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Original Research Article

CLINICAL AND HEMATOLOGICAL PROFILE OF ANEMIA IN GERIATRIC PATIENTS: A TERTIARY CARE HOSPITAL BASED CROSS SECTIONAL STUDY

Shyma OK[1], Salam Kenny Singh[2], Keisham Jaya Chanu[3], Taruni Ngangbam[4], Jaojianshing Kamei[5]

[1]Senior Resident, Department of Medicine, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur, India
[2]Associate Professor, Department of Medicine, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur, India
[3]Assistant Professor, Department of Medicine, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur, India
[4]Professor, Department of Medicine, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur, India
[5]Junior Resident, Department of Medicine, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur, India

Abstract

Background: According to the Census 2011, India has 104 million elderly people (60+years). Anemia is a common problem in elderly patients and it significantly increases the risk of morbidity, mortality and frailty in them. As many as 33% of geriatric anemia remain unexplained, and their pathogenesis remains speculative. Failure to evaluate them may lead to delayed diagnosis of potentially treatable conditions. The objective is to study the clinical profile and the pattern of anemia in elderly patients with anemia. **Materials and Methods:** 123 patients aged 60 years and above with haemoglobin (Hb)<13gm% in males and <12 gm% in females based on World Health Organization(WHO) criteria were included in this cross sectional study. Clinical and laboratory parameters were recorded for all the patients. Upper GI endoscopy and bone marrow examination were done when required.Data was analyzed using IBM SPSS version 21.Chi square and Fischer exact test was used to check association between the final diagnosis of anemia and p value <0.05 was taken as significant. **Result:** The mean ± SD age was 67.6 ± 6.6 years.The most common symptom was non-specific including general weakness (44.7%) and most common sign was pallor (63.4%). Normocytic anemia(43.9%) was the most common peripheral smear picture and anemia of chronic disorder (52.8%) of which chronic kidney disease (44.6%) was the most common final diagnosis. **Conclusion:** Elderly patients with anemia mainly presents with nonspecific complaints which requires worked up, allowing timely initiation of optimaltreatment.

INTRODUCTION

The world's elderly population will reach 1.2 billion by 2025 from present 765 million in 2010 (from around 8% in 2010 to around 12% in 2025).[1]According to the Census 2011, India has 104 million older people (60+years), constituting 8.6% of the total population of the country.[2]Anemia is considered a major public health problem in developing countries.[3] Third National Health and Nutrition Examination Survey (NHANES-III) of WHO study revealed that the prevalence of anemia as 11% of men and 10.2% of women aged 65 years and older than 65 years.

Results from a number of studies have shown that anemia have a substantial negative impact on function as well as the quality of life in the geriatrics, requiring allocation of health care resources.[4,5] The decline of hemoglobin and concomitant increased prevalence of anemia with age is not necessarily a result of "normal aging", because anemia is a sign and not a diagnosis.As many as 33% of geriatric anemia remain unexplained, and their pathogenesis remains speculative. In elderly persons the etiology of anemia differs sufficiently from younger adults to warrant considering anemia as a distinct entity.[6] It becomes all the more important to look for the type

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and severity of anemia in order to plan for bettermanagement strategies.

Objectives:
To study the clinical profile and the pattern of anemia in elderly patients with anemia.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Department of Medicine, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur from January 2021 to October 2022. A total of 123 patients, aged 60 years and above were included in the study.

Inclusion Criteria
Patients aged 60 years and above with hemoglobin (Hb) <13gm% in males and <12 gm% in females, as per World Health organization(WHO) definition of anemia[7]admitted in Medicine ward.

Exclusion Criteria
1. Patients not willing to participate in the study,
2. History of blood transfusion in the past 3 months and
3. Patients on treatment with hematinics.

The study participants were selected through convenience sampling. Study variables such as age (completed years),sex, BMI(Kg/m2), history of alcoholism, diabetes mellitus, hypothyroidism and hypertension were recorded as independent variables. Outcome variables for the study included1) Presenting complaints, 2) Clinical findings and 3) Complete hemogram with peripheral smear. Routine investigations for liver function, kidney function, thyroid function, USG whole abdomen, chest X- ray, reticulocyte count were done for all patients. Iron profile, stool for routine and occult blood, UGI endoscopy and bone marrow study were done when indicated by the overall clinical picture of the patients.

Classification of anemia:

Categories	Hb% (Male)	Hb% (Female)
Mild	11-12.9	11-11.9
Moderate	8-10.9	8-10.9
Severe	<8	<8

Macrocytic anemia: When MCV >100 fl
Normal Red cell count:
Men:4.5-5.9×1012 /L
Women:4.5-5.1×1012/L
Hemoglobin:
Men:14.0-17.4gm/dl
Women: 12.3-15.3 gm/dl
Packed cell volume
Men :0.415-0.504
Women :0.36-0.45
MCV:80-96 fL
MCH:27.5-33.2pg
MCHC :33.4-35.5gm/dl
Platelet count:150-450×109/L

Iron deficiency anemia(IDA) was diagnosed by reduced hemoglobin, increasedred cell distribution wide (RDW), presence of microcytic hypochromic RBCs in peripheral smear. It is confirmed by serum ferritin < 15μg/L, Serum iron <30μg/dl, total iron binding capacity(TIBC) >360μg/dl and percent saturation<10%.Megaloblastic anemia was diagnosed when peripheral smear showed macrocytic anaemia with megaloblastic features along with MCV more than 100fL.[7]

Statistical Analysis: The collected data was analyzed using IBM SPSS version 21. Chi square and Fischer exact test was used to check association between the final diagnosis of anemia and p value <0.05 was taken statistically significant.

Ethics: The ethical approval was taken from the Research Ethics Board (Ref. No. A/206/REB-Comm(SP)/RIMS/2015/702/44/2020), RIMS, Imphal. Written informed consent was obtained from the study participants before data collection.

RESULTS

Among 123 patients, the mean ± SD age was 67.6 ± 6.6 years. The median age of the study participants was 66.0 years, with a minimum of 60 years and a maximum of 90 years. Four-fifth of them were in 60-70 years age group (77.2%). More than half of the elderly with anemia (53.7%) were of male gender with M:F ratio of 1.2:1. Based on body mass index (BMI), 38.2%were underweight, 30.8% had normal BMI, 17.8% were overweight and 13% were obese.
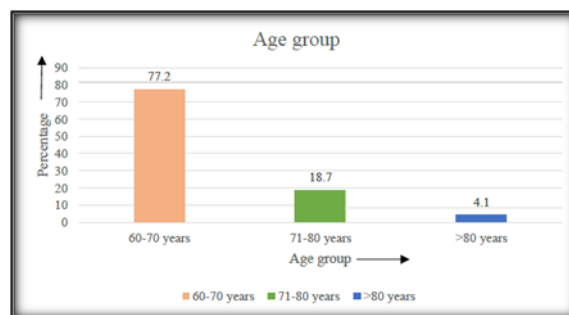
Figure 1. Age distribution of the elderly with anaemia (N= 123)
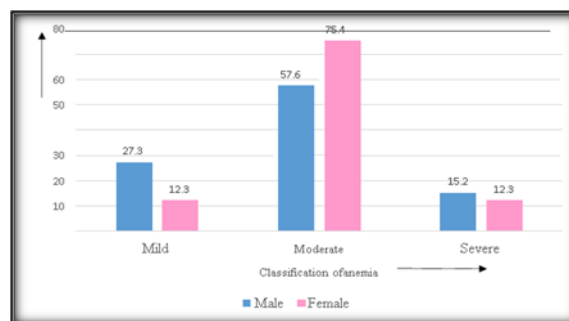
Figure 2: Classification of anemia according to gender (N=123)

Majority of the anemia was in moderate category that is 8-10.9 gm/dl, both for male and female groups (male = 38, 57.6%, female = 43, 75.4) as shown in [Figure 1].

In our study alcoholism history was present in 34.9%, 17.9%haddiabetes mellitus, 22% had hypertension and 3% had hypothyroidism as co-morbidities.

The systemic involvement according to the chief complaint included maximum of non-specific findings (44.7%) comprising of generalized weakness/ fatigue, palpitation, headache, fever and pedal edema as shown in [Table 1].

Most common general physical examination finding in our study was pallor (63.4%) followed by edemaas shown in [Table 2].

Peripheral smear examination showed majority of normocytic normochromic anemia picture (43.9%) followed by macrocytic anemia (28.5%) as shown in [Figure 2].

The hematological parameters of elderly with anemia as found in our study, expressed in mean (±SD) is shown in [Table3].

The final diagnosis of the elderly with anaemia included anaemia of chronic disorder in maximum cases (52.8%), iron deficiency anaemia in 31 patients (25.2%), nutritional anaemia in 13 patients (10.5%), anaemia due to blood loss in 6.5% and remaining were due to hematological conditions (5%) which included acute myeloid leukemia (3patients), multiple myeloma (2patients) and myelodysplastic syndrome(1patient). Male patients were found to have significantly more number of hematological condition compared to female gender (p=0.03) in our study. Iron deficiency anaemia was significantly higher among those who were 60 to 70 years (p=0.02) and hematological conditions was also significantly higher among those with more than 70 years (p=0.03) as shown in [Table 4].

Most common etiology of anemia of chronic disease was found to be chronic kidney disease 44.6%(n=29) among other causes found after being work up as shown in [Figure 3].

Table 1: Systemic involvement according to the chief complaint of the elderly with anemia (N=123)

Systemic involvement	Frequency (n)	Percentage (%)
Non- specific	55	44.7
Musculoskeletal	8	6.5
GIT	27	22.0
Renal	6	4.9
Hepatobiliary	3	2.4
CNS	12	9.8
Respiratory	12	9.8

Table 2: General physical examination (GPE) findings in elderly with anemia(N=123)

GPE Findings	Frequency	Percentage
Pallor	78	63.4
Icterus	12	9.75
Lymphadenopathy	4	3.25
Oedema	21	17
Koilonychia	2	1.6
Glossitis/cheilitis	10	8.1

Table 3: Hematological parameters for the elderly with anemia (N= 123)

Hematological parameters	Mean (± SD)	Median	Minimum	Maximum
Hb	8.1 (±1.6)	8.3	3.8	11.3
PCV	26.1 (±7.6)	25.0	10.3	69.5
MCV	81.6 (±16.8)	80.0	19.0	133.0
MCH	26.9 (±6.9)	28.0	15.2	50.0
MCHC	31.2 (±3.6)	32.5	18.0	37.8
RDW	19.3 (±4.3)	18.8	13.0	31.7
RBC	3.1 (±0.9)	3.1	0.7	5.4
Platelet count	2.6 (±1.1)	2.6	0.1	6.6
Reticulocyte count	1.7 (±1.1)	1.6	0.4	6.5

Table 4: Association between the final diagnosis and age group of the patients (N=123)

Final diagnosis	Age group			p-value
	60 to 70years, n(%)	71 to 80years, n(%)	>80years, n (%)	
Anemia of chronic disorder				0.18*
Yes	54 (83.1%)	10 (15.4%)	1 (1.5%)	
No	41 (70.7%)	13 (22.4%)	4 (6.9%)	
Blood loss				0.42*
Yes	5 (62.5%)	3 (37.5%)	0	
No	90 (78.3%)	20 (17.4%)	5 (4.3%)	
Iron deficiency anemia				0.02*
Yes	23 (74.2%)	4 (12.9%)	4 (12.9%)	
No	72 (78.3%)	19 (20.7%)	1 (1.1%)	
Nutritional deficiency				0.99*

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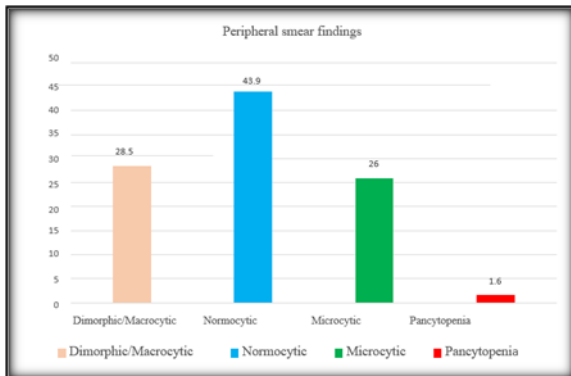|				
Yes	11 (84.6%)	2 (15.4%)	0	
No	84 (76.4%)	21 (19.1%)	5 (4.5%)	
Hematological conditions				0.03*
Yes	2 (33.3%)	4 (66.7%)	0	
No	93 (79.5%)	19 (16.2%)	5 (4.3%)	

*Fischer exact test

Figure 2: Anemia characterization based on peripheral smear findings (N=123)
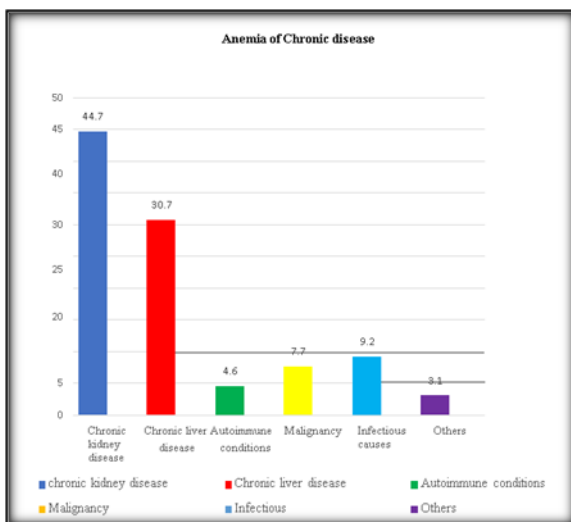

Figure 3: Distribution of elderly patients with anemia of chronic disease according to etiology (N=65)

DISCUSSION

Anemia in elderly persons is an emerging global health problem for the 21st century. Our study found that among 123 elderly patients with anemia, the mean ± SD age was 67.6 ± 6.6 years. This finding was in accordance with life expectancy in India according to Census 2011 and census population projection report 2021 where life expectancy at birth in 2022 is 69.4 years for men and 72.7 years for women.[3,8,9] More than half of the elderly with anemia (53.7%) were of male gender with M:F ratio of 1.2:1. Buden et al,[10] Manju et al,[11] showed M:F ratio as 1.6:1, 1.3:1 respectively. However, studies conducted by Talukdar et al,[12] Rogrig et al,[13] had shown female preponderance (F:M=1.9:1), 67.5% respectively. Our study reported that majority of anemia were in moderate category in both the genders. Study by Gangadharan et al,[14] found that men had predominantly mild anemia while in

women moderate anemia was more common. Based on BMI, most patients were in underweight group (38.2%), which is in concordance with study done by Ni W et al,[15] showing relationship of anemia with various nutritional deficiencies. Alcoholism was present in 34.9% of patients. This is comparable with study done by Sharma et al.[16] Alcohol is directly toxic to the bone marrow, which contains the precursors of all blood cells, as well as to the mature cells circulating in the bloodstream. Long-term excessive alcohol consumption can interfere with various physiological, biochemical, and metabolic processes involving the blood cells causing anemia, an increased risk of serious bacterial infections and impaired blood clotting and fibrinolysis, which can cause excessive bleeding. These direct effects may be exacerbated by the presence of other alcohol-related disorders, such as liver disease and nutritional deficiencies.[17] Among our subjects, 17.9% had diabetes mellitus and 22% had hypertension. Persons with diabetes mellitus and hypertension are at increased risk of developing anemia because of an increased damage to cells and vascular architecture of renal tubular-interstium, systemic inflammation, autonomic neuropathy and the induction of inhibitors of erythropoietin release.[18]

In our study, we found that the systemic involvement according to the chief complaint of the elderly with anaemia were non-specific (44.7%). Similar findings were reported in a study conducted by Vojjala et al,[19] where most common presentation was generalized weakness, respiratory, CNS, renal causes. Our study found that the most common general physical examination finding was pallor (63.4%) followed by oedema which constitute 17%, among others. Similar findings were seen in study done by Sharma et al,[16] in which pallor was noted in 84% and peripheral oedema in 21.9% and glossitis in 8.1%. In our study the haematological parameters expressed in mean (±SD) included the following, where Hb was 8.1 (±1.6), PCV was 26.1 (±7.6), MCV was 81.6 (±16.8), MCH was 26.9 (±6.9), MCHC was 31.2 (±3.6), RDW was 19.3 (±4.3), RBC was 3.1 (±0.9), platelet count was 2.6 (±1.1), reticulocyte count was 1.7 (±1.1). Study by Humaney NR et al,[20] showed comparable finding. The characteristics of anemia on peripheral smear in our study showed, majority were normocytic (43.9%), comparable to the result seen in the study conducted by Bhasin et al,[21] where majority of the patients had normocytic blood picture (62%), microcytic among 20% and pancytopenia among 2% of the patients. It is noteworthy to mention that anemia of chronic disease or disorder is the most

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common anemiainelderly. This type of anemia associated with a number of conditions, such as acute infections, chronic infections (e.g., tuberculosis), chronic inflammatory disorders (e.g., rheumatoid disease and osteoarthritis), and malignancy.[22]Our study also reported a similar finding of anemia of chronic disorder (52.8%) being most common followed by iron deficiency anemia in 31patients (25.2%).The pathophysiology of anemia of chronic disease (ACD) is multifactorial. There is an increase of pro-inflammatory cytokines such as Interleukin-1 (IL-1), tumour necrosis factor-α (TNF-α), IL-6, IL-10 and Interferon-γ (IFN-γ), which interfere with the iron homeostasis, decrease circulating iron, inhibit the production of erythropoietin (EPO) by the kidney thereby inhibiting erythropoiesis. Also, IFN-γ, TNF-α and IL-1 directly inhibit erythropoiesis by reducing the proliferation and differentiation of erythroid progenitor cells. An impaired induction of EPO by low hemoglobin levels has been described in an inflammatory milieu. Hepcidin production, which is stimulated by IL-6 in the liver,leads to the internalization of the iron transporter ferroportin and thus inhibits iron release from macrophages and from the duodenal enterocyte, the latter resulting in decreased gastro-intestinal absorption of iron. The second most common is iron deficiency anaemia (IDA). IDA is most frequently due to poor diet, chronic, often occult blood loss in the gastro-intestinal tract, and is related to conditions such as oesophagitis, gastritis, gastric or duodenal ulcers, colon cancer, diverticulosis andangiodysplastic lesions. Chronic blood loss originating from sources outside of the gastrointestinal tract is less common and gynaecological losses occur only exceptionally in elderly women.Vitamin B12 (cobalamine) and folate deficiencies are common in elderly persons and become more prevalent with rising age. In the Framingham study, a prevalence of 12 % of vitamin B12 deficiency was found for the elderly living in the community, while folate deficiency seemed to be less frequent. Both the deficiencies cause a macrocytic anaemia, explained by the inhibition of the proliferation of erythroid progenitor cells. Macrocytosis reduces the lifespan of the red blood cells. Folate deficiency is almost always due to an inadequate dietary intake (often related to the thermolability of folate) whereas vitamin B12 deficiency in elderly persons,is most frequently (in 60 to 70 % of the cases) related to a food-cobalamin malabsorption syndrome,while the more classical pernicious anemia is less commonly seen (15 to 25 % of the cases).[23]Malignant hematological disorders like myelodysplatic syndrome, myeloma, chronic lymphoproliferative disorder, chronic myeloproliferative disorder, and lymphoma are common in older age.16 Male patients were found to have significantly more of hematological condition compared to female gender (p=0.03). Iron deficiency anaemia was significantly higher among those who were more than 80 years (p=0.02) and

hematological conditions was also significantly higher amongthose with more than 70 years (p=0.03). However, there was no association between anemia of chronic disorder, blood loss, iron deficiency anemia (IDA) or nutritional deficiency with gender and age group of the elderly patients. Our study found that chronic kidney disease was the most common etiology for anemia of chronic disease (44.6%,n=29) similar to the finding of study done by Manjunath F et al(45%).[24]The function of the kidneys is impaired in the elderly, more so in patients with hypertension and diabetes mellitus regardless of the presence of recognized disease. The NHANES III study shows that levels of hemoglobin start to decline, usually with GFR under 70 mL/min in men and under 50 mL/min in women. Furthermore the incidence of anemia with hemoglobin levels below 11 g /dL increases in patients with GFR levels below 30 ml/min/1.73 m2. A decreased level of erythropoietin (EPO) in the serum plays a principal role in anemia associated with impaired renal function.[25]

Limitation of the Study

One of the limitations of the study is relatively lesser sample size hence the issue of generalization. The possibility of underestimation and overestimation cannot be ruled out and hence it is advised to interpret the finding based on clinical significance. Longitudinal study with larger sample size will help us increase the robustness of the study.

CONCLUSION

Anemia in geriatrics still remains under reported and inadequately investigated despite the modern diagnostic advances, especially when mild. It necessitates evaluation as majority have an underlying treatable cause of anemia. The routine screening and individual assessment of etiological causes of anemia in the elderly will allow timely initiation of optimal and appropriate treatment for the improvement in overall outcome and quality of life of geriatric patients.

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