DOI: 10.36347/sjams.2017.v05i03.069

Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2017; 5(3E):1079-1084 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com

Original Research Article

Spectrum of anemia and red cell indices in adult male patients in a tertiary care hospital

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Abstract: Anemia is not a diagnosis, but may be a sign of an underlying cause or disease. Further evaluation of the patient with anemia is necessary to elucidate the underlying cause. Anemia is more common in children, adolescents and women in reproductive age group. Adult men less frequently present with symptoms of anemia as compared to children and women. Our aim was to study the prevalence of anemia among adult men presenting to a tertiary care hospital and also to study the spectrum of anemia and red cell indices in these anemic adult men who were hospitalised. Male patients who had hemoglobin levels less than 13g/dl and are ≥15 years of age are included in the study. Prevalence of anemia was estimated to be 30.1%. Among the hospitalised patients normocytic normochromic anemia was the most common morphological type. Anemia was found to be more between the age groups of 35 to 65 years. We intended to study the spectrum of red blood cell morphology and red cell indices in hospitalised anemic adult males presenting to a tertiary care hospital and to know the most common morphological type of these anemias. Men being the bread winners of the family, anemia leads to loss of physical productivity, more so in those who do manual work. Identifying anemia at an early stage and also confirming the morphological type of anemia may help in diagnosis of the underlying condition. Early treatment may improve the general condition of the patient and the outcome thus shortening the hospital stay.
Keywords: anemia, adult men, hemoglobin, red cell indices, dimorphic

INTRODUCTION

Anaemia is a major health problem in India. As per National Family Health Survey (NFHS-3) on population health and nutrition done in 2005-2006; the prevalence of anaemia was 70% in children aged 6–59 months, 55% in females aged 15–49 years, and 24% in males aged 15–49 years [1]. Anemia is more prevalent in children, young adults, women in reproductive age group and elderly [2, 3]. Anemia in these groups is mostly due to nutritional deficiencies. Adult men less frequently present with symptoms related to anemia and the most common underlying cause being gastrointestinal or urinary tract bleeding [4, 5]. Nutritional causes along with addiction to smoking and alcohol may contribute to the cause and severity of anemia in men [3]. In elderly the causes include chronic bleeding, anemia due to chronic disease and malignancies [5]. Anemia has emerged as a risk factor that is associated with a variety of adverse outcomes in older adults, including hospitalization, disability and mortality [5, 6].

Certain disorders like chronic inflammatory states are commonly associated with anemia which is mild to moderate in severity. In lymphomas like chronic lymphoid leukemia, anemia may be due to autoimmune hemolysis [7]. Anemia is most often detected during screening laboratory tests. In a patient with anemia, peripheral smear examination and red cell indices help in morphological classification which is of great value to evaluate the cause of anemia [3]. According to the morphological classification, anemias are classified into three group's normocytic normochromic, microcytic hypochromic and macrocytic [8]. RBC indices along with the peripheral smear help in the morphological classification of anemia. They can be calculated manually or with the help of automated analyzers [9].

MCV is useful in determining the type of anemia. Low MCV is seen in conditions like iron deficiency, thalassemia, and few cases of anemia chronic disease. High MCV is seen in megaloblastic anemia, alcoholic liver disease, myelodysplastic syndrome, acute blood loss or chronic diseases show normal MCV. However in small but significant proportions of anemia microcytosis or macrocytosis with anisocytosis can be missed. MCHC helpful in determining the chromasia of red cell [8]. RDW is a measure of red cell anisocytosis [9]. According to the study by WHO published in 2011, prevalence of anemia in men is 9.2%-23.9% [2]. Few other studies showed prevalence of anemia in adult men ranging from 9.2-17.7% [4, 10, 11].

AIMS AND OBJECTIVES

To study the prevalence of anemia in adult men attending a tertiary care hospital. To study the morphological spectrum of anemia and red blood cell indices in hospitalised patients in a tertiary care hospital.

MATERIAL AND METHODS

This prospective study was done in one month period in the clinical pathology laboratory of a tertiary care hospital. During the study period we received blood samples of 1094 patients, among which 395 were falling into the study group i.e; men ≥15 years age. Patients' samples were run in hematology analyser SYSMEX- XP-100. Hemoglobin values and the red cell indices i.e; PCV, MCV, MCH, MCHC and RDW were noted. Based on the Hb concentration 119 of 395 men were found to be anemic (WHO criteria for anemia in males above 15 years Hb <13g/dl) [2]. There were 61 outpatients and 58 inpatients.

Peripheral smears were made from the inpatient samples within an hour of collection and are stained with Leishman's stain. These were studied and correlated with RBC indices to determine the morphological type of anemia. Relevant clinical details of the patients were taken. Haemoglobin concentrations (g/dL) for assessment of severity of anemia in men > 14 years according to the World Health Organization were as follows, mild -11-12.9 g/dl, moderate-8-10.9g/dl and severe-<8g/dl [2].

Based on the Hb concentration and morphology of red cells all the patients were grouped into mild, moderate, severe; and normocytic normochromic, microcytic hypochromic and macrocytic anemias respectively. Those cases which showed both microcytes and macrocytes are grouped as dimorphic anemia.

Inclusion criteria: Only one sample of each patient with Hb <13g/dl was included in this study. The samples that were received subsequently were not included.

RESULTS

This was a prospective study done in the clinical pathology laboratory of a tertiary care hospital. The study was done from 3-6-2016 to 2-7-2016. A total number of 1094 patients' samples were received in the laboratory during this period. Out of which 395 patients were males above 15 years age. Among these, 119 patients had anemia i.e, Hb less than 13 g/dl. There were 58 in patients and 61 out patients.

Table 1: Age wise distribution of degree of anemia in adult males (N=119)

Age in years	Total No. of anemia cases	Degree of anemia (Hb g/dl)		
		Mild (11-12.9g/dl)	**Moderate** (8-10.9g/dl)	**Severe** (<8g/dl)
15-25	5	0	2	3
26-35	10	4	4	2
36-45	27	10	10	7
46-55	24	7	11	6
56-65	38	14	15	9
ABOVE 65	14	2	8	4
TOTAL	119	37	50	31
%	100%	32%	42%	26%

Out of these 119 patients, 37 had mild anemia (Hb 11-12.9g/dl), 50 had moderate anemia (Hb 8-10.9g/dl) and 31 had severe anemia (Hb <8g/dl). Inpatients were 58 and outpatients 61. Moderate to severe anemia was seen 77.5% of inpatients and 60% of outpatients. Out of 58 inpatients 13 had mild anemia

(22.4%), 27 moderate anemia (46.5%) and 18 severe anemia (31%) (Table 1).

Clinical details of inpatients:

Out of 58 patients, 22 were agricultural labourers, 29 were workers on daily wages, and 4 of them do not have any occupation, a student doing a part time job, a government employee and business man. All these patients took mixed diet except for a single patient who was a vegetarian. Based on the clinical details likely clinical conditions were found to be chronic disease conditions/ inflammatory states in 23 patients which included diabetes with complications, peripheral vascular disease, pulmonary tuberculosis, chronic obstructive pulmonary disease, spondylitis and malignancies like lymphoma, carcinoma of lung, carcinoma of colon, carcinoma stomach. History of blood loss both acute and chronic in 9 patients. Gastrointestinal bleeding was the cause for chronic blood loss. Acute blood loss was due to trauma. Ten patients had coronary artery disease. Vitamin B 12 deficiency was seen in one patient. Ten patients were chronic smokers, nine gave history of chronic alcoholism, 23 were addicted to both alcohol and smoking, and remaining 16 had no addictions. Pallor was seen in all individuals.

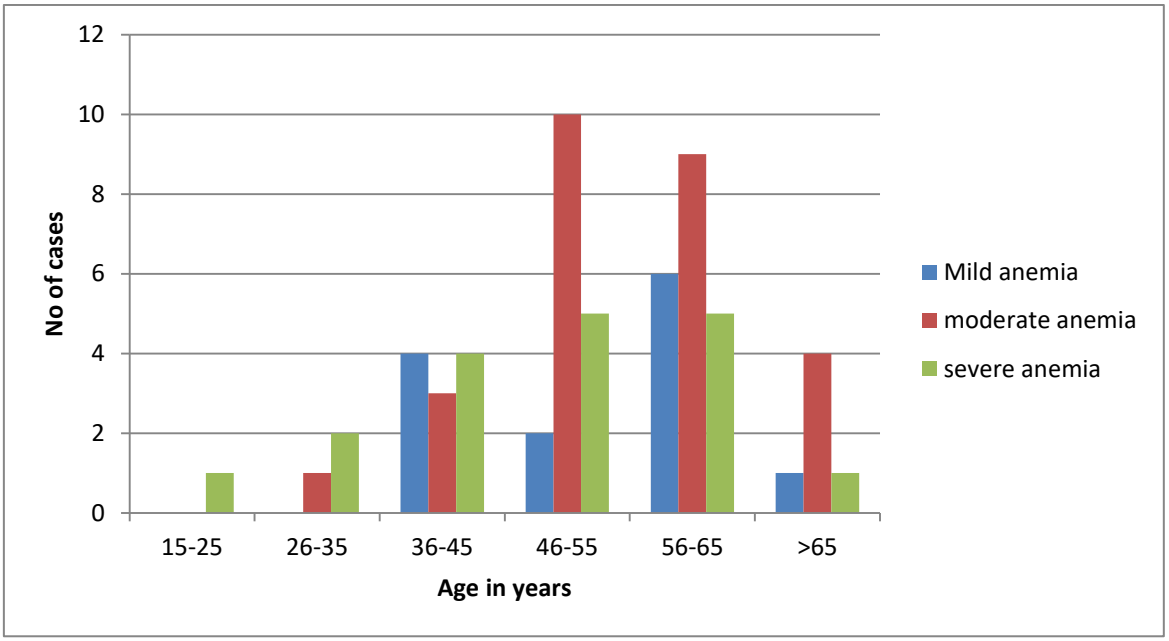

Fig 1: Age wise distribution and severity of anemia among hospitalised males

Among the 58 hospitalised patients 13 patients had mild anemia (22%), 27 had moderate anemia (47%) and 18 had severe anemia (31%). Maximum number of anemia cases was seen in the age group of 46 to 65 years (Fig 1).

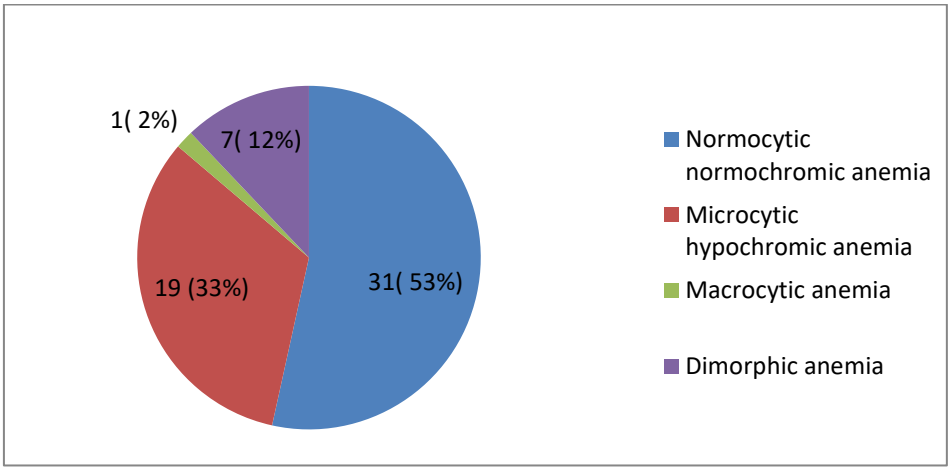

Fig 2: Morphological classification of anemia in adult male (≥ 15 years) [n=58]

Out of 58 hospitalised 31 had normocytic normochromic anemia, 19 had microcytic hypochromic anemia, 1 had macrocytic anemia and 7 had dimorphic anemia (Fig 2).

Table 2: Red cell indices in anemic male inpatients (n=58)

Red cell indices (normal range)	Normal	High	Low
MCV (80-100 fl)	34	1	23
MCH (26-34 pg)	31	2	25
MCHC (31-36 %)	36	0	22

Normal MCV was seen in 34 patients. Out of these patients, on peripheral smear examination 28 patients had normocytic normochromic anemia, 4 showed dimorphic picture and remaining 2 showed microcytic hypochromic picture. High MCV was seen in one case which on peripheral smear showed macrocytosis. Whereas low MCV was seen in 16 patients with microcytic hypochromic, 3 patients had normocytic normochromic, remaining 5 patients showed dimorphic picture (Table 2).

Normal MCH was seen in predominantly normocytic normochromic anemia and few microcytic anemias. High MCH was seen in macrocytic and one case of normocytic normochromic anemia. Low MCH was seen in microcytic hypochromic and some in normocytic normochromic and dimorphic anemia (Table 2).

Normal MCHC was seen in 36 patients. Out of these patients, on peripheral smear examination 31 patients had normocytic normochromic anemia, 3 showed microcytic anemias, 2 showed dimorphic picture. Low MCHC is seen in 15 patients with microcytic anemia, 1 macrocytic and remaining 6 in dimorphic anemia (Table 2).

Table 3: Mean values of Hb and red cell indices

Red cell parameter	Normocytic normochromic	Microcytic hypochromic	Macrocytic anemia*	Dimorphic anemia
HB(g/dl)	9.99	8.03	4.6	6.2
HCT (%)	30.85	28.03	16.6	21.5
MCV(fl)	86.8	71.36	127.7	81.2
MCH(pg)	28.1	20.68	35.4	24.4
MCHC(g/dl)	32.4	28.8	27.7	29.0
RDW-SD(fl)	47.26	46.54	128.5	58.72
RDW-CV (%)	15.38	17.75	29.2	21.5

*A single case of macrocytic anemia in the study

Mean values of Hb, HCT, MCV, MCH, MCHC and RDW correlated with the morphological features on peripheral in all the groups except dimorphic anemias (Table 3).

In few cases MCV and MCH did not correlate with the morphological picture found in the peripheral smear examination. Two cases of microcytic hypochromic anemia had normal MCV and MCH and three cases normocytic normochromic anemia had borderline values of MCV and MCH, which on peripheral smear examination show insignificant number of microcytes.

DISCUSSION

Several studies done on age and sex prevalence of anemia showed that the percentage of adult men suffering with anemia is less than other group's i.e; women, children and elderly above 65 years [12]. On the basis of WHO criteria, in this study prevalence of anemia in adult men was 30.1%. Most of them were in the age group of 36 to 65 years. Elderly men were less in number. Whereas other studies showed increase in incidence of anemia with age. Elderly show high incidence of anemia as compared to younger age groups. These studies were mostly community based studies [12, 13]. High prevalence may be because this study was done in a tertiary care hospital which also includes hospitalised patients.

Bhattacherjee S *et al.* in their study found that in total 304 patients in a rural area, 138 patients were males and among them 59.4% were anemic and remaining 40.6% were non anemic. Out of these anemic patients, 37.0% mild, 19.6% moderate and 2.9% severe anemic patients are present. There was mild degree of anemia in most of adult males [11]. In present study moderate anemia was seen in 42% patients.

Most common morphological type was normocytic normochromic anemia followed by microcytic hypochromic, dimorphic and macrocytic anemias respectively which correlates well with other studies [11, 12]. Present study showed common morphologic type was normocytic normochromic anemia in both 15- 65 years and more than 65 years age groups. Srinivasamurthy BC found normocytic normochromic anemia was common in males aged between 12 - 65 years and dimorphic anemia was common in elderly patients aged above 65 years. In the present study most common cause of anemia was chronic disease or inflammatory state followed by malignancies, acute and chronic blood loss and renal failure [14]. Red cell indices correlated with the peripheral smear findings in normocytic, microcytic and macrocytic anemias except for a negligible number as seen in other studies [4, 14]. However in the group of dimorphic anemia there was no correlation with the red cell indices as both microcytes and macrocytes were seen in the peripheral smear [9].

CONCLUSION

Normocytic normochromic anemia was the most common type of anemia in adult men. Severity of anemia was more among hospitalised patients and majority of outpatients had mild anemia. Studies show, in adult population, anemia was common in elderly age i.e. above 65 years. However in this study among adult men, we found anemia is more commonly seen in the age group of 35-65 yrs (74.7%). Only 14 patients (11.7%) were above 65 years of age. Whereas in hospitalised patients 6 patients were above 65 years age. Normocytic normochromic anemia was the common morphological type in both the above mentioned age group.

In anemias classified as normocytic normochromic, microcytic hypochromic and macrocytic, red cell indices correlated well with peripheral smear findings except for a small proportion of 5 cases. Few cases grouped as dimorphic anemia either had normal or low red cell indices, which can be expected. These findings emphasize the importance of peripheral smear examination in classification of anemias. Peripheral smear examination is cheap and gives valuable morphological details of not only red cells but also leucocytes and platelets. Morphological classification also helps the clinician in further evaluating the cause of anemia and treating it. In the present study, most of the patients were agricultural labourers and workers on daily wages who can lose their earnings due to prolonged hospital stay. Anemia is a sign of underlying disease and if detected early, it can help in finding and correcting the cause; thus improving the outcome of hospital stay and quality of life of these men.

ACKNOWLEDGEMENTS:

This study was taken up as short term student project, Indian Council of Medical Research.

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