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Geriatric Medicine

Anemia in Ageing Population – A Study on the Types of Anemia in Older People

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Abstract **Original Research Article**

Objectives: To estimate the prevalence of different types of anemia in older anemic patients. ***Methods:*** In this cross-sectional observational study, 93 older subjects aged 65 and above diagnosed to have anemia based on the WHO criteria were selected to participate. Various investigations were done to find out the types of anemia in these older anemic subjects. ***Results:*** Of the 93 anemic older subjects aged 65 and above, 55 were males and 38 were females. The mean age of the study population was 70.1 years. In this study moderate anemia was seen in 59.1% of the study population. In this study we did not find any association between age and severity of anemia. We did not find any association between gender and severity of anemia. Of the 93 anemic patients, 30.1% had anemia of chronic inflammation, 35.5% had nutrient deficiency anemia, 9.7% had anemia of chronic renal insufficiency, 11.8% had unexplained anemia, 5.4% had anemia due to hematological malignancy and 7.5% had anemia in various combinations. Infections and inflammatory joint disease were the common associated causes in anemia of chronic inflammation. Renal disease was seen in 13 subjects with anemia. 19.4% of the study subjects had gastrointestinal causes. Iron deficiency anemia was the common among those with gastrointestinal lesion. ***Conclusion:*** In this study nutrient deficiency anemia was common followed by anemia of chronic inflammation in older people. 19.4% of the study subjects had gastrointestinal causes of anemia indicating the necessity of gastrointestinal evaluation in older anemic patients.

Keywords: Anemia, Older, nutrient deficiency anemia, Unexplained anemia, Anemia of chronic inflammation.

INTRODUCTION

Anemia is a common problem in the older people and is often overlooked. It is usually diagnosed during the workup of other conditions. With ageing the capacity to produce new blood cells is reduced. Apart from this, qualitative defects in the functions of red blood cells due to ageing and age associated diseases also occur. The WHO defines anemia as a hemoglobin concentration of less than 13g /dl in men and less than 12g/dl in women [1]. When compared with younger adults, the hemoglobin values of older people vary a little. Thus, there are no separate diagnostic criteria for older people. The prevalence of anemia increases with age and the prevalence are higher in men as they age. The prevalence of anemia is more common in the institutionalised elderly than in the community dwelling elderly. In older people anemia is often a comorbid condition associated with other medical conditions affecting the prognosis. In older people the consequences of anemia are functional impairment, loss of mobility, frequent hospitalisation, worsening of comorbidities, and delayed recovery from illness, reduced quality of life and increased mortality. In younger adults, the cause of anemia is usually apparent but in older people, discerning the cause of anemia is often challenging Though there are many studies on anemia in women and children, less importance is given to anemia in older people. Hence, we took up this study to estimate the prevalence of different types of anemia in older people.

MATERIALS AND METHODS

This cross sectional, observational study was conducted in the outpatient clinic and in-patient ward of the Department of Geriatric medicine, Madras Medical College and RGGGH, Chennai, from June 2012 to December 2012. Ethical committee clearance to conduct the study was obtained from institutional ethical committee of Madras Medical College, Chennai. The inclusion criteria of the study were older people aged 65 and above with Hemoglobin levels <12d g/dl in women and Hemoglobin levels < 13g/dl in men according to the WHO criteria for diagnosing anemia. Critically ill patients were excluded from the study. 93 subjects fulfilling the WHO criteria for anemia were selected to participate in the study. Both sexes were

included in the study. A written consent was obtained from the study participants. Detailed history and clinical examination were performed. Using a sterile syringe, 10 ml of venous blood was drawn under aseptic precaution from the study participants. Various investigations such as total count, differential count, platelet count and red cell indices such as mean corpuscular volume, mean corpuscular hemoglobin concentration, packed cell volume, erythrocyte sedimentation rate, and reticulocyte count were performed. Renal function test was performed. Renal failure was defined as serum creatinine >1mg/dl. With the blood sample peripheral smear study was done. Serum ferritin assay as a measure of iron stores was done. Bone marrow aspiration was done in patients with blood smear showing immature white cells, nucleated red cells and in patients with severe anemia, intermediate iron stores and unexplained anemia. To evaluate the gastro intestinal causes of anemia, stool occult blood was done. Upper Gastrointestinal endoscopy was done. Colonoscopy was done in patients with stool occult blood positivity with normal Upper Gastrointestinal endoscopy. Iron deficiency anemia was considered if the subject had serum ferritin concentration below 20ng/ml, serum iron concentration of ≤45µg/dl. Vitamin B12 and folate assays were carried out in patients with macrocytic anemia and in patients with dimorphic picture in peripheral smear study. Vitamin B12 deficiency was defined as serum B12 concentration less than 180 pg/ml. Folate deficiency was defined as serum folate concentration less than 2.6 ng/ml. Serum electrophoresis was done in subjects with abnormal renal function test to rule out multiple myeloma. To rule out haemolysis, serum LDH, direct coomb's test and serum bilirubin were done. To analyse the data SPSS (IBM SPSS Statistics for Windows, Version 23.0, Armonk, NY: IBM Corp. Released 2015) was used. The Significance level was fixed as 5% ($\alpha = 0.05$).

RESULTS

Of the 93 anemic older subjects, 55 were males and 38 were females. The mean age of the study population was 70.1 years. Having WHO criteria as the basis, the prevalence of severity of anemia was assessed in the study subjects. Those having haemoglobin levels <8g/dl were categorised as having severe anemia. Those having haemoglobin levels between 8- 10.9 g/dl were categorised as having moderate anemia and those having haemoglobin values between 11- 11.9g/dl in women and 11-12.9g/dl in men were categorised as having mild anemia. Of the 93 subjects, 8 (8.6%) had mild anemia, 55 (59.1%) had moderate anemia and 30(32.3%) had severe anemia. This is shown in figure–1.

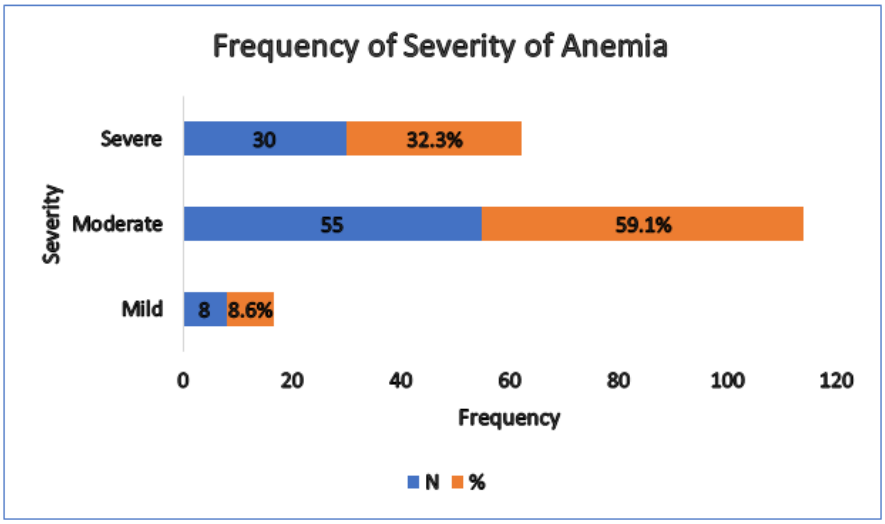

Fig-1

The mean age of the mildly anemic subjects was 69.50 years, moderately anemic was 70.73 years and severely anemic was 69.17 years. one-way ANNOVA was used to compare the mean age between severity levels. We found no association between age and severity of anemia (p= 0.286). This is shown in table – 1.

Table-1: Age and severity of anemia

Severity	N	Mean Age	Std. Dev	p-value
Mild	8	69.50	4.140	0.286
Moderate	55	70.73	4.716	
Severe	30	69.17	4.044	
Total	93	70.12	4.479	

There was an observed difference in the severity of anemia between older men and older women. 34.6% of males and 29% of females had severe anemia. When Chi square test was applied to compare the proportions between gender and severity, we found no association between gender and severity (p=0.175). This is shown in table- 2.

Table-2: Gender and severity of anemia

Severity	Gender						p value
	Male		Female		Total		
	N	%	N	%	N	%	
Mild	7	12.7	1	2.6	8	8.6	0.175
Moderate	29	52.7	26	68.4	55	59.1	
Severe	19	34.6	11	29	30	32.3	
Total	55	100.0	38	100.0	93	100.0	

We assessed prevalence of types of anemia in the study subjects. 30.1% of the study population had anemia of chronic inflammation (ACI), 9.7% had anemia of chronic renal insufficiency and 35.5% had nutrient deficiency anemia. In the nutrient deficiency anemia group, three fourths had iron deficiency anemia. Iron deficiency anemia was seen in 26.9%, vit B12 deficiency was seen in2.2%, folate deficiency in 1% and a combination of iron deficiency and B12 deficiency anemia in 5.4%. Unexplained anemia was seen in 11 subjects constituting about 11.8% of the study population. 5 subjects had hematological malignancy constituting about 5.4% of the study population. 5 subjects had haematological malignancy constituting about 5.4% of the study population. Of the 5 having hematological malignancy 3 had myelodysplastic syndrome constituting about3.2% of the study population and 2 had leukemia constituting about 2.2% of the study population. 7 subjects had anemia in various combinations constituting about 7.5 % of the study population. The combinations include anemia of chronic inflammation with iron deficiency in 3 subjects, anemia of chronic renal insufficiency with anemia of chronic disease in 1subject and anemia of chronic renal insufficiency with iron deficiency anemia in 3 subjects. This is shown in Table-3 and Figure-2.

Table-3: Prevalence of types of anemia

Anemia type	All Anemia (N)	All Anemia (%)
Nutrient deficiency		
Iron only	25	26.9
B_{12} only	2	2.2
Folate only	1	1
Iron and B_{12}	5	5.4
Disease related not nutrient deficiency		
Anemia of chronic inflammation	28	30.1
Anemia of chronic renal insufficiency	9	9.7
Unexplained anemia	11	11.8
Myelo dysplastic syndrome	3	3.2
Myelo proliferative syndrome	2	2.2
Anemia in combinations		
ACI and iron deficiency anemia	3	3.2
ACI and anemia of chronic renal insufficiency	1	1.1
Anemia of chronic renal insufficiency and iron deficiency anemia	3	3.2
Total	93	100

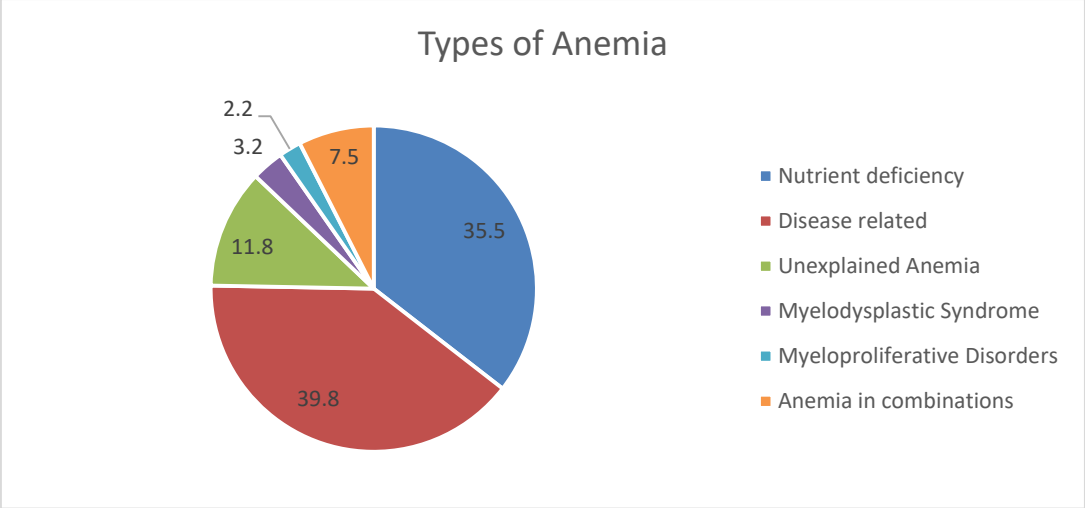

Fig-2

We observed the causes of anemia in the study subjects. Of them 13subjects had elevated renal parameters. Of the 11unexplained anemia subjects, 9 had no identifiable cause and 2 had associated cardiac problems. In subjects with anemia of chronic inflammation, 12 had infections, 8 had arthritis and 4 had associated malignancy. The other associated causes include stroke, decompensated liver disease and hypothyroidism. This is shown in table-4.

Table-4: Anemia and its associated conditions

Disease	Anemia of chronic inflammation	Iron deficiency	Anemia of chrnic renal insufficiency	unexplained	Anemia in combinations	Total
	N	N	N	N		N
CVA	1	0	0	0		1
DCLD	3	0	0	0		3
Hypothyroidism	1	0	0	0		1
Infections	12	0	0	0		12
Arthritis	7	0	0	0	1	8
Malignancy	3	0	0	0	1	4
Cardio vascular disease	0	0	0	2		2
Renal	0	0	9	0	4	13
hemmorhoids	0	3	0	0	0	0

19.4% of the study population had gastrointestinal lesions. Stool occult blood was done in all the subjects. 8 subjects (8.6%) had stool occult blood positive. Upper gastrointestinal endoscopy was done in all the subjects.13 subjects (13.9%) had demonstrable upper gastrointestinal lesion. Haemorrhoids were seen in three subjects. Colonoscopy was done in subjects with stool occult blood positivity and negative upper GI endoscopy. 2 subjects (2.1%) had colonic polyp. Iron deficiency anemia was common among those with gastrointestinal lesion. Of the 25iron deficiency anemia subjects, 6 had upper gastrointestinal lesion constituting about 24% of iron deficiency anemia and 2 had lower gastrointestinal lesions, constituting about 8% of iron deficiency anemia. This is shown in table-5.

Table-5: Upper Gastro intestinal Endoscopy and colonoscopy findings in different types of anemia

Endoscopy findings	Iron deficiency anemia	Anemia of chronic inflammation	Anemia of chronic renal insufficiency	Iron +B12 deficiency anemia	Iron deficiency+ ACI
Gastritis			2		1
Duodenitis	1				
Post gastrojejunostomy ulcer				2	
Gastric ulcer	3				
Duodenal ulcer	1				
Colonic polyp	2				
Varices		2			
Hook worm	1				
Total	8	2	2	2	1

DISCUSSION

In this study moderate anemia was seen in 59.1% subjects and severe anemia was seen in 32.3%subjects. A study by Guralink *et al*. found that severe anemia was seen in less than 1% of community dwelling older adults [2]. Since our study is a hospital-based study, we found a greater number of older people with moderate and severe anemia.

In this study, anemia of chronic inflammation was seen in 30.1% of the study population. In a study by Ferrucci *et al*. the prevalence of anemia of chronic inflammation in the community dwelling older persons was 24.4% [3].

In this study we grouped iron deficiency anemia, vitamin B12 deficiency and folate deficiency anemia as nutrient deficiency anemia. In this study the nutrient deficiency anemia was seen in 35.5% of the study subjects. Nutrient deficiency anemia was prevalent in 34.3% according to the Third national health and nutritional survey [4]. The results of our study in this aspect are consistent with the findings of the Third national health and nutritional survey. According to the Third national health and nutritional survey, the prevalence of iron deficiency anemia was 16.6%, folate deficiency was 6.4%, B12 deficiency was 5.9%, iron with folate or B12 deficiency or both was 3.4% [4]. In our study, Iron deficiency anemia was seen in 26.9%. According to a study by Yildizhan *et al*. the prevalence of iron deficiency anemia in older persons in the community was 40.5% [5]. In our study the prevalence of folate deficiency was 1%. A study by Yilidirim *et al*. showed the prevalence of folate deficiency was 1% [6]. A study by Clarke *et al*. showed a prevalence of B12 defecincy anemia was 6.1% [7]. In our study the prevalence of B12 deficiency anemia was 2.2%.

In our study the prevalence of anemia of chronic renal insufficiency was 9.7%. According to the NHANES III study the prevalence of anemia of chronic renal insufficiency was 8.2% [4].

Myelodysplasia as a cause of anemia was seen in 3.2% of the anemic subjects in this study. A study by Joosten *et al*. showed myelodysplasia was the cause of anemia in 5% of the study subjects [8].

No obvious cause for anemia was found in 17% of cases in a study conducted by Joosten *et al*. [8]. In our study 11.8% of subjects had unexplained anemia.

In a study conducted by Rockey *et al*. gastrointestinal causes in those with iron deficiency anemia were evaluated and found upper gastrointestinal lesions in 25%, lower gastrointestinal lesions in 37%, and lesion in both sites in 1% [9]. In our study we found that 24% of iron defecincy anemia subjects had upper gastrointestinal causes and 8% of iron deficiency anemia subjects had lower gastrointestinal causes.

CONCLUSION

This study showed that nutrient deficiency anemia was common among older people and this implies that the proper nutrition of older people can prevent the occurrence of nutrient deficiency anemia. Around one third of patients with iron deficiency anemia had gastrointestinal cause. This indicates that a gastrointestinal evaluation is essential in cases of anemia especially iron deficiency anemia in older people.

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