both descriptive statistics, which provide numerical summaries of sample characteristics, and inferential statistics, which can be used to estimate how well the sample reflects the population. The first section summarizes demographic characteristics of participants (age and sex) in order to provide a basic overview of how well the sample matches the population. The second section uses mean and standard deviation to present key haematological parameters (haemoglobin use, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and mean corpuscular haemoglobin concentration (MCHC). In addition, the relationship between participants' ages and their haematological parameters was tested for significance using the $\chi 2$ statistic. Both of these sections would then be compiled into a series of tables to illustrate patterns of anemia (the most prevalent), red cell parameters based on age of the participant group. The level of statistical significance was defined as $p \leq 0.05$.

TABLE 1 Represents the Descriptive Statistics Based on Age and Gender Distribution in the Study Population

Parameter	Option	FREQUENCY	PERCENTAGE	MEAN± S.D
Age in years	51-60	7	7.0	70.61±7.336
	61-70	47	47.0	
	71-80	34	34.0	
	81-90	12	12.0	
Gender	FEMALE	47	47.0	-
	MALE	53	53.0	

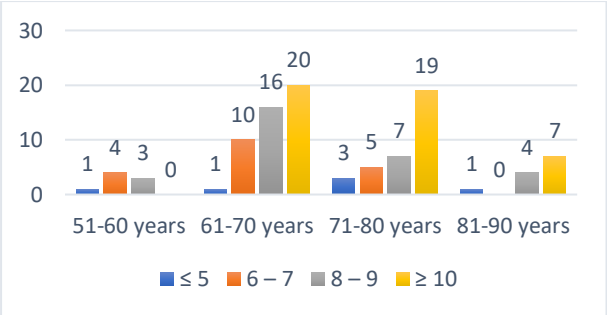
Table 1 displays age and gender distributions from the participants being studied. The average age was 70.61 ± 7.336 years. Participants were primarily older adults with the greatest proportion (47%) of participants being between 61 and 70. The second largest group of participants were between 71 and 80 years (34%); 12% of the participants fell into the 81 to 90 year age range, and 7% of participants fell into the 51 to 60 year range. The gender distribution of participants was relatively even (53% male, 47% female) with no large differences between groups based on gender.

TABLE 2 Represents the Association Between the Age and Hb Levels Among the Study Population by Using Chi square test

Hemoglobin (g/dL)	Age in years					Sig
	51-60 years	61-70 years	71-80 years	81-90 years	Total	
≤ 5	1	1	3	1	6	0.025
6 – 7	4	10	5	0	19	
8 – 9	3	16	7	4	30	
≥ 10	-	20	19	7	46	
Total	7	47	34	12	100	

A p-value ≤ 0.05 was considered statistically significant.

Table 2 demonstrates a statistically significant association between age groups and hemoglobin levels (Chi-square test, p = 0.025). Severe anemia (≤5 g/dL and 6–7 g/dL) was more common in the 51–60 and 61–70 years groups.



In contrast, higher hemoglobin levels (≥10 g/dL) were predominantly observed in the 71–80 and 81–90 years groups, indicating significant variation across age categories.

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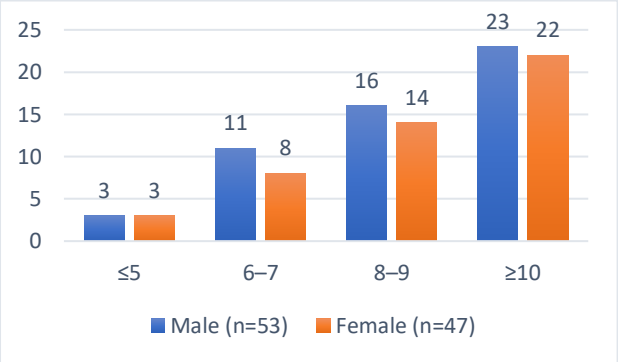
TABLE 3 Association between Gender and Hemoglobin levels

Hemoglobin (g/dL)	Male (n=53)	Female (n=47)	Total	Sig (Chi-square)
≤5	3	3	6	0.04
6–7	11	8	19	
8–9	16	14	30	
≥10	23	22	45*	
Total	53	47	100	

Table 3 demonstrates the association between gender and hemoglobin levels. Moderate Anemia (8–9 g/dL) and mild Anemia (≥10 g/dL) were common in both males and females. Severe Anemia (≤5 g/dL) was observed in a small proportion of both genders



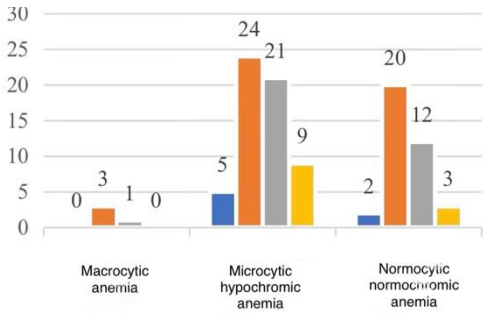
There was no statistically significant association between gender and hemoglobin levels on chi-square testing ($p > 0.05$), implying that anemia severity did not differ between male and female geriatric patients.

TABLE 4 Represents the Association between the Age and Peripheral smear findings among the study population by using Chi square test

Age in Years	Smear			Total	Sig
	Macrocytic anemia	Microcytic hypochromic anemia	Normocytic normochromic Anemia		
51-60 years	0	5	2	7	0.928
61-70 years	3	24	20	47	
71-80 years	1	21	12	34	
81-90 years	0	9	3	12	
TOTAL	4	59	37	100	

P value less than or equal to 0.05 is considered statistically significant difference

Table 4 illustrates the association between age and peripheral smear findings using the Chi-square test. Microcytic hypochromic anemia was the most common smear pattern across all age groups, particularly in 61–70 and 71–80 years. Normocytic normochromic anemia was the next most frequent finding, while Macrocytic anemia was rare.



The p-value of 0.928 indicates no statistically significant association between age and smear findings ($p > 0.05$), suggesting smear patterns were independent of age.

TABLE 5 Association between Gender and Peripheral smear pattern

Peripheral Smear Pattern	Male (n=53)	Female (n=47)	Total	Sig (Chi-square)
Microcytic hypochromic anemia (59)	31	28	59	0.03
Normocytic normochromic anemia (37)	20	17	37	
Macrocytic anemia (4)	2	2	4	
Total	53	47	100	

Table 5 shows the association between gender and peripheral smear pattern using the Chi-square test. Microcytic hypochromic anemia was the most common

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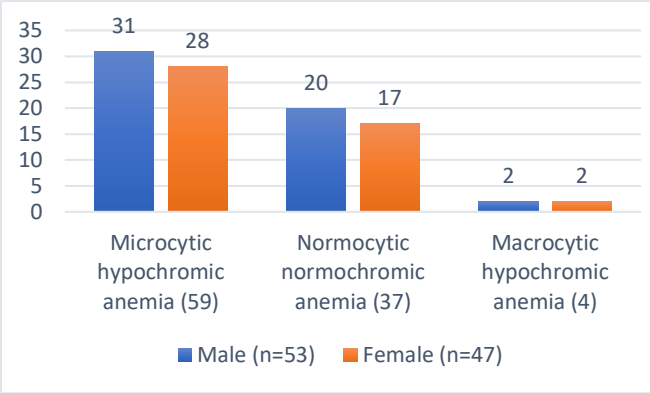
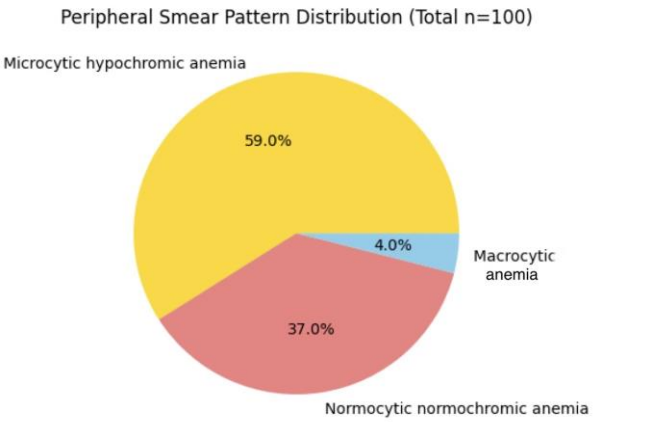
pattern in both males (31) and females (28), followed by normocytic normochromic anemia.



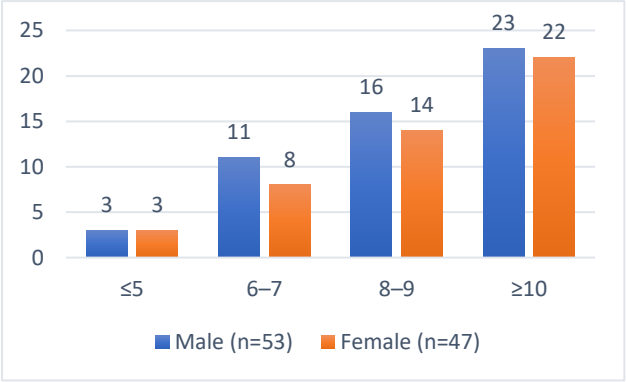


The association was statistically significant (p = 0.03), indicating a significant relationship betwe gender and peripheral smear pattern.

TABLE 6 Association between Gender and Hemoglobin levels

Hemoglobin (g/dL)	Male (n=53)	Female (n=47)	Total	Sig (Chi-square)
≤5	3	3	6	0.04
6–7	11	8	19	
8–9	16	14	30	
≥10	23	22	45*	
Total	53	47	100	

Table 7 demonstrates the association between gender and hemoglobin levels. Moderate anemia (8–9 g/dL) and mild anemia (≥10 g/dL) were common in both males and females. Severe anemia (≤5 g/dL) was observed in a small proportion of both genders



No statistically significant association was observed between gender and hemoglobin levels on chi-square analysis ($p > 0.05$), implying that anemia severity did not differ between the two groups.

4. DISCUSSION

A major clinical issue is the experience of older individuals with anemia because of its high occurrence within the population, the complex causation that can lead to this condition, and the associated increased risk of other negative health conditions. This study was performed in a hospital setting that was prospective in nature and completed a thorough examination of patterns of anemia in elderly patients through analysis of red blood cell indices and peripheral blood smears, thus allowing for greater understanding of demographic and hematological aspects related to anemia.

This study's participants had a mean age of 70.61 (+/- 7.33), and the majority of participants fell between the ages of 61-70 years old. The distribution of males and females was almost equal indicating an equal impact on both genders for the condition of anemia when compared to younger populations where anemia is more prevalent among females. The average hemoglobin level measured in the subjects at 9.03 +/- 2.05 g/dL illustrates a large amount of moderate to severe anemic patients in this tertiary care facility. There was an association ($p = 0.025$) between age and hemoglobin levels indicating that the severity of anemia can vary based upon age. Peripheral smear findings showed Microcytic hypochromic anemia in 59% of cases, followed by normocytic normochromic anemia (30%). These findings are consistent with studies from developing countries, where iron deficiency—often secondary to chronic gastrointestinal blood loss or nutritional deficiency—is common.

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5. CONCLUSION

The study highlights the importance of routine haematological evaluation in elderly patients. Morphological classification using complete blood count and peripheral smear examination provides a practical and cost-effective approach for early detection and appropriate management, particularly in resource-limited tertiary care settings**.** The study demonstrated that Microcytic hypochromic anemia was the predominant morphological pattern, followed by normocytic normochromic anemia, as assessed by red cell indices and peripheral smear examination. These findings suggest that iron deficiency and anemia of chronic disease are likely major contributors to anemia in the geriatric population. A statistically significant association was observed between age and hemoglobin levels.

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:

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Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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