International Journal Dental and Medical Sciences Research
Volume 3, Issue 3, May - June 2021 pp 96-102 www.ijdmsrjournal.com ISSN: 2582-6018

Correlation of Severity of Anemia with Hematological Profile in Geriatric Population

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Submitted: 01-05-2021 Revised: 18-05-2021 Accepted: 22-05-2021

ABSTRACT: Anemia is a global public health problem, increasing in incidence as age advances. It is an emerging risk factor in elderly population greatly affecting their performance status and quality of life. Every case of Geriatric anemia must be thoroughly investigated as it might be a harbinger of an underlying serious disorder. The purpose of this study was to assess the various types and etiological causes of anemia in geriatric population
(>65yrs). A total of 250 elderly patients above the age of 65, visiting the General Medicine out patient and in patient department at Rajarajeswari Medical Hospital were included in the study. Detailed history, examinations and investigations were done as per pre-designed proforma. Prevalence of anemia was more in elderly males (59.2%) with majority having moderate anemia. 36.8% of the patients were diagnosed with iron deficiency anemia followed by 20.8% of the patients who were diagnosed with anemia of chronic disease. Normocytic normochromic (65%) followed by microcytic and hypochromic (29.9%) were the most common peripheral smear pictures in our study. Easy fatigability, the most common presenting complaint is often overlooked as being age related. Geriatric anemia is a disease that often goes unreported and hence every effort should be made to identify the disease and evaluate the cause. It should not be ignored as merely being a consequence of ageing, as it can be the cause for higher morbidity in elderly.

Keywords: Geriatric Anemia, Anemia in Elderly,Iron Deficiency, Anemia of Chronic Disease, PeripheralSmear.

I. INTRODUCTION

Anemia is a state of decreased oxygen carrying capacity of blood wherein the hemoglobin count is less than 13g/dl in men and less than 12g/dl in non-pregnant women as per WHO reference standards[(1).] Anemia, being a major concern in the elderly population with a reported prevalence of 8%-44% [(2,5)]can greatly hinder the quality of life, cause increased morbidity, fatigue, depression, dementia and higher risk of falls [(6-13)].

Although anemia is a condition that commonly manifests in the geriatric population, the typical symptoms like fatigue, weakness and dyspnea are often easily overlooked as age related. **Anemia in elderly can cause worsening of underlying chronic illness like congestive heart failure, cognitive impairment, hepatitis, vascular disease etc.,**

Screening for anemia in elderly is not practiced commonly. It is typically discovered during a workup for other conditions, when many of its deleterious effects may have already occurred. Anemia in elderly is an underappreciated common problem and may indicate a serious underlying disorder. Every case of geriatric anemia should be thoroughly investigated so that a definite diagnosis can be made and appropriate treatment can be instituted.

Aim: With the above thought in mind, the study was conducted to evaluate the severity of anemia and correlate the same with the hematological parameters in geriatric population.

II. MATERIALS AND METHODOLOGIES

This study was conducted by the department of General Medicine at Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, India. A total of 250 patients, both male and female who were above the age of 65, admitted in the medicine wards and those attending the General Medicine OPD were included in the study.Seriously ill patients, clinically unstable patients, known case of anemia who are taking hematinics and patients who did not give their consent for the study were excluded from this experiment. The data was collected over a period of one year for this study.

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We calculated the sample size with respect to the sample size formula:

$$N = Z^2 * p * (1-p) / MOE^2$$

where, N = population size; Z = critical value of the normal distribution (Z = 1.96 for a 95% confidence level); MOE = Margin of Error (5%); p = estimated prevalence of measure(23.9% in elderly population [18]).

A detailed history of each patient was documented which included past medical history, medication information, habits like smoking, alcohol consumption and drug usage. Patients were subjected to a detailed physical examination including systemic examination and the investigations were documented.Patients were grouped based on age (into 3 groups: 65-70, 71-80, 81-90), gender (into 2 groups: Male, Female), grading of anemia depending on Hb levels (into 4 groups: Normal, Mild, Moderate, Severe).

Blood samples were collected from all patients in plain vacutainers and EDTA containing vacutainers. Complete blood counts for all the samples were done using SYSMEX 3-part differential analyzer and the RBC indices were noted along with total WBC count, differential count, platelet count and hematocrit. ESR was done using Westergren tube. Peripheral smears were made for all the samples and stained using Leishman stain. Supravital staining using methylene blue was done for reticulocyte counting. Quantitative determination of iron was done using the automated Beckman Coulter analyzer which works on the principle of photometric colour test. Quantitative Vitamin B12 analysis was done using automated Access immunoassay system from Beckman Coulter that is a chemiluminescent immunoassay.

III. STATISTICAL METHODS

Both descriptive and inferential statistical analysis were carried out. Statistical significance was assessed at 5%.Statistical software namely SPSS 22.0, and R environment ver.3.2.2 were used for the analysis. The one-way analysis of variance (ANOVA) was used to determine whether there are any statistically significant differences between the means of three or more independent (unrelated) groups. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

IV. RESULTS

Table 1: Age distribution of geriatric population studied

Age in years	Geriatric population	%
65-70	177	70.8
71-80	43	17.2
81-90	30	12.0
Total	250	100.0

Mean ± SD: 70.52±5.99 years

Our study included a total population of 250 patients ranging in the age group between 65yrs and 85yrs. The mean age was 70.52±5.99yrs. About 70.8% of the patients were in the age group of 65-70 yrs. (Table1)

Table 2: Gender distribution of geriatric population studied

Gender	Geriatric population	%
Female	102	40.8
Male	148	59.2
Total	250	100.0

Prevalence of anemia in our study was 61.6%. 59.2% of the population were male. (Table2)

Most common presenting complaint was easy fatigability followed by exertional breathlessness.37.2% of the patients were hypertensive and 30% had diabetes mellitus.(Table3) Most common clinical examination finding (Fig1) was pallor (53.2%) followed by platynychia(32.8%) and

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koilonychia (22.8%).

Table 3: Clinical History and comorbidities

Clinical history	Geriatric population (n=250)	%
Easy fatiguability	155	62.0
Gi bleed	13	5.2
Abdominal distention	14	5.6
Exertional breathlessness	101	40.4
Syncope	13	5.2
Palpitation	6	2.4
Chronic drug intake	131	52.4
Smoking	114	45.6
Alcohol	108	43.2
Hypertension	93	37.2
Diabetes mellitus	75	30.0
Thyroid disease	12	4.8
Cardiac disease	31	12.4
Renal	12	4.8
Liver	7	2.8
Malignancy	8	3.2
Others	119	47.6

Fig. 1 Distribution of different clinical findings

International Journal Dental and Medical Sciences Research
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Among the 250 patients, 61.6% of the population were diagnosed with anemia. Majority of the cases (30%) had moderate grade anemia (8g/dL < Hb < 10g/dL). Severe anemia (Hb < 8g/dL) was more common in males.(Fig2)

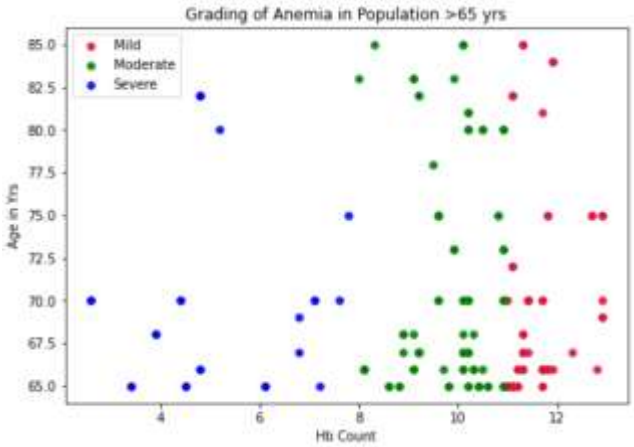

Fig. 2 Distribution of different grades of anemia across age

The most common cause of anemia was due to Iron Deficiency 36.8% (Fig3).20.8% of the patients had anemia of Chronic Disease. Low RBC indices were noticed in both iron deficiency anemia and anemia of chronic disease. Combined deficiency of Iron and Vitamin B12(dimorphic anemia) had lowest hemoglobin concentration (7.95±2.09gm/dl), low RBC count (2.98±1.15million cells/cum), low Total leucocyte count (4055.0±2303.3 cells/cum) and low hematocrit (24.85±6.86%).

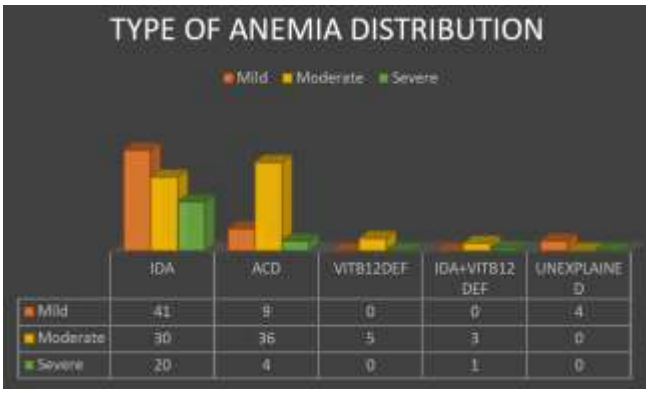

Fig. 3 Type of anemia in relation to severity of anemia

The most common peripheral smear picture in our study was Normocytic Normochromic (NCNC) anemia, having about 65% of prevalence followed by Microcytic Hypochromic (MCHC) anemia (29.9%). In both cases of Iron Deficiency anemia (n=56; 60.9%) and anemia due to Chronic Disease (n=41, 78.8%), Normocytic Normochromic study has been themost common peripheral smear.(Fig4)

Etiology for Iron deficiency anemia could be attributed predominately to nutritional deficiency. 36.6%(n=17) of the patient population had Chronic Obstructive Pulmonary disease, which was the major reason for anemia due to chronic disease. Serum iron levels were reduced in both iron deficiency anemia (79.18±75.31) and anemia of chronic disease (107.60±84.67), but low serum ferritin store was exclusively seen in only iron deficiency anemia.

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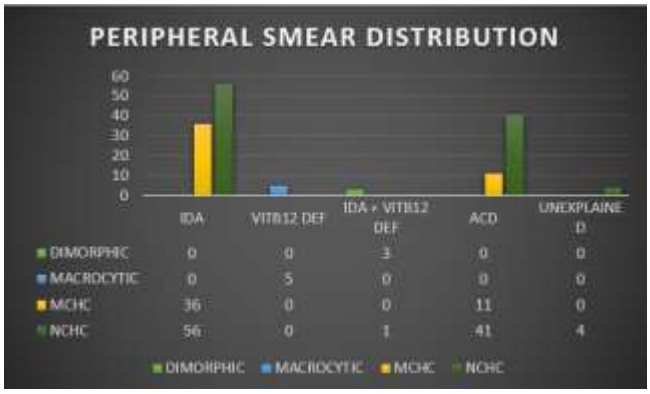

Fig. 4 Peripheral smear distribution in relation to type of anemia

V. DISCUSSION

Our study identified 154 elderly patients with anemia of which 85 (53.2%) were male and 72 (46.7%) were female. This finding is in accordance with Indian studies by Bhasin et al [(5)] and Srivastava et al [(14)] and International study like the THIRD NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES III) STUDY [(3)]. Geriatric anemia is unique and contrast compared to anemia in younger people, in that, anemia in elderly is more common in men than women [(14)]. Cessation of menstrual blood loss in elderly women may be a contributing factor for this observation. It was observed by Mclennan et al [(15)] that, in women of postmenopausal age group hemoglobin concentration increases by 0.6 g/dl per decade and hence women may have lesser incidence of anemia than men in elderly age group. This cross-over effect where men are more likely than women to have anemia as age advances than at younger ages reflects in the application 94 of sex-specific criteria for defining anemia and more so on the sex differences in the distribution of hemoglobin concentration.

The mean age group of patients in our study was 70.52±5.99 years with maximum cases in the mean age group of 65-70 years. The mean hemoglobin in our study was 11.63±0.59gm/dl. Majority of the patients were found to have with moderate anemia accounting for 75 cases (48.70%). We used the WHO guidelines to define anemia according to which hemoglobin ranging from 8 to 10gm/dl is classified as moderate anemia.

The commonest etiology of anemia in geriatric population as per our study was iron deficiency anemia (IDA) accounting to 92 cases (36.8%) followed by anemia of chronic disease (ACD) accounting to 52 cases (20.8%). This is in discordance with various Indian and International studies where the most probable cause was anemia of chronic disease (ACD). Our study was conducted in a tertiary care hospital catering to patients from both urban and rural backgrounds with the latter being the larger number. Alcohol intake (bleeding varices), poor dietary intake of iron, agricultural background (worm infestations), could be some of the reasons explaining the larger proportion of iron deficiency anemia seen in our study.

The dominant peripheral blood picture in our study was normocytic normochromic (NCNC), 102 cases (65%) followed by microcytic hypochromic (MCHC), 47 cases (29.9%) This finding is in accordance with most of the other Indian studies. A study by Soni PN et al [(15)] also found a vast majority of peripheral blood picture with normocytic normochromic (NCNC) blood picture followed by microcytic hypochromic blood picture which is lower in percentage than our study. Similar findings were seen in the International study by Tettamanti et al [(16)] with majority having a normocytic normochromic (NCNC) peripheral blood picture followed by microcytic hypochromic peripheral blood picture (MCHC) the percentage of which was lower than our study. The percentage of macrocytosis and dimorphic blood picture was lower in our study compared to most of the other studies.

Our study showed majority of the patients with iron deficiency anemia had a normocytic normochromic peripheral blood picture (60.9%) followed by microcytic hypochromic peripheral blood picture (39.1%). 78.8% of patients having anemia with chronic disease had a normocytic normochromic peripheral blood picture followed by 21.2% of patients having microcytic hypochromic peripheral blood picture. Iron deficiency anemia and anemia of chronic disease are both accompanied by a low serum iron level. Microcytosis may or may not be present in either of these disorders. In classic iron deficiency anemia, theTIBC is more than 400 µg/dL. In anemia of chronic disease, the TIBC is usually below normal. This is because transferrin is reduced in the presence of acute and chronic stress as it is an acute phase reactant [(17)]. The mean serum iron level was 39.69±49.92 µg/dL in patients with IDA and

35.92±39.17 µg/dL in patients with ACD. Mean serum ferritin level was 79.18±75.31 µg/dL in patients with IDA and 107.60±84.67 µg/dL in patients with ACD. Serum ferritin level is the most effective way to diagnose iron deficiency anemia. Iron deficiency is virtually certain when serum ferritin is less than 15 µg/l. Iron deficiency is unlikely if the serum ferritin level is more than 100 µg/l. Serum ferritin levels between 15 and 100 µg/l are moderately predictive of iron deficiency anemia [(17)]. Differentiating between iron deficiency anemia and anemia of chronic disease may often represent a challenge and an invasive bone marrow aspiration with iron stain may provide the final answer.

Out of the 92 cases of IDA only 39.1% showed microcytic hypochromic blood picture although the iron profile was suggestive of iron deficiency. Also, only 12 cases had history suggestive of gastrointestinal bleed thus ruling out chronic blood loss as possible cause of the IDA. Thus, poor intake of iron could have been a possible cause of iron deficiency. No significant correlation could be made from BMI. Bone marrow analysis in 3 cases showed scant material with few myeloid and lymphoid series with megakaryocytes.No hematological malignancies were found in our study.

The distribution of comorbidities among patients with anemia of chronic ailment indicated that majority of the patients had hypertension and diabetes possibly suggesting of end organ damage like early stages of chronic kidney disease leading to anemia. End stage renal disease as such was found in 6 cases. Among others the most common etiology was chronic obstructive pulmonary disease (n=17). Among malignancies carcinoma of lung was found in 3 individuals, carcinoma of esophagus was found in 2 individuals, carcinoma of prostrate was found in 2 individuals, carcinoma of tongue was found in 1 individual. No hematological malignancies were found in our study. Only 1.6% of the population had anemia due to unexplained etiology in our study, which is very small compared to other international studies of anemia on geriatric population.

After looking into the various etiological causes of anemia in geriatric population, it becomes paramount for the treating physician to be cognizant of the underlying existence of anemia in elderly although the presenting condition and symptoms may be different.

VI. CONCLUSION

The commonest type of anemia among elderly patients according to our study is iron deficiency anemia followed by anemia due to chronic disease. Easy fatigability which is the most common presenting complaint in this study can often be overlooked as age related. Not many clinical signs consistent with anemia were detected except for pallor which may be absent in cases of mild anemia and hence misleading the diagnosis. The peripheral smear studies of iron deficiency anemia in our study showed that normocytic normochromic picture was the commonest even when the MCV levels were suggestive of microcytic anemia. A wrong diagnosis of anemia of chronic disease can be avoided in such cases by observing the iron profile. Serum ferritin is exclusively low only in iron deficiency anemia.

Geriatric anemia is a disease that often goes underreported and hence every effort should be made to identify the disease and evaluate the cause. It should not be ignored as merely being a consequence of ageing, as it can be the cause for highermorbidity in the elderly.

Conflicts of interest

No conflict of interest.

Acknowledgement: A special thanks to the contributions of Mrs.ArunaSridharan, Data analyst-Reseachaide,MSIM graduateW.P.Carey School of business,Arizona state university for her contribution to the statistical analysis and data visualization.

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