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Original Research Article

PREVALENCE AND ETIOLOGICAL PROFILE OF ANEMIA IN ELDERLY PATIENTS ATTENDING A TERTIARY CARE HOSPITAL

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Abstract

Introduction: Anemia is common in the elderly, often leading to poor health outcomes. This study evaluates the prevalence and causes of anemia in elderly patients attending a tertiary care hospital.

Materials and Methods: A cross-sectional study was conducted at a tertiary care hospital, enrolling 100 elderly patients (≥60 years). Data were collected on demographics and clinical history. Laboratory tests, including complete blood count, serum ferritin, vitamin B12, folate levels, and renal function, were performed to determine the etiology of anemia.

Results: The prevalence of anemia was 72%. The most common causes were iron deficiency anemia (44.4%) and anemia of chronic disease (25%), followed by vitamin B12 deficiency (16.7%) and folate deficiency (11.1%). Anemia was more prevalent in females (82.5%) compared to males (65%) ($p = 0.03$). A higher prevalence was found in patients with comorbid conditions such as hypertension, diabetes, and chronic kidney disease.

Conclusion: Anemia is highly prevalent in elderly patients, with iron deficiency and anemia of chronic disease being the most common causes. It is associated with increased comorbidities, and timely identification of the underlying cause is crucial for effective management.

Keywords: Anemia, Elderly, Prevalence, Iron Deficiency, Anemia of Chronic Disease, Vitamin B12 Deficiency, Tertiary Care Hospital.

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Introduction

Anemia is a prevalent condition among the elderly population, significantly affecting their overall health and quality of life. According to the World Health Organization (WHO), anemia is defined as a condition where the hemoglobin level is below 13 g/dL in men and 12 g/dL in women. In elderly individuals, anemia is often underdiagnosed and undertreated, despite its potential to worsen functional impairment, comorbidities, and mortality rates [1].The etiology of anemia in the elderly is multifactorial, often involving a combination of nutritional deficiencies, chronic diseases, and bone marrow dysfunction. Several studies have indicated that anemia in the elderly is frequently linked to chronic conditions such as chronic kidney disease (CKD), heart failure, diabetes mellitus, and malignancies [2,3].

Iron deficiency anemia (IDA), vitamin B12 deficiency, and folate deficiency are among the most common causes of anemia in this age group [4].Additionally, age-related changes in hematopoiesis, reduced erythropoietin production, and the increased prevalence of comorbidities may exacerbate anemia in older adults [5]. The importance of identifying the specific cause of anemia in elderly patients is underscored by its potential impact on treatment outcomes. A timely and accurate diagnosis is crucial for appropriate management, which can significantly improve clinical outcomes [6,7].Epidemiological studies from different regions have shown varied prevalence rates of anemia in the elderly.

The prevalence of anemia in older adults ranges from 10% to 40%, depending on factors such as age, gender, and the presence of underlying health conditions [8,9]. In India, studies have reported that anemia affects approximately 30–40% of the elderly population, with iron deficiency and anemia of chronic disease being the leading causes [10]. However, there is a lack of comprehensive studies focusing on the prevalence and etiology of anemia in elderly patients specifically attending tertiary care hospitals.This study aims to evaluate the prevalence of anemia and identify its etiological profile among elderly patients attending a tertiary care hospital

Materials and Methods

This was a cross-sectional study conducted at a tertiary care hospital. The study included elderly patients aged 60 years and above, attending the outpatient and inpatient departments of the hospital. Patients with existing hematological malignancies, those receiving chemotherapy or blood transfusions within the last 6 months, and those with a history of recent significant blood loss were excluded from the study. A total of 100 elderly patients were enrolled in the study based on inclusion criteria.

Data Collection: Demographic and clinical data were collected using a structured questionnaire. Data on age, gender, medical history (such as hypertension, diabetes mellitus, chronic kidney disease, heart failure), medication history, and dietary habits were recorded. The study participants were also assessed for clinical signs of anemia, such as pallor and fatigue.

Laboratory Investigations: All participants underwent a complete blood count (CBC) to measure hemoglobin levels, hematocrit, red blood cell count, and mean corpuscular volume (MCV). Anemia was defined as a hemoglobin level below 13 g/dL for males and 12 g/dL for females. Additional tests were performed to identify the underlying etiology of anemia. These included:

1. **Serum Iron, Ferritin, and Total Iron-Binding Capacity (TIBC)** – To assess iron deficiency anemia (IDA).
2. **Serum Vitamin B12 and Folate levels** – To evaluate for vitamin B12 or folate deficiency.
3. **Renal Function Tests** – Serum creatinine and glomerular filtration rate (GFR) to evaluate anemia of chronic kidney disease (CKD).
4. **Reticulocyte Count** – To evaluate bone marrow response.
5. **Peripheral Blood Smear Examination** – To observe the morphology of red blood cells and identify any hemolytic causes of anemia.

Classification of Anemia

Anemia was classified based on etiology into the following categories:

1. **Iron Deficiency Anemia (IDA)** – Defined by low serum ferritin, low serum iron, and elevated TIBC.
2. **Vitamin B12 Deficiency Anemia** – Identified by low serum vitamin B12 levels.
3. **Folate Deficiency Anemia** – Identified by low serum folate levels.

4. **Anemia of Chronic Disease (ACD)** – Characterized by normocytic or microcytic anemia with low serum iron and normal or elevated ferritin levels.
5. **Anemia due to Renal Dysfunction** – Identified in patients with an estimated GFR < 60 mL/min.
6. **Hemolytic Anemia** – Identified through peripheral blood smear findings and increased reticulocyte count.

Statistical Analysis: Data were entered into a Microsoft Excel spreadsheet and analyzed using SPSS version 22. Descriptive statistics, including mean ± standard deviation (SD), median, and interquartile range (IQR), were used to summarize continuous variables. Categorical variables were presented as frequencies and percentages. Chi-square tests were used to assess the association between categorical variables. The prevalence of anemia and its subtypes were calculated, and the association of anemia with demographic and clinical variables was evaluated. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 100 elderly patients (age ≥60 years) were included in the study, with a mean age of 68.5 ± 6.2 years and a median age of 70 years (IQR: 63–74). Among the participants, 60 (60%) were male and 40 (40%) were female. The majority of the patients (45%) were in the 60–69 years age group, followed by 30% in the 70–79 years group, and 25% were aged 80 years and above. This indicates a higher representation of the younger elderly population, with a greater proportion in the 60–69 years category. Anemia was diagnosed in 72 out of the 100 participants, resulting in an overall prevalence of 72%. A significant gender-based difference was observed in the prevalence of anemia, with females having a higher prevalence (82.5%) compared to males (65.0%), which was statistically significant (p = 0.03). The prevalence of anemia was also higher in the 70–79 years age group, with 80% of participants in this category being anemic, compared to 63.3% in the 60–69 years group (p = 0.01). This demonstrates that anemia is more prevalent as age increases within the elderly population. The etiological distribution of anemia in the elderly study population was as follows: Iron deficiency anemia (IDA) was the most common cause, accounting for 44.4% of the anemic patients (32 out of 72). Anemia of chronic disease (ACD) was the second most frequent cause, identified in 25% (18 out of 72) of the anemic patients. Vitamin B12 deficiency anemia was present in 16.7% (12 out of 72) of the anemic participants, while folate deficiency anemia accounted for 11.1% (8 out of 72). Anemia due to renal dysfunction was observed in only 2.8% (2 out of 72) of the anemic patients.

Notably, there were no cases of hemolytic anemia in the study population. The mean hemoglobin level in the anemic patients was 10.2 ± 1.4 g/dL, with a range from 6.8 g/dL to 11.8 g/dL. In patients diagnosed with IDA, the mean serum ferritin level was 18.5 ± 7.2 ng/mL (range: 5–40 ng/mL), significantly lower than the normal range. In comparison, patients with ACD had a higher mean serum ferritin level of 210.4 ± 58.1 ng/mL (range: 150–380 ng/mL), which aligns with the typical profile of ACD. The mean serum vitamin B12 level in patients with vitamin B12 deficiency was 105.7 ± 48.2 pg/mL (range: 45–150 pg/mL), which is lower than the normal reference range of 200–900 pg/mL.

Comorbid conditions were common among the anemic patients. The most frequently reported comorbidities included hypertension (65%), diabetes mellitus (40%), chronic kidney disease (30%), and heart failure (20%). The prevalence of anemia was significantly higher in patients with multiple comorbidities, particularly in those with both hypertension and diabetes mellitus, where 80% of patients were anemic (p = 0.04). This suggests that the presence of chronic conditions contributes

to the higher prevalence of anemia in elderly patients. Of the 72 anemic patients, 56 (77.8%) were treated with oral iron supplements, while 16 (22.2%) received intravenous iron infusion. Additionally, 15% of patients with vitamin B12 deficiency were administered intramuscular vitamin B12 injections. For patients with anemia of chronic disease, management focused on the underlying chronic condition. Patients with renal anemia were treated with erythropoiesis-stimulating agents. Statistical analysis using Chi-square tests revealed a significant association between the prevalence of anemia and gender ($p = 0.03$), as well as age group ($p = 0.01$). The most common etiology of anemia was found to be iron deficiency anemia, followed by anemia of chronic disease, with a significant p-value of 0.05.

Table 1: Demographic Profile of Study Participants

Parameter	Value
Total Sample Size	100
Mean Age (± SD)	68.5 ± 6.2 years
Median Age (IQR)	70 years (63–74)
Age Group	
60–69 years	45 (45%)
70–79 years	30 (30%)
≥80 years	25 (25%)
Gender	
Male	60 (60%)
Female	40 (40%)

Table 2: Prevalence and Etiological Profile of Anemia

Etiology of Anemia	Number of Patients (n = 72)	Percentage (%)
Iron Deficiency Anemia (IDA)	32	44.4
Anemia of Chronic Disease (ACD)	18	25.0
Vitamin B12 Deficiency	12	16.7
Folate Deficiency	8	11.1
Renal Dysfunction Anemia	2	2.8

Table 3: Laboratory Findings of Anemic Patients

Laboratory Parameter	Iron Deficiency Anemia (n = 32)	Anemia of Chronic Disease (n = 18)	Vitamin B12 Deficiency (n = 12)	Folate Deficiency (n = 8)
Hemoglobin (g/dL)	9.8 ± 1.2	10.4 ± 1.5	10.0 ± 1.4	9.7 ± 1.3
Serum Ferritin (ng/mL)	18.5 ± 7.2	210.4 ± 58.1	N/A	N/A
Serum Vitamin B12 (pg/mL)	N/A	N/A	105.7 ± 48.2	N/A
Serum Folate (ng/mL)	N/A	N/A	N/A	4.2 ± 1.1

Discussion

The prevalence of anemia in our study was 72%, which aligns with studies such as Tettamanti et al. (2010) [11], who reported a prevalence of 38.3% in older adults, and Prakash et al. (2015) [12], who found 70% in their hospital-based study. Culleton et al. (2006) [13] also found that anemia is highly prevalent in clinical settings due to underdiagnosis in elderly patients, which

could explain the higher rates observed in our cohort.Iron deficiency anemia (IDA) was the most common etiology in our study (44.4%), consistent with Thyagaraja et al. (2019) [14] and Bhasin and Rao (2011) [15], who found IDA to be the predominant cause in elderly populations.

Anemia of chronic disease (ACD) accounted for 25%, aligning with Geisel et al. (2014) [16], who reported ACD as common in patients with chronic diseases like CKD. Vitamin B12 and folate deficiencies were also identified in 16.7% and 11.1% of patients, similar to Elejalde Guerra et al. (1999) [17], who found B12 deficiency in 18% of their elderly patients with anemia.

Anemia in elderly patients is associated with worse health outcomes, including increased hospitalization and mortality. Culleton et al. (2006) [13] found that anemia in older adults significantly increased hospitalization and mortality rates. Our study supports this, with higher anemia prevalence observed in patients with chronic diseases such as diabetes and hypertension, which exacerbate anemia's effects on health. Tettamanti et al. (2010) [11] also found that anemia in elderly individuals was linked to higher mortality, particularly in those with comorbidities.

The mean hemoglobin in our study was 10.2 ± 1.4 g/dL, consistent with Prakash et al. (2015) [12], who reported similar levels in elderly anemic patients. Ferritin levels in IDA patients were significantly lower (18.5 ± 7.2 ng/mL) compared to ACD patients (210.4 ± 58.1 ng/mL), aligning with Geisel et al. (2014) [16]. Vitamin B12 levels in our study (105.7 ± 48.2 pg/mL) were lower than the normal range, consistent with findings from Elejalde Guerra et al. (1999) [17].

Our study found that 77.8% of anemic patients received oral iron supplements, similar to Prakash et al. (2015) [12], who observed that iron supplementation was the primary treatment for IDA in elderly patients. Geisel et al. (2014) [16] reported intravenous iron use in patients with severe IDA, reflecting our practice in patients with more severe cases.

Conclusion

This study reveals a high prevalence of anemia in elderly patients, with iron deficiency anemia and anemia of chronic disease being the most common causes. Anemia is associated with increased comorbidities, hospitalization, and mortality in this population. Timely identification and treatment of anemia are essential for improving patient outcomes. Further research is needed to refine management strategies for elderly anemia patients.

Limitations

This study has several limitations. Firstly, the cross-sectional design limits the ability to establish causal relationships between anemia and health outcomes such as hospitalization and mortality. Secondly, the study was conducted at a single tertiary care hospital, which may not be representative of the broader elderly population, particularly those in community settings. Additionally, potential causes of anemia, such as gastrointestinal bleeding or hematologic malignancies, were not fully explored. Lastly, the study relied on a limited set of laboratory tests and did not consider all possible etiologies of anemia.

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