

# Geriatric Anemia in Tertiary Health-Care Center

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## Abstract

**Introduction:** Geriatric anemia, characterized by a decline in hemoglobin levels below the established normal range for a particular age and sex, poses a significant clinical challenge in the aging population. Anemia is recognized as a substantial health burden among the elderly population at a national level, even among those who show no clinical symptoms. Anemia in older adults often signifies an underlying health concern rather than solely being a consequence of aging and it is known to be associated with elevated morbidity and mortality.

**Aims and Objectives:** This study was clinical and hematological characteristics of anemia and various morphological types of anemia in patients age 60 years and above. Therefore, this study was conducted to determine them and to know more about associated disorders.

**Materials and Methods:** The present study involved 891 patients aged 60 and above who were clinically diagnosed as anemic. Routine hematological investigations including peripheral blood smear examination and complete hemogram were performed using HORIBA Penta XLR cell counter. Additional investigations such as reticulocyte counts and iron studies were done whenever required.

**Results:** Males were more affected than females, with the most affected age group being 60–70 years. Normocytic normochromic anemia was the predominant morphological type, with chronic diseases identified as the most common etiological factors. Generalized weakness and fatigue emerged as the predominant presenting symptoms.

**Conclusion:** The consequences of untreated or inadequately managed anemia in the elderly are significant, extending beyond mere fatigue and weakness. They encompass cognitive impairment, diminished quality of life, increased vulnerability to infections, and heightened morbidity and mortality rates so necessity of determining the etiological origins of anemia in all cases to facilitate the choice and implementation of effective therapy.

**Key words:** Chronic disease, Elderly, Generalized weakness, Geriatric anemia, Normocytic normochromic anemia

## INTRODUCTION

Geriatric anemia, characterized by a decline in hemoglobin levels below the established normal range for a particular age and sex, poses a significant clinical challenge in the ageing population.<sup>[1]</sup> Anemia frequently occurs among older individuals. Previously, it was believed that the reduction in hemoglobin levels could be a typical outcome of aging; however, we now understand that anemia in older adults

often signifies an underlying health concern rather than solely being a consequence of aging<sup>[2]</sup> and it is recognized that elevated morbidity and mortality are linked.<sup>[3]</sup>

Anemia is recognized as a substantial health burden among the elderly population at a national level, even among those who show no clinical symptoms. Emerging evidence suggests that adults and the elderly are more prone to experiencing severe complications from anemia compared to younger individuals.<sup>[4]</sup> Approximately one-third of anemia cases seem to be linked to a nutrient deficiency, with over half of the individuals in this group exhibiting an iron deficiency, either independently or in conjunction with folate or Vitamin B12 deficiencies.<sup>[2]</sup>

According to the guidelines set by the World Health Organization (hemoglobin levels below 12 g/dL in women

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and below 13.5 g/dL in men), the prevalence of anemia in the elderly varies from 8% to 45%, with the highest prevalence observed in men aged 85 years or older.<sup>[5]</sup> In the past decade, anemia has increasingly been recognized as a risk factor associated with various adverse outcomes in older adults, such as increased rates of hospitalization, disability, and mortality.<sup>[6]</sup> This study was conducted to evaluate the hematological classifications and potential causes of anemia in the elderly population.<sup>[6]</sup>

Hemoglobin levels in healthy older individuals aged 60–98 remain relatively stable and show little to no significant change. The common changes that accompany aging often elevate the risk of anemia, thereby elucidating the connection between anemia and advancing age. These encompass diminished capacity to absorb essential nutrients, a reduction in hematopoietic reserve, and a decreased sensitivity to erythropoietin.<sup>[2]</sup>

By synthesizing current research findings and clinical guidelines, we seek to provide health-care professionals with a comprehensive resource to enhance their understanding and optimizing the care of older adults with anemia.<sup>[1]</sup>

**Objectives**

1. To investigate the clinical and hematological characteristics of anemia in patients age 60 and above
2. To examine the various morphological types of anemia and their prevalence among them
3. To know the typical causes of anemia
4. To know the different disorders associated with it.

**MATERIALS AND METHODS**

The present study is a descriptive cross-sectional study carried out over a period of 3 years from October 1, 2020, to October 31, 2023. All the geriatric indoor patients who were clinically diagnosed as anemic were included in the study. Comprehensive medical histories were taken, physical examinations were performed, laboratory measurements were conducted, and additional diagnostic studies were undertaken. Hemoglobin was determined using HORIBA Penta XLR cell counter. A complete blood count and peripheral blood smears examination were conducted to assess the pattern of anemia. Additional studies such as reticulocyte counts, iron studies, and bone marrow examinations were conducted as necessary.

**Inclusion Criteria**

The following criteria were included in the study:

1. Indoor patients
2. Patients aged 60 year and above
3. Patients having Hb <12 g/dL.

**Exclusion Criteria**

The following criteria were excluded from the study:

1. Outpatient department patients
2. Patients aged 59 year and below
3. Patients having Hb >12 g/dL.

**RESULTS**

Table 1 indicates that the majority of subjects 683 were in the age group of 60–70 years, 163 subjects in the age group of 71–80 years, and 45 subjects were aged 80 years and above.

Table 2 and Figure 1 indicate that 56.90% of the participants were male, with 43.10% being female in the present study.

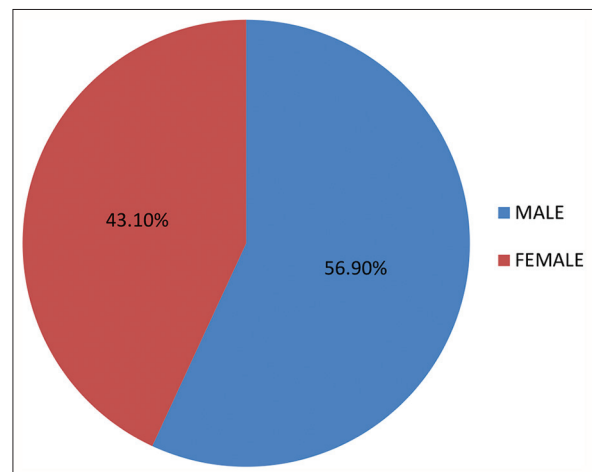
In this study, anemia was most frequently linked with non-specific symptoms, followed by symptoms and signs related

**Table 1: Age-wise distribution of cases**

Age (years)	Total number (n=891)	Percentage (100%)
60–65	478	53.65
66–70	205	23.01
71–75	121	13.58
76–80	42	4.71
81–85	29	3.25
86–90	12	1.35
91–95	4	0.45
Total	891	100

**Table 2: Distribution of cases according to gender**

Sex	Number of cases	Percentage
Male	507	56.90
Female	384	43.10
Total	891	100



**Figure 1: Pie diagram representing distribution of cases according to gender**

**Table 3: Relation with symptoms and sign**

Associated factor	Total number (n=891)	Percentage (100%)
Respiratory	196	21.99
Gastrointestinal	143	16.05
Carcinomas	129	14.48
Nutritional disorders	116	13.02
Renal	40	4.49
Liver	35	3.93
Non-specific	232	26.04
Total	1257	100

**Table 4: Patterns of peripheral blood smear**

Peripheral blood smear findings	Total number (n=891)	Percentage (100%)
Normocytic normochromic anemia	441	49.5
Hypochromic microcytic anemia	246	27.61
Normocytic hypochromic anemia	90	10.10
Dimorphic anemia	77	8.64
Macrocytic anemia	37	4.15
Total	891	100

to respiratory illnesses, gastrointestinal diseases, carcinoma, nutritional disorders, liver disease, and renal issues [Table 3].

In this study, anemia due to chronic disease (49%) was the most prevalent type, followed by iron deficiency anemia (19.3%), nutritional anemia (12.4%), anemia due to blood loss (15.8%), hemat malignancy (2.4%), and other causes being least prevalent (1.1%) [Table 4].

In our study, we observed that normocytic normochromic anemia was the most prevalent morphological type, accounting for 49.5%, followed by hypochromic microcytic (27.61%), normocytic hypochromic anemia (10.10%), dimorphic (8.64%), with macrocytic being the least common at 4.15%.

The graph depicted in Figure 3 indicates that out of 891 patients, 398 were classified as Grade 2 (Moderate Anemia).

**Table 5: Comparative study of gender-wise distribution of geriatric anemias**

Gender	Present study (n=891) (%)	Pathania et al. n=229 (%)	Amarneel and Sheth n=42 (%)	Khatib et al. n=256 (%)	Gandhi et al. n=675 (%)	Joosten et al. n=178 (%)	Mathew Rong et al. n=424 (%)
Male	56.90	36.7	28.6	53.9	51	38.8	48.6
Female	43.10	63.3	71.4	46	49	61.2	51.4

**Table 6: Comparative study of maximally affected age group**

Age group (years)	Present study n=891 (%)	Amarneel and Sheth n=42 (%)	Khatib et al. n=256 (%)	Aithal et al. n=100 (%)	Geisel et al. n=388 (%)
50–59	-	-	-	-	-
60–70	76.66	61.25	58.59	70	13.9
71–80	18.29	27.5	31.25	23	40.2
81–90	4.6	11.25	5.07	7	46
91–99	0.45	-	5.07	-	-

**Table 7: Comparative study of contributory causes resulting in anemia**

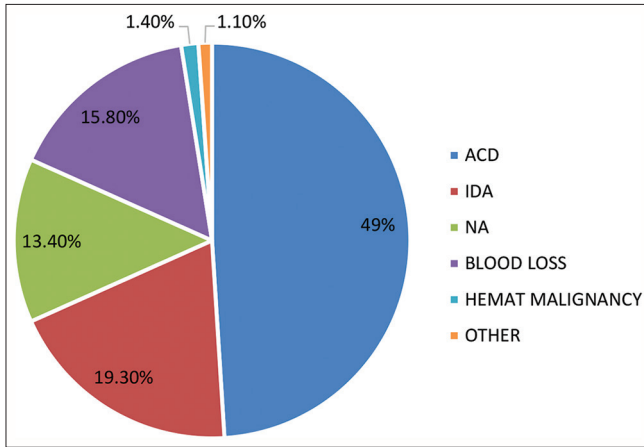
Cause of anemia	Present study n=891 (%)	Nisha et al. n=500 (%)	Guyatt et al. n=259 (%)	Joosten et al. n=178 (%)	Mathew Rong et al. n=424 (%)
Iron deficiency Anemia	19.3	12.2	36.3	15	13
Anemia of chronic disease	49	48.9	43.6	41.5	29.3
Nutritional anemia	13.4	6.9	8.10	5.5	13
Blood loss	15.8	8.5	-	7.0	-
Hematological malignancy	1.4	18.5	2.70	11	0.7
Others	1.1	5	9.3	20	44

**Table 8: Comparative study of grading of anemia**

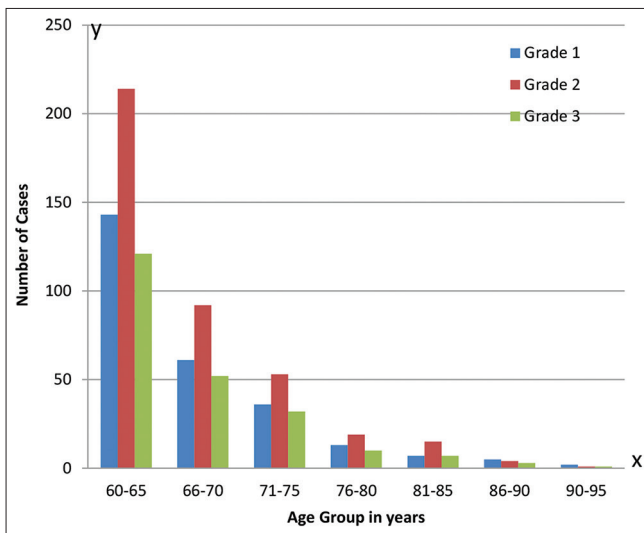
Grade of anemia	Present study n=891 (%)	Pathania et al. n=229	Nisha et al. n=826 (%)	Suma et al. n=114 (%)	Gandhi et al. n=675 (%)	Joosten et al. n=178 (%)
Mild (10–12 g/dL)	29.97	47.60	68.8	19.29	80.9	29.2
Moderate (7–10 g/dL)	44.67	47.16	26.3	16.7	16.7	57.9
Severe (<7 g/dL)	25.36	5.24	4.9	2.4	2.4	12.9

**Table 9: Comparative study of associated comorbidities**

Associated comorbidities	Present study (%)	Suma et al. (%)	Aithal et al. (%)	Mathew Rong et al. (%)	Geisel et al. (%)
GI disorder	20.7	18.2	-	8.69	15.66
Liver	9.3	6.0	20	21.73	-
Renal	8.6	12	50	-	56.6
Respiratory	29.3	36.4	17.5	34.8	-
Carcinoma	19.5	15.2	-	34.8	12.4
Arthritis	12.6	12.1	12.5	-	15.7



**Figure 2: Pie diagram representing causes of anemia**



**Figure 3: Grading of anemias according to age**

**DISCUSSION**

In our study, we observed a higher prevalence of anemia among males compared to females, consistent with findings reported by Khatib et al.<sup>[7]</sup> and Gandhi et al.<sup>[4]</sup> However, our results differ from those of Pathania et al.,<sup>[8]</sup> Amarneel and Sheth<sup>[9]</sup> Joosten et al.,<sup>[10]</sup> and Mathew Rong et al.,<sup>[11]</sup> where females exhibited a higher prevalence of anemia [Table 5].

In our study, we observed that the age group most affected was 60–70 years, consistent with the finding of Amarneel

and Sheth<sup>[9]</sup> Khatib et al.,<sup>[7]</sup> and Aithal et al.<sup>[6]</sup> Conversely, Geisel et al.<sup>[3]</sup> found that the age group most affected was 81–90 years [Table 6].

In the present study, the most common underlying cause of anemia was found to be anemia of chronic disease, which is consistent with the study done by Guyatt et al.,<sup>[12]</sup> Nisha et al.,<sup>[5]</sup> and Joosten et al.<sup>[10]</sup> They also observed that chronic disease was primarily responsible for anemia followed by iron deficiency anemia [Table 7].

In our study of hematological malignancies, we found chronic myeloid leukemia in 8 (1.4%) of the subjects, that is consistent with the 1% prevalence noted by Aithal et al.<sup>[6]</sup> Chronic leukemia and lymphoproliferative disorders were observed in 0.4% of the cases, contrasting with the higher rates reported in studies conducted by Nisha et al.<sup>[5]</sup> and Vijay Tilak and Tilak,<sup>[13]</sup> 2.2% have the anemia due to chronic leukemia and lymphoproliferative disorder.

Anemia due to chronic diseases is the most common type of geriatric anemias as observed in this present study. This finding aligns with the study conducted by Tettamanti et al.<sup>[14]</sup>

In the present study, the majority of subjects exhibit moderate-grade anemia (Grade II). This result aligns with the findings reported by Joosten et al.<sup>[10]</sup> [Table 8].

Our findings contrast with those of studies conducted by Pathania et al.,<sup>[8]</sup> Nisha et al.,<sup>[5]</sup> Suma et al., and Gandhi et al.,<sup>[4]</sup> where the majority of elderly participants had mild anemia (Grade I).

In our study, the majority of subjects (29.3%) are associated with respiratory disease which correlates with study done by Suma et al. (36.4%) and Mathew Rong et al. (34.8%). Our findings differ from those of studies conducted by Aithal et al.<sup>[6]</sup> and Geisel et al.<sup>[3]</sup> where renal disease was predominantly observed in subjects 50% and 56.6%, respectively. Next common condition associated was gastrointestinal disorder in our study, whereas renal disease was observed predominantly in subjects [Table 9].<sup>[15]</sup>

## CONCLUSION

Our study concluded that while anemia of chronic disease is the most common type of anemia in elderly individuals, other types are also observed in varying proportions. The most striking conclusion is the significant prevalence of anemia among elderly patients admitted to the hospital due to a wide range of different disorders. It emphasizes the necessity of determining the underlying causes of anemia in all cases to facilitate the choice and implementation of effective therapy. The consequences of untreated or inadequately managed anemia in the elderly are significant, extending beyond mere fatigue and weakness. They encompass cognitive impairment, diminished quality of life, increased vulnerability to infections, and heightened morbidity and mortality rates.

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