

## A Study of the Laboratory Determinants in the Diagnosis of Geriatric Anemia

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### Abstract:

**Introduction:** The prevalence of anaemia among elderly Indians, as reported in Indian cross-sectional studies is between 6 and 30 % among men and between 10 and 20 % among women. Thus, anaemia represents an emerging global health problem producing a negative impact in the quality of life among the elderly and requiring greater allocation of health resources. Based on this aim of study is to identify elderly patients with anaemia and study the aetiology, clinical parameters, and laboratory parameters in these patients.

**Methodology:** The cases received in the haematology department for peripheral smear reporting were screened and 100 cases that showed haemoglobin levels lower than standard WHO values were chosen. The entire medical history was obtained from each of the cases including previous medical reports and imaging studies. Complete blood counts for all the samples was done and the RBC indices was noted along with total WBC count, differential count, platelet count and haematocrit. Ferritin, iron and TIBC for all samples was done and values obtained using colorimetric methods.

**Results:** Among the aetiologies, iron deficiency anaemia was seen in 43% of patients, anaemia of chronic disease in 32%, anaemia of chronic kidney disease and unexplained anaemia in 11 % each and 1 case  $\beta$  thalassaemia. Among clinical features the commonest symptom was easy fatigability and commonest sign was pallor. Peripheral smear study showed that normocytic normochromic anaemia was commonest type.

**Conclusion:** This study showed that the commonest cause for anaemia among elderly patients is iron deficiency anaemia followed by anaemia due to chronic disease. Geriatric anaemia is a disease that often goes unreported hence every effort should be made to identify the disease and evaluate the cause and it should not be ignored as merely being a part of ageing, for the consequences of anaemia can have higher morbidity in the elderly.

**Keywords:** Geriatric Anaemia, Elderly, Peripheral Smear.

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### Introduction

Anemia is defined as a state of decreased oxygen carrying capacity of the blood wherein the hemoglobin is less than 13 g/ml in men and less than 12 g/ml in non-pregnant women by WHO reference standards [1]. The demographic transition with ageing of population is a global phenomenon and in recent years there has been an increasing international awareness of health issues relating to aging population [2,3]. According to a 2004 report of the United States National Health and Nutritional Examination Survey (NHANES) III, 10 % of Americans 65 years and older are anemic, rising to a 25 % of men and 20 % of women 85 years and older. The prevalence of anemia among elderly Indians, as reported in Indian cross-sectional studies is between 6 and 30 % among men and between 10 and 20 % among women. Thus, anemia represents an emerging global health problem producing a nega-

tive impact in the quality of life among the elderly and requiring greater allocation of health resources [4]. Based on this objective of our study is to identify elderly patients with anemia based on WHO criteria, to study clinical features, radiological features in those diagnosed with anemia and to analyze the laboratory parameters in these patients.

### Materials and Methods

The cases received in the hematology department for peripheral smear reporting were screened and 100 cases that showed hemoglobin levels lower than standard WHO values were chosen. The entire medical history was obtained from each of the cases including previous medical reports and imaging studies. Blood samples were collected from all patients in plain vacutainers and EDTA containing vacutainers. Complete blood counts for all the sam-

ples was done using SYSMEX 3 part differential analyzer and the RBC indices was noted along with total WBC count, differential count, platelet count and hematocrit.ESR for all cases 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. Ferritin, iron and TIBC for all samples was done using SPINREACT kits. Statistical analysis was done using SPSS statistical software

## Results

In our study of 100 patients studied 87 patients [87 %] fall in the age group of 65 to 75 years, 11 patients [11%] fall in the age group of 76 – 85 years and 2 patients fall in the age group of 86-95 years. Of the 100 cases studied 57 patients were men and 43 were women. Among the causes for anemia iron deficiency was the commonest constituting 43% of the cases followed by anemia of chronic diseases which constituted 32 % of the cases. Among the causes for anemia due to chronic inflammation 4 patients had both diabetes and hypertension, 2 had pulmonary tuberculosis, 2 had coronary heart disease, 1 was a case of thymoma, 2 were hematological malignancies, 2 cases were malignant melanomas, 4 were lung cancers, 3 breast cancers, 3 GI malignancies, 1 was a bone tumor, and 2 were unidentified malignancies.

Based on the WHO criteria anemia can be classified into mild anemia with hemoglobin less than 10 gm/dl, moderate anemia with hemoglobin between 7 and 9.9 gm/dl and severe with hemoglobin less than 7 gm/dl. Of the 100 patients studied the commonest symptom associated with anemia was easy fatigability which was present in 75 patients, followed by GI bleed in 10 patients and palpitation in 9 patients. Of the clinical signs pallor was commonest and was present 92% of patients, peripheral edema in 20 patients, tachycardia in 15 patients, glossitis in 11 patients, koilonychias in 7 patients, hepatomegaly in 5 patients and splenomegaly in 6 patients.

## Correlation of clinical features with intensity of anemia

Of the 31 patients who presented with mild anemia only 16 patients complained of easy fatigability, and there were no other specific complaints. 2 patients presented with splenomegaly.

In our study 39 patients had moderate anemia out of which 18 patients had history of easy fatigability. Of the 39 patients all had pallor, 2 patients had icterus, 7 had pedal edema, 2 had koilonychia, 7 had glossitis, 4 patients had aphthous ulcers, 3 had hepatomegaly, 3 had splenomegaly and 2 patients had tachycardia. In our study 30 patients in our study had severe anemia. Of the 30, 29 patients had history of easy fatigability, all had pallor, 2 presented with icterus, 7 had pedal edema, 7 had koilonychias, 2 had glossitis, 2 had aphthous ulcers, 1 patient had lymphadenopathy, 1 had hepatomegaly, 1 had splenomegaly and 9 patients had tachycardia.

## Correlation of red cell indices with intensity of anemia

Of the 31 patients with mild anemia 19 patients had normal MCV, 20 had normal MCH, 23 patients had normal MCHC and 19 had normal RDW. Low MCH was found in 12 patients, low MCHC in 11, low MCHC in 3 patients whereas increased MCV or MCH was seen in none, increased MCHC was seen in 5 patients and increased RDW was found in 12 patients.

Out of 39 patients with moderate anemia normal MCV was present in 24 patients, normal MCH in 24 patients, normal MCHC in 23 patients and normal RDW was seen in 9 patients. 15 patients had decreased MCV, 15 had decreased MCH 8 had decreased MCHC, whereas 3 had increased MCHC and 30 had increased RDW. Among the 30 severely anemic patients normal MCV, MCH, MCHC and RDW was found in 8, 9, 15 and 2 patients respectively, low MCV, MCH, MCHC was found in 21, 20 and 14 patients respectively with high MCH, MCHC and RDW found in 1, 1 and 28 patients respectively.

**Table 1: RBC indices in patients with severity of anemia**

<b>MILD ANEMIA</b>	<b>MCH</b>	<b>MCH</b>	<b>MCHC</b>	<b>RDW</b>
Normal	19	20	23	19
Decreased	12	11	3	0
Increased	0	0	5	12
<b>MODERATE ANEMIA</b>	<b>MCV</b>	<b>MCH</b>	<b>MCHC</b>	<b>RDW</b>
Normal	24	24	28	9
Decreased	15	15	8	0
Increased	0	0	3	12
<b>SEVERE ANEMIA</b>	<b>MCH</b>	<b>MCH</b>	<b>MCHC</b>	<b>RDW</b>
Normal	8	9	15	2
Decreased	21	20	14	0
Increased	0	1	1	28

The mean values of RBC indices in microcytic hypochromic anemia is as follows: MCV- 69.08, MCH 23.33, MCHC 31.34, in normocytic normochromic anemia is as follows: MCV 85.91, MCH 28.46, and MCHC 33.2 and in dimorphic anemia is MCV 31.34, MCH 33.2, and MCHC 35.8. The mean ferritin levels in microcytic hypochromic anemia in this study was found to be 61.75 and iron values was 39.09. The same indices in normocytic normochromic anemia was 162.16 and 52.82 and in dimorphic anemia was 299 and 87.9. The ferritin values according to the various etiologies showed the following values in iron deficiency anemia it was 23.58 µg/dl, in anemia of chronic disease it was 220.51 µg/dl, anemia in chronic disease was 222.44 µg/dl, and unexplained anemia was 95.52 µg/dl.

In our study normal ferritin levels were seen in 20 mildly anemic patients, 19 moderately anemic patients and 30 severely anemic patients. Ferritin levels were low in 4 mildly anemic, 10 moderately

anemic and 8 severely anemic patients whereas increased ferritin levels was seen in 7 in the mildly anemic group, 10 in moderately anemic group and 8 in severely anemic group. Similarly iron levels were normal in 21, 22, 13 patients among the mild, moderate and severely anemic respectively. Low iron was seen in 9 mildly anemic, 17 moderately anemic and 16 severely anemic patients whereas only 1 patient in the mildly anemic group showed increased iron levels.

Normocytic normochromic erythrocytes is seen in a total of 50 patients out of which 19 were mildly anemic patients, 21 were moderately anemic patients and 10 were severely anemic patients. Microcytic hypochromic erythrocytes were found in a total of 44 patients of whom 10 were mildly anemic, 17 were moderately anemic and 18 were severely anemic patients. Dimorphic blood picture was seen totally 6 patients of whom 2 were mildly anemic, 1 was moderately anemic and 2 were severely anemic patients.

**Table 2: Erythrocyte morphology in mild, moderate and severe anemia**

	Normocytic normochromic	Microcytic hypochromic	Dimorphic
Mild anemia	19	9	3
Moderate anemia	21	17	1
Severe anemia	10	18	2
Total	50	44	6

## Discussion

This study, conducted in a rural tertiary hospital, identified 100 old age persons with anemia (hemoglobin less than 13 gm/dl in men and less than 12 gm/dl in women) who were included in the study.

With regard to the various clinical features of anemia in old age in this study (table 7) the most common symptom was easy fatigability which was seen in 75% of patients followed by peripheral edema seen in 10 % and palpitations in 9 % of patients. These features corroborate closely with the results of the study by Amit Bhasin et al [5]. The clinical signs seen in this study was pallor in 92 %, peripheral edema in 21%, glossitis in 11%, koilonychia in 7%, hepatomegaly in 5 % and splenomegaly in 6%. All the clinical signs were of higher incidence than that seen by Amit Bhasin et al except peripheral edema which was similar in incidence.

Regarding the age, the age in the present study population ranged from 65 to 96 years with the mean age being 70.38. This mean age is similar to the studies conducted by Amit Bhasin et al 2010[5]. In the present study the maximum number of patients were in the age group between 65 and 75 years comprising 85 % of the study population and this is similar to the study by Sfurti Mann et al 2014[6], Tettamanti M et al 2010[7]. The examination of peripheral smears in this study showed normocytic normochromic anemia to be the com-

monest seen in 50% of the patients which is similar to the study by Sfurti Mann et al 2014[6], Kaur et al 2013[8]. This is followed by microcytic hypochromic anemia which was found in 44% of patients which is slightly higher than that seen in the study by Sfurti Mann et al 2014[6], Kaur et al 2013[8]

Regarding the various etiologies for anemia the commonest cause in the present study was iron deficiency anemia which differed from other studies like NHANES III [9], Sfurti Mann et al 2014[6], Kaur et al 2013[7], Tettamanti M et al 2010[7], Chul Won Choi et al 2003[10], which show anemia of chronic disease to be the commonest cause.

Regarding the iron parameters in microcytic hypochromic anemia the ferritin values had a mean value of 61.75 µg/dl, in normocytic normochromic anemia it was 162.16 µg/dl and in dimorphic anemia it was 299 µg/dl which varied from other studies. Sfurti Mann et al 2014[6] showed that mean ferritin values in microcytic hypochromic anemia was 70.58 µg/dl, in normocytic normochromic anemia was 424.67 µg/dl and in dimorphic anemia was 261.33 µg/dl. Iron parameters in this study depending on etiology showed the ferritin levels varying from that seen by Sfurti Mann et al 2014[6] as shown below.

Of the 43 patients with iron deficiency anemia only 32 patients had peripheral smear showing the char-

acteristic microcytic hypochromic picture even though the iron studies showed values suggestive of iron deficiency. Of the 43 patients only 6 patients had history of GI bleed. Hence chronic blood loss could not be attributed to the iron deficiency and the deficiency is probably due to nutritional causes since almost all of the persons in the study population belong to the low socioeconomic status.

### Conclusion

This study showed that the commonest cause for anemia among elderly patients is iron deficiency anemia followed by anemia due to chronic disease and also that it can be asymptomatic which is incidentally stumbled upon when one is evaluated for other symptoms... Geriatric anemia is a disease that often goes unreported hence every effort should be made to identify the disease and evaluate the cause and it should not be ignored as merely being a part of ageing, for the consequences of anemia can have higher morbidity in the elderly.

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