



A Clinical and Hematological Profile in Geriatric Patients with Special Emphasis on Morphological and Etiological Classification of Anemia in These Patients - A Pilot Study

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Abstract

Introduction: Anemia in geriatric population is a very common problem and if untreated, anemia in elderly age group is associated with impairment of functional capacities, poorer health related quality of life, increased morbidity and mortality. **Purpose:** To study the clinical and anemia profile of geriatric patients and to classify anemia in this age group according to morphology and etiology. **Material and Methods:** After obtaining informed and written consent from patients, each patient's particulars were noted in a structured proforma. This was followed by detailed physical and systemic examination. Complete blood count was done on automated 6-part hematology analyzer XN-1000i (Sysmex Corporation, Kobe, Japan). Peripheral blood smear was stained by Leishman stain and subsequently studied under microscope. Iron studies, serum B₁₂ levels and folic acid levels were estimated as per the protocol of our lab. **Results:** During a period of 2 months, 60 patients aged 60 years and above admitted in our hospital were evaluated for anemia. Male to female ratio was 1:2. The age of our cases ranged from 60 - 87 years with mean age of patient being 64.2 years. Clinically majority of our patients presented with generalized weakness and fatigue (66.6%), followed by dyspnea (36.6%) and fever (33.3%). Majority of our patients presented with moderate anemia (65%) followed by severe anemia (18.33%) and mild anemia (16.67%). Morphologically normocytic anemia (75%) was most common type in our study, followed by microcytic anemia (21.7%) and macrocytic anemia (3.3%). Etiologically, anemia of chronic disease was the most common type followed by iron deficiency anemia and Vitamin-B₁₂ deficiency anemia. **Conclusion:** Keeping in mind the deleterious effect of even mild anemia in geriatric population, an extensive evaluation of anemia in these population is essential so as to make an early diagnosis of potentially treatable cause of anemia.

Key Words

Anemia, CBC, Etiology of anemia, Geriatric population, Morphological classification of anemia

Introduction

Regardless of the underlying cause of the low hemoglobin in elderly, anemia in geriatric population is a very common problem and it is associated with more severe complication in these patients when compared to

younger adults. If untreated, anemia in elderly age group is associated with impairment of functional capacities,

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poorer health related quality of life, increased morbidity and mortality (1,2). Although ageing may have effect on blood production with increased ratio of fat cells in marrow which leads to decrease in the volume of hematopoietic cells, folic acid, vitamin B12 and iron levels, however anemia in geriatric age group is always associated with disease process and not because of physiological process of ageing (3).

As described by the World Health Organization, anemia is present when hemoglobin level is less than 12gm% in females and less than 13gm% in males (4). The prevalence of anemia ranges from 8% to 44% in different sections of geriatric population (5). According to Third National Health and Nutritional Examination study (NHANES-III) of USA, anemia is seen in around three million peoples in age group of 65 years and above with prevalence of anemia ranges from 10.2% of females to 11% of males in this age group (3,6). Furthermore, the prevalence of anemia increases to 40-50% in hospitalized geriatric patients (7). Etiologically, nutritional deficiency anemia and anemia of chronic disease is responsible for around two third cases of anemia in geriatric age group with anemia of unknown etiology or unexplained anemia is responsible for rest one third of the cases (1,3,8).

Under diagnosis of anemia is very common in geriatric patients because symptoms associated with anemia like weakness, lethargy, fatigue, shortness of breath etc. may sometime be due to aging process itself (9), and even mild anemia in elderly patients lead to increased morbidity and mortality. When anemia is associated with chronic diseases, which are common in our country like tuberculosis, bronchiectasis, pneumonia, ischemic heart diseases etc., it leads to increased morbidity in older patients (3). Although many studies are available regarding the prevalence of anemia in high-risk groups like children, pregnant and lactating women. Very few studies regarding hematological profile and types of anemia in geriatric age group is available from different parts of India and no reliable data on anemia in geriatric patient is available for Delhi region.

Keeping in mind the negative effect of even mild anemia on functional status and quality of life in geriatric age group and paucity of studies from our region, we plan to conduct this study to know the clinical, hematological and anemia profile of all patients aged 60 years and above who were admitted in our hospital. We classified various types of anemia on the basis of their morphology and etiology which will leads to early treatment of cause of anemia. The aim of our study was to evaluate the clinical

and hematological findings in geriatric patients with the following objectives: a) To study the clinical presentation of geriatric patients admitted to our hospital; b) To classify anemia in this age group according to morphology of red blood cells (Morphological classification of anemia); and c) To classify anemia in geriatric patients according to their cause (Etiological classification of anemia).

Material and Methods

All patients aged 60 years and above who attended outdoor patient department (OPD) and admitted in various wards in a period of two months were enrolled in this prospective cross-sectional study done at our hospital. Self-designed structured Proforma was used as a study tool. After obtaining informed and written consent from patients, each patient's particulars were noted along with chief complains, history of present illness, past illness, family history, dietary history, history of any drug intake, history of any chronic disease, history of previous surgery in a structured proforma. This was followed by detailed physical and systemic examination.

Hematological parameters were recorded in all patients, which include Complete blood count (CBC), Peripheral blood smear examination (PBS) and Iron studies. CBC includes Hb level, Total red blood cell count (TRBC), Total leukocyte count (TLC), Differential leukocyte count (DLC), Platelet count, Packed cell volume (PCV) and Red blood cell indices like Mean corpuscular volume (MCV), Mean corpuscular hemoglobin (MCH) and Mean corpuscular hemoglobin concentration (MCHC). CBC was done on automated 6-part hematology analyzer XN-1000i (Sysmex Corporation, Kobe, Japan). PBS was stained by Leishman stain and subsequently studied under microscope. Iron studies include Serum iron, Serum ferritin level and Total iron binding capacity (TIBC). The supporting biochemical parameters like Serum B12 levels and Folic acid levels were estimated as per the protocol of our lab.

Definition of Anemia:

- I. Hb level < 12g/dL in women
- II. Hb level < 13g/dL in men
- III. Severity of Anemia:
 - a. Mild Anemia: Hb level 11-11.9g/dL in women and 11-12.9g/dL in men
 - b. Moderate Anemia: Hb level 8-10.9g/dL
 - c. Severe Anemia: Hb level < 8g/dL
- IV. Morphological Classification of Anemia:
 - a. Microcytic Anemia: MCV < 80 fl



- b. Normocytic Anemia: MCV 80-100 fl
- c. Macrocytic Anemia: MCV >100 fl
- V. Iron Deficiency Anemia:
 - a. Low serum iron (lower than 50µg/dl in women and 60µg/dl in men)
 - b. Low ferritin (lower than 15ng/ml)
 - c. Low transferrin saturation rate (lower than 16%)
 - d. Increased total iron binding capacity (higher than 450 µg/dl)
- VI. Anemia of Chronic Disease:
 - a. Normal or increased ferritin higher than 100 ng/ml
 - b. Transferrin saturation higher than 25% and lower than 50%
 - c. Decreased total iron binding capacity (lower than 250 µg/dl)
- VII. Vitamin B₁₂ Deficiency Anemia: Vitamin B₁₂ level < 200 pg/ml
- VIII. Folic acid Deficiency Anemia: Folic acid level < 3 ng/ml

Results

During a period of 2 months, 60 patients aged 60 years and above admitted in our hospital were evaluated for anemia. Out of 60 geriatric patients, 40 patients were female (67%) and 20 patients were male (33%) with male to female ratio of 1:2. Majority of our patients (75%) belonged to age group of 60-65 years, followed by 8 cases (13.33%) in the age group of more than 70 years and 7 cases (11.67%) in the age group between 66-70 years (Figure 1). The age of our cases ranged from 60-87 years with mean age of patient being 64.2 years. The mean age of male patients was 62.8, while the mean age of female patients was 64.8 years.

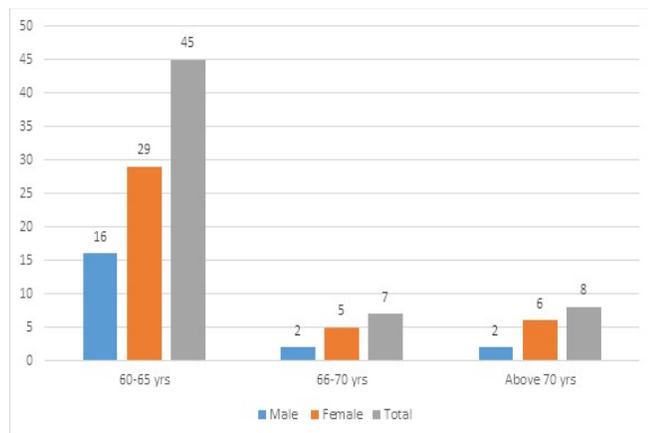


Figure 1: Age and Sex Distribution of Patients

Clinically, majority of our patients presented with generalized weakness and fatigue (66.6%), followed by dyspnoea (36.6%), fever (33.3%), nausea and vomiting (35%), palpitation (26.6%) and pain abdomen (26.6%). The rare clinical presentations were loss of appetite (11.6%), cough (8.3%), chest pain (6.6%), yellowness of eyes (5%) and vertigo (3.3%) (Table 1). However, most of our patients had overlapping symptoms. 16 of our cases were a known hypertensive, while 15 cases were diabetic, which were on medication. Four of our cases had tuberculosis.

We classified severity of anemia into mild, moderate and severe anemia according to WHO guidelines. Majority of our patients (39 cases, 65%) were presented with moderate anemia followed by 11 cases (18.33%) with severe anemia and 10 cases (16.67%) with mild

Table 1: Clinical Presentation of Patients

Symptoms	No. of Patients (%)
Generalised weakness and fatigue	40 (66.6%)
Dyspnoea	22 (36.6%)
Nausea & vomiting	21 (35%)
Fever	20 (33.3%)
Palpitations	16 (26.6%)
Pain abdomen	16 (26.6%)
Polyuria	10 (16.6%)
Body ache	09 (15%)
Constipation	08 (13.3%)
Diarrhoea	07 (11.6%)
Loss of appetite	07 (11.6%)
Cough	05 (8.3%)
Chest pain	04 (6.6%)
Yellowness of eyes	03 (5%)
Giddiness	02 (3.3%)

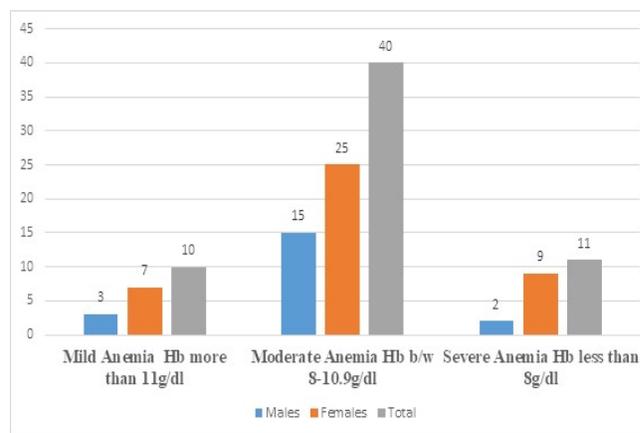


Figure 2: Severity of Anemia in Males and Females

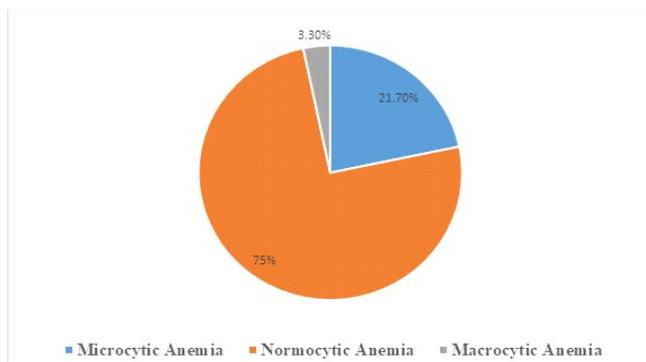


Figure 3: Anemia Characterization Based on RBC Morphology

anemia (Figure 2). Morphological classification of anemia revealed that most of our cases had normocytic anemia (45 cases, 75%) followed by 13 cases (21.7%) of microcytic anemia and only 2 cases (3.3%) of macrocytic anemia (Figure 3). The peripheral blood smears of microcytic anemia revealed presence of hypochromic RBCs along with microcytes and presence of pencil cells in some cases. The blood smear of macrocytic anemia showed presence of macrocytes, macro-ovalocytes and hypersegmented neutrophils. Gender wise analysis showed that out of 45 cases of normocytic anemia, 25 patients were female while 20 patients were male. Out of 13 cases of microcytic anemia, 12 patients were females and only one patient was male. Both the two cases of macrocytic anemia were seen in females.

Etiologically, iron deficiency was seen in all the 13 cases of microcytic anemia with serum ferritin level of less than 15ng/ml. Anemia of chronic disease (ACD) is the cause of all 45 cases of normocytic anemia with serum ferritin level of more than 100ng/ml in all the cases. Out of 45 cases, 15 cases had diabetes, deranged renal function tests with increased serum and creatinine level was noted in 14 patients, while four patients had tuberculosis. In rest 12 cases of normocytic anemia no underlying disease was seen. Both the cases of macrocytic anemia were turned out to be due to vitamin B₁₂ deficiency.

Discussion

As per 2011 population census of India, there are nearly 104 million elderly persons aged 60 years or above in our country, which constitute 8.6% of total population of India. The population of elderly males are 8.2% of total population (51 million), while the population of elderly

females are 9% of total population (53 million), which is slightly more than the elderly male population (10). In Delhi the geriatric population is about 6.8% of total population of Delhi (10). Both communicable and non-communicable diseases are common in geriatric population. Anemia in geriatric population is a very common problem and it is associated with more severe complication in these patients when compared to younger adults. If untreated anemia in elderly age group is associated with impairment of functional capacities, poorer health related quality of life, increased morbidity and mortality (1,2).

In this study out of 60 cases, most were females (66.7%) with male to female ratio of 1:2. Our finding is in contrast to majority of studies conducted from various regions of India. In study done by Prakash *et al.*, the male patients were 64%, while 52% males were there in the study of Bhasin *et al.* (1,6). Tilak *et al.* reported male predominance with M:F ratio of 2.1:1, while Shrivastava *et al.* found 58.7% males in their study (11,9). However, Agarwalla *et al.* in their study reported female predominance (57.9%) (12). Majority of our patients fall in the age group of 60-65 years (75%) with mean age of 64.2 years. Our findings were similar to those reported by Prakash *et al.* (54%) and Tilak *et al.* (70.5%) (1,11). Bhasin *et al.* and Shrivastava *et al.* found majority of their patients in the age group 60-69 years (6,9). Clinically, most of our patients presented with symptoms of generalised weakness and fatigue (66.6%), followed by dyspnoea, nausea and vomiting, fever and palpitation. Our study is in concordance with the study of Prakash *et al.* and Bhasin *et al.*, who also reported fatigue as the presenting symptoms in their patients (1,6).

In our study majority of the patients presented with moderate anemia (65%) followed by severe anemia (18.33%) and mild anemia (16.67%). Our study is in concordance with the study conducted by Raina *et al.* who reported moderate anemia in 72.6% of their cases (3). However, our study was in discordance with the study conducted by Prakash *et al.* and Tilak *et al.* who reported severe anemia in majority of their patients (1,11). Morphological classification of anemia revealed that majority of our patients had normocytic anemia (75%) followed microcytic anemia (21.7%) and macrocytic anemia (3.3%). Prakash *et al.*, Bhasin *et al.*, Shrivastava *et al.* and Tilak *et al.* also reported normocytic anemia as the most common type of anemia morphologically in their study (1,6,9,11). Macrocytic anemia was the least common type of anemia morphologically in our study,

Table 2: Comparative Study from Different Region of India

Authors	Place	No. of Cases	Male	Female	Grading of Anaemia			Morphological Classification of Anaemia		
					Mild	Moderate	Severe	Microcytic	Normocytic	Macrocytic
Bhasin <i>et al.</i> (2011) (6)	Bangalore, South India	100	52%	48%	Not mentioned			30%	62%	6%
Tilak <i>et al.</i> (2013) (11)	Varanasi, North India	139	67.6%	32.3%	9.4%	25.9%	64.7%	10.8%	52.5%	14.4%
Shrivastava <i>et al.</i> (2013) (9)	Bijapur, South India	654	59.9%	40.1%	Not mentioned			11.6%	78.05%	6.02%
Raina <i>et al.</i> (2014) (3)	Jammu, North India	168	54.8%	45.2%	6%	72.6%	21.4%	21.4%	57.2%	21.4%
Prakash <i>et al.</i> (2015) (1)	Bangalore, South India	50	64%	36%	18%	40%	42%	32%	52%	16%
Singh <i>et al.</i> (2016) (13)	Bhopal, Central India	200	62%	38%	67.39%	15.22%	17.39%	31.88%	55.07%	4.35%
Agarwalla <i>et al.</i> (2016) (12)	Assam, North-East India	330	42.1%	57.9%	61.3%	23.27%	15.33%	Not mentioned		
Current study	New Delhi	60	33%	67%	16.7%	65%	18.3%	21.7%	75%	3.3%

seen in only two patients. Our study is in concordance with the study of Prakash *et al.*, Bhasin *et al.* and Shrivastava *et al.*, who also reported macrocytic anemia as the least common type of anemia morphologically, however our study is in discordance with the study of Tilak *et al.* who reported microcytic anemia as the least common type of anemia morphologically (1,6,9,11). The comparative study from different parts of India is tabulated in *Table 2*.

Etiologically, anemia of chronic disease (ACD) was the most common cause of anemia in our study seen in 75% of cases. Prakash *et al.*, Bhasin *et al.*, Shrivastava *et al.* and Tilak *et al.* also reported ACD as most common cause of anemia in their study (1,6,9,11). However, Raina *et al.* reported iron deficiency anemia (IDA) as the most common cause of anemia in their study (3). In our study IDA was seen in 21.7% of cases. Prakash *et al.* reported IDA in 24% of their cases, while Raina *et al.* reported IDA in 21% of their cases which is in concordance with our study, while Tilak *et al.* reported IDA in only 12.3% of their cases which is much lesser than our finding (1,3,11). Vitamin B₁₂ deficiency was seen in only two of our cases (3.3%). Bhasin *et al.* also reported Vitamin B₁₂ deficiency in only 3% of their cases (6).

The main limitation of our study is less number of patients. This is because this STS project of ICMR was of two months duration only. We still need a larger study to validate our findings.

Conclusion

Anemia in geriatric population is a quite common problem. When compared to young adults, anemia in elderly is associated with more severe complication and if anemia in these patients is not treated on time it will leads to poorer health related quality of life, impairment of functional capacities, increased morbidity and mortality. Keeping in mind the progressively increasing number of geriatric population, an extensive evaluation of anemia in these population is essential so as to make an early diagnosis of potentially treatable cause of anemia, so that geriatric population remain considered as a blessing on our society and they should not be treated as burden by the society.

In our study we found normocytic anemia as the most common type of anemia morphologically. ACD was the most common cause of normocytic anemia in these patients, thus prevention as well as early diagnosis of these chronic disease helps us in eliminating increased incidence of anemia in geriatric population. However our sample size is small and an extensive work on this with increased number of patients are required to further augment the learning of anemia profiles in geriatric patients.

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Conflicts of Interest

There are no conflicts of interest.

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