Original Research

Patterns of Anaemia in Elderly Patients in Relation with RBC Indices - A Study at Tertiary Care Hospital

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ABSTRACT

Background & Objectives: Anemia, one of the most common manifestations seen in elderly patients is still a concern in the modern world as its prevalence increases with age. Higher mortality rates have been found in elderly who had anemia in comparison to those who didn't. Anemia greatly influences the quality of life, ability to recover from illness and functional capability, so there is a need to study its impact in older persons.

Methods: An observational study of 100 elderly patients (visiting hospital including both OPD and IPD) with anemia was done for a period of four months in a tertiary care hospital to determine the etiology behind the anemia with the help of RBC indices.

Results: Anemia was categorized on the basis of hemoglobin levels and patterns on peripheral blood smear. It was found that in the elderly population most common pattern of anemia was microcytic hypochromic due to deficiency of iron and high prevalence of chronic diseases. More than 50% of the patients in the study had moderate anemia with RBC indices showing a wide range of values due to different etiological factors leading to anemia.

Interpretation & Conclusion: Anemia is one of the major concerns in elderly as it accentuates morbidity and mortality and needs to be investigated thoroughly as most of the cases are treatable and only few have an unexplained anemia. This being a hospital based study only few people could be evaluated, and so screening programs should be encouraged on community level for older persons.

Key Words: Anemia, MCV, MCH, MCHC, RDW-CV, Hematocrit

BACKGROUND & AIMS

Anemia is defined as decrease in the number of red blood cell (RBC) or hemoglobin (Hb) which results in lower capability of blood to carry oxygen.[1] Anemia in geriatric age group is a great concern as it increases the risk of mortality and morbidity.[2] The census report of 2011 shows the population of elderly as 8.1% of the total population in India and it is expected to increase to 19% by 2050.[3] Anemia is not related with aging in elderly but it is associated with poor quality of life, poor performance status, dementia, depression and reduced mobility and it worsens the co-morbidities like cardiovascular disease and other conditions.[4-8] The United Nations has accepted an age of 60 years or above to define an 'elderly' or older person.[9] According to World Health Organization (WHO), prevalence of anemia in people of age group 60 years or older

was found to be 23.9% i.e. 164 million people affected across the globe.[10]

Anemia is defined by WHO as hemoglobin concentration of <13gm/dl for men and <12gm/dl for women.[11] Evaluation of anemia to explicate its cause can be done by collaborating the morphological classification of anemia with the red blood cell indices given by the automated cell counter. Categorization of anemia like normocytic normochromic, microcytic hypochromic, macrocytic and dimorphic picture is helpful in treatment.[12] Peripheral blood smear (PBS) examination comes up with invaluable information for diagnosing anemia with red cell morphology evaluation i.e. size, shape, chromasia, concentration of hemoglobin, and inclusions.[13]

In the present study we aimed to investigate the pattern of anemia in elderly patient with RBC indices in combination with PBS study and underlying etiology of anemia.

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METHODS

An observational study was undertaken in the Pathology Laboratory at a tertiary care hospital for a period of 4 months from December 2019 to March 2020. All blood samples of patients which were received in k3- EDTA anti coagulated vacutainer in the laboratory and were processed within one hour of collection using the 6 part automated hematology analyzer. Hemoglobin and red blood cell (RBC) indices i.e. mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red cell distribution width (RDW-CV) and hematocrit (Hct) were recorded and anemia and its pattern was reevaluated by peripheral smear examination on Leishman stained slides in all cases. We included 100 patients of age more than 60 years with anemia (Hb <12 gm/dl in women, Hb <13gm/dl in males.[11]

Approval for waiver of patients consent and patient information sheet was obtained from Institutional Ethical Committee since the study involved the data available in the record that were anonymized and coded so as to delink with any identity of patient.[14]

Inclusion criteria
1. Patients of age 60 years and older [9]
2. WHO criteria of hemoglobin <12gm/dl in women and <13gm/dl in males to define anemia.[11]

Exclusion criteria
1. Patients who had history of blood transfusion within the 3 past months
2. Patients on chemotherapy and radiotherapy
3. Patients with history of bleeding disorders or having acute bleeding
4. Patients with End Stage Renal Disease

Hemoglobin and red blood cell indices were assessed in all the cases. The data was tabulated and analyzed. Statistical mean and standard deviation (SD) was calculated for the respective parameters and comparison was done between different categories.

RESULTS

In this study, we included 100 patients who required Complete Blood Count (CBC) investigation as a part of their management and were found to be anemic. The age group of presenting patients varied from 60 to 90 years of age, with the mean age of 68.43 ± 7.5 years in the study. A majority of patients were in the age group of 60-69 years i.e. 58%. When correlated with the gender both males and females showed higher numbers in this age group. An overall slight male predominance was observed in our study with 51% males as compared to 39% of female patients. (Table 1)

More than half of the patients i.e. 53% suffered from moderate anemia, with hemoglobin level between 7-10gm/dl. This was followed by 38% with mild anemia (hemoglobin >10gm/dl) and only 18% had severe anemia (hemoglobin <7 gm/dl). The mean hemoglobin of the 100 anemic patients came out to be 9.09 gm/dl ± 2.16gm/dl (SD) (Table 2)

In this study, we studied the RBC parameters of all the patients. The mean corpuscular volume (MCV) was in the range of 60.8 to 144.0fl with the mean value of MCV as 87.25±15.66fl. The mean ± SD value of mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) was 29.28±6.90 pg and 33.47±2.63% respectively. The red cell distribution width (RDW-CV) showed a varied range from 12.5 to 31.6% with mean of 17.45±3.77%. The mean hematocrit (Hct) value was 27.34±6.35%. (Table 3)

On peripheral smear examination, RBC morphology was evaluated for anemia. It was found that microcytic hypochromic anemic pattern was observed in the majority of the patients (42%), which was followed by dimorphic pattern of RBCs in 26% cases. The normocytic normochromic and macrocytic pattern was found in only 19% and 13% cases respectively. (Table 4)

Table 5 evaluates the cause of anemia in our study and compares the prevalence of each case with the findings of the other studies in the literature based upon anemia in geriatric age group.

DISCUSSION

Anemia is not a disease, but an entity underlying many diseases. It is one of the most common blood disorder found in clinical practice as well as in laboratory investigations, affecting almost one-third of the population all over the world.[15] Studying anemia in geriatric patients is important as it is associated with many complications which deteriorate the quality of life.[16] Anemia also affects the work output of an individual as it leads to decrease oxygen supply to tissues.[17] Prevalence has been seen to increase with increase in age.[18] Owing to its high prevalence, anemia is studied widely and it is necessary to classify it so that to evaluate the cause of anemia. This needs to be diagnosed early as it can be easily missed due to its non specific symptoms like fatigue, weakness, malaise which are common to ageing also.[16]

100 elderly patients (above or equal to 60 years), who came to our hospital and required Complete Blood Count (CBC) as the part of their management, their reports were taken from the hospital data and analysed in this study. Most of the patients were in the patients were in the age group of 60-69 years (68%) with the total male to female ratio of 1.3:1. Similar finding of elderly males affected more with anemia as

compared to women was observed in the study by Petrosyan I et al.[19] where 57% males were anemic as compared to 50% females and more than 60% anemic falling in the age group of 60-69 years. Male predominance was also seen in few other studies. (Price EA et al. Tay MRJ et al., Bang SM et al. Contretras MM et al.).[20-23] But in studies like Jadhav M et al. and Singhal S et al. female predominance was found.[24-25] The variation of gender varies from place to place and also the fact that male patients have always been more who have approached to a hospital for their illness as compared to females in a developing country like India, can contribute to the male predominance in this study.

Anemia was classified based on hemoglobin level i.e. mild anemia with hemoglobin > 10mg/dl, moderate anemia with hemoglobin in the range of 7-10 gm/dl and severe anemia in cases of hemoglobin <7gm/dl. Majority of cases i.e. 53% were in the moderate anemia group which was in accordance with Singhal S et al.[25] but few other studies had majority in mild anemic group (Hafiz F et al., Petrosyan I et al., Cherian M et al., Melku M et al.).[19, 26-28] The mean hemoglobin was 9.09gm/dl (moderate anemia) which was similar to many other studies like Hafiz F et al. and Singhal S et al. where the mean hemoglobin was 8.1 gm/dl and 9.24gm/dl.[25-26]

In our study the mean Mean Corpuscular Volume (MCV) value (fl), Mean Corpuscular Hemoglobin (MCH) value (pg), Mean Corpuscular Hemoglobin Concentration (MCHC) value (g/dl) and Red cell Distribution Width (RDW %) of the patients was 87.25fl, 29.28pg, 33.47g/dl and 17.45% respectively. Hafiz F et al. and Sandhya V et al. also reported mean MCV, MCH and MCHC of 82.72fl, 28.54pg, 33.33g/dl and 81.09fl, 25.2pg, and 31.11g/dl respectively.[26,29] The mean RDW was 17.45±3.77%, which was higher than the normal range of 11-15%. The higher values of RDW correlated well with dimorphic pattern on PBS, around 26 % cases of the total.

Anemia is also broadly defined as an absolute decrease in the red cell mass.[30] Direct measurement of red cell mass is difficult but estimation of hematocrit (packed cell volume) can help understand the quantity of red cell mass particularly in cases of anemia. The mean hematocrit was 27.34±6.35 % and it showed a wide variation from 7.9 to 40.9% reflecting the degree of anemia. A study found that lower hematocrit values of less than 33% patients was found in 50% patients at admission requiring blood transfusion as treatment for anemia.[31]

On peripheral blood smear examination, microcytic hypochromic pattern of anemia was predominant in this study (42%). The findings was similar in studies by Patel S et al., where majority i.e., 72% cases were of microcytic pattern and was followed by normocytic pattern i.e. 24% cases.[32] Mukaya JE et al. also reported 54% cases of microcytic anemia amongst 165 cases of anemia in geriatric age group

and 31% of normocytic normochromic anemia.[33] Only low MCV cannot be taken as microcytic anemia, as there were many cases in which MCV was within normal limits in anemia cases, but on PBS features of iron deficiency was quite expressive. It was also observed by studies like Goodnough LT et al.[31] This led to the importance of correlation between RBC indices and PBS for evaluating the etiology.

Anemia is a multifactorial disease.[34] The major cause of anemia was found to be iron deficiency anemia (36%) and anemia of chronic diseases (21%) which was also the case in the studies by Sharma D et al., Petrosyan I et al. and Bhasin A et al.[16, 19, 35] It was followed by vitamin B12/folate deficiency and anemia due to chronic kidney disease. Vegetarian diet and low socioeconomic status can be attributed as the one of the main reason behind the nutritional deficiency in Indian population as found to be during the clinical data obtained from the records of the patients. Similar reasons were also attributed for nutritional deficiency anemia in a study by Patel S et al.[32] In our study only 11% cases had an unexplained etiology, whereas this has been a major cause in studies on geriatric population in developed nations. A study by Goodnough LT et al. in Stanford University, California found that of the 142 anemic elderly patients, 42 (37%) had unexplained anemia of the elderly (UAE), which was followed by iron deficiency anemia. They defined this entity (UAE) as hypoproliferative normocytic anemia to which any cause of anemia could not be attributed such as nutritional deficiency, CKD or inflammatory disease.[31]

CONCLUSION

Anemia amongst the elderly is a health concern in both developed as well as developing countries, hence early diagnosis and treatment is essential. Only CBC parameters cannot help determine the cause or etiology behind the anemia, PBS correlation is equally important in evaluating the etiology of the anemia. The correlation of CBC parameters and the PBS examination plays an important role in laying down the foundation of the further investigations which need to be carried out to confirm the etiology of anemia and help in starting the preliminary treatment for anemia. This aids in reducing the morbidity and mortality due to anemia.

Limitation of the study

We only included the patients who came to the hospital for treatment, which is just the tip of an iceberg. There is a need to evaluate the much greater population suffering from anemia which is still hidden in the community, and people are incognizant to their illness and the morbidity associated with it. For this reason screening programs for anemia needs to be organized on community level.

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Table 1: Distribution of study subjects according to age and sex

Age Group	Male	Female	Total
60-69 years	35 (68%)	23 (58%)	58
70-79 years	19 (37%)	12 (30.7%)	31
>80 years	7 (13%)	4 (10.2%)	11
Total	51	39	100

Table 2: Haemoglobin levels in patients of Anaemia

Hb(gm/dl)	No. of patient
< 07 gm/dl	18
07-10 gm/dl	53
>10 gm/dl	39
Total	100

Table 3: Distribution of anemic patients based on RBC parameters

RBC indices	Minimum value	Maximum value	Mean ± SD
MCV (fl)	60.8	144	87.25 ± 15.66
MCH (pg)	19.7	48.5	29.28 ± 6.90
MCHC (%)	28.7	39.2	33.47 ± 2.63
RDW-CV (%)	12.5	31.6	17.45 ± 3.77
Hct (%)	7.9	40.9	27.34 ± 6.35

Table 4: Distribution of anemic patients based on the anemic pattern of PBF

Type of anaemia	No. of patients
Normocytic Normochromic	19
Microcytic Hypochromic	42
Macrocytic	13
Dimorphic Anaemia	26

Table 5: Major cause of anaemia in geriatrics: comparison of different studies

Type of Anaemia	Bhasin et al 2011	Petrosyan et al 2012	Dheeraj et al 2015	Our study 2020
Anaemia of chronic disease	27	62.1	22.9	21
Iron deficiency anaemia	30	30.5	24.8	36
Chronic kidney disease	21	17.8	12.4	11
Vitamin B12/Folate deficiency	5	38.9	2.9	19
Hematological malignancy	6	6.3	15.2	2
Unexplained	2	8.4	8.6	11
Total cases	91	164	86.8	100