



Research Article

Prevalence of microcytic and hypochromic anemia in rural areas of Mysore district (India)

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ABSTRACT

Microcytic Anemia (MA) and Hypochromic Anemia (HA) is one of the pathological condition concerned with all age group. It is found more common in females of all age groups primarily due to deficiency of iron, hyperthyroidism and acute blood loss. In our present study, we collected 96 samples from Swami Vivekananda Memorial Hospital, Sargur, Mysore (Dist), Karnataka. The collected data were segregated individually based on gender into three different groups (0-20 yrs, 21-40 yrs and 41+ yrs) in order to investigate the prevalence of MA and HA. It was observed that the majority of patients were having MA and HA. Significant number of patients showed decreased levels of hemoglobin concentrations and the blood indices showed variable level of Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin Concentration (MCHC) and Mean Corpuscular Hemoglobin (MCH). Our study revealed that MA and HA is more predominant among all anemias especially in female patients.

INTRODUCTION

Anemia is one of the most common alarming complication in global healthcare that can be observed in day to day life in Mysore district, southern part of India. Anemia is an abnormal physiological and hematological condition concerned with reduction in oxygen carrying capability of the blood due to decline in Red Blood Cell (RBC) count, Packed Cell Volume (PCV) and Hemoglobin (Hb) concentrations than normal ranges [1]. Research studies shown that among several anemia types, Microcytic Anemia (MA) and Hypochromic Anemia (HA) is most relevant in children's and adulthood. Laboratory findings in these group revealed smaller RBC and lower Mean Corpuscular Volume (MCV) (<80 fl) [2]. According to previous studies, the occurrence of MA and HA in Central India [3], Western Rajasthan [4], Mehravli in South Delhi [5], Koppal Institute of Medical Science Karnataka [6], Rishikesh Uttarkhand [7], Anil Neerukond Institute of Medical Science Andhra Pradesh [8], Department of Pathology and Medicine Institute of medical Science Banaras Hindu University Varanasi [9], Raichur Karnataka [10] and Bijapur Liberal District Educational Association (BLDE) University Karnataka [11] were 59 %, 47.6 %, 50 %, 34.1 %, 54.86 %, 16 %, 10.8 %, 63.24 % and 11.6 % respectively. These reports already explained about causes, pathology and laboratory diagnosis of anemia in various age groups in either sex [12]. The most common causes of MA worldwide are iron deficiency [13], thalassemia [14], chronic diseases [2] and other health disorders related to inflammation, erythropoietin [2,15]. Therefore this prospective study was conducted to determine the occurrence of various anemia's in the patients especially from local region of Mysore district which is located in the Karnataka state of India.

MATERIALS AND METHOD

Data collection: This study included analysis of 96 cases of different age group who came for routine hematological investigation at Swami Vivekananda Memorial Hospital, Sargur, Mysore (Dist), Karnataka from 20th May 2016 to 10th July 2016.

Test methods: All collected specimen were analyzed

for Complete Blood Cell Count (CBC) such as Hb, PCV, Total Leucocytes Count (TLC), MCV, Mean Corpuscular Hemoglobin (MCH) and Mean Corpuscular Hemoglobin Concentration (MCHC) performed using automated analyzer (Sysmex KX-21N). All results analyzed by analyzer were confirmed by manual method. The Peripheral Blood Smear (PBS) was made in order to examine red cell morphology. All the test results were documented in laboratory register.

Data segregation: All patient's reports were categorized separately into three groups (0-20 yrs), (21-40 yrs), (41 yrs and above) for both male and female.

Data Analysis: The recorded reports of Hb, PCV, TLC, MCV, MCH, MCHC and peripheral blood smears were analyzed to determine the incidence of various types of anemia in different age group. The data was analyzed using Microsoft office excel 2013.

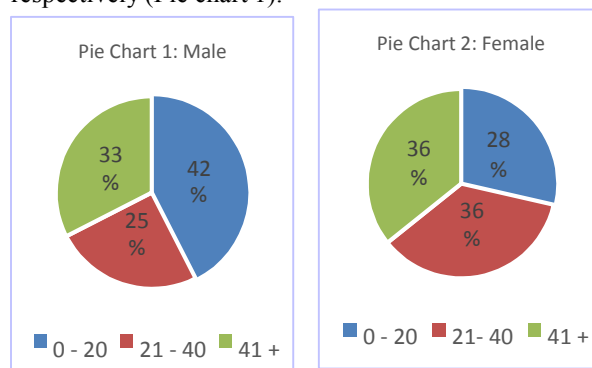
RESULTS AND DISCUSSIONS

Total number of patients were participated in our study were 96 of which 40 were males and 56 were females which were segregated age wise in table no 1.

Table No 1: Total number of male and female patients based on age groups participated in our study.

Age Group (Yrs)	Male	Female	Total Patient
0-20	17	16	33
21-40	10	20	30
41+	13	20	33

The main purpose of our study was to distinguish the occurrence of various anemia in different age groups. Our present study revealed that among 40 male cases, percentage of children (0-20 years), adult (21-40 years) and old (41+ years) were 42%, 25% and 33% respectively (Pie chart 1).



Similarly, among 56 female patients, the percentage of children were 28% and adult and old were 36% respectively (Pie Chart 2). As shown in table no 2, Hemoglobin Concentration of male and female patients were categorized into mild, moderate and severe anemia as per the WHO scale. 81% to 100% female patients were having lower PCV and 19% to 35% female patients were having lower MCH values in comparison to male patients. Similarly, in males of all age group, 6% to 15% patients shown higher MCH and 6% to 60% patients had higher MCHC.

Table No 2: This table represents percentage of male and female anemic patients age wise based on Hemoglobin concentration (g/dl) using WHO criteria of anemia categorization ^[16].

Age Group	Total number of patient's		Mild Anaemia			Moderate Anaemia			Severe Anaemia		
	Male	Female	WHO Scale	Male	Female	WHO Scale	Male	Female	WHO Scale	Male	Female
0 -59 months	12	7	10 - 10.9	8%	14%	7 - 9.9	67%	43%	< 7	0%	14%
5 11 yrs	3	2	11 -11.4	33%	0%	8 - 10.9	0%	50%	<8	0%	0%
12-14 yrs	0	2	11 - 11.9	0%	50%	8 - 10.9	0%	50%	<8	0%	0%
Above 14 yrs	25	45	M:11 - 12.9	8%	27%	8 10.9	20%	31%	<8	20%	17%
			F:11 - 11.9								

Table No 3: This table represents percentage of male patients having abnormal hematological reports.

Age	< TLC 4000 cu/mm	> TLC 4000 cu/mm	< PCV 39 %	> PCV 49 %	< MCH 26 pg	> MCH 34pg	< MCHC 33%	> MCHC 37%	< MCV 80fl	> MCV 100 fl
0 - 20	12%	23%	94%	0%	64%	6%	23%	0%	88%	0%
21 - 40	10%	0%	70%	0%	20%	10%	10%	20%	20%	10%
41 +	0%	23%	92%	0%	31%	15%	23%	0%	54%	15%

Table No 4: This table represents percentage of female patients having abnormal hematological reports.

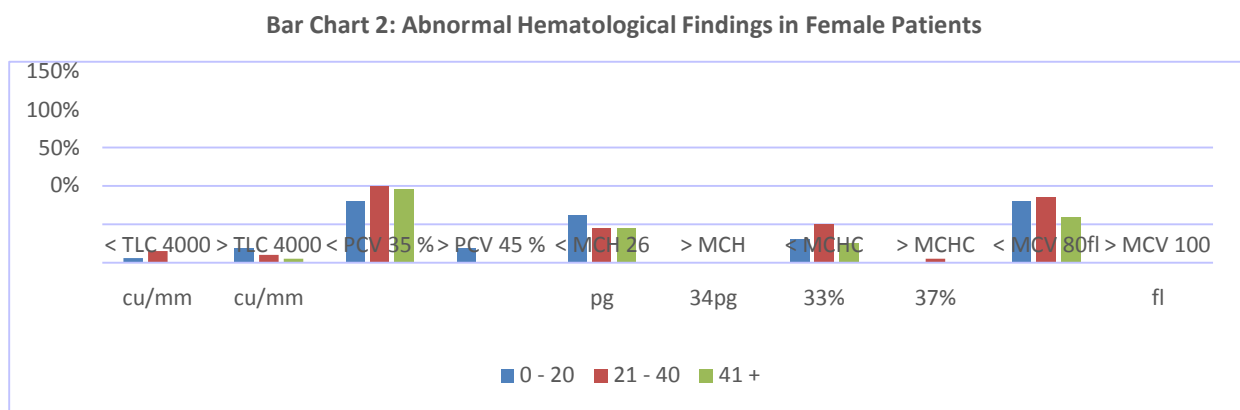
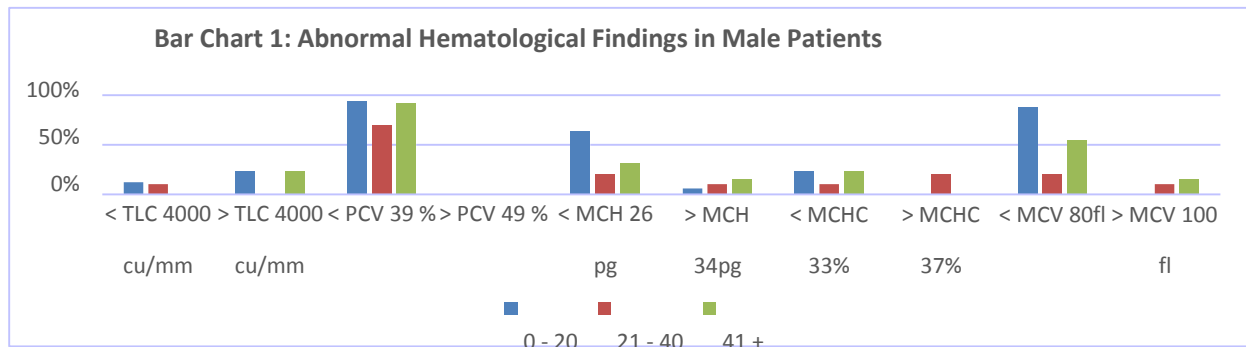
Age	< TLC 4000 cu/mm	> TLC 4000 cu/mm	< PCV 35 %	> PCV 45 %	< MCH 26 pg	> MCH 34pg	< MCHC 33%	>MCHC 37%	< MCV 80fl	> MCV 100 fl
0 - 20	6%	19%	81%	19%	62%	0%	31%	0%	81%	0%
21 - 40	15%	10%	100%	0%	45%	0%	50%	5%	85%	0%
41 +	0%	5%	95%	0%	45%	0%	25%	0%	60%	0%

It has been observed from the result analyzed that occurrence of anemia was most common in two age groups i.e., 0-20 yrs and 41 yrs above. In these age groups, level of Hb, MCH, and MCV were found lower in range (Table 3-4; Bar chart 1-2).

Our present study revealed that the significance of anemia among children's and upper age groups were significant and percentage shown in Table Number 3-4. The reason behind this could be due to insufficient intake of dietary source possibly due to new trend of consuming snacks and junk foods that has low nutritional value ^[17,18].

Previous studies reported that anemia can lower immune system and increases the approachability to

common infection ^[19]. Therefore it is advised to anemic patients to take balanced diet and dietary supplements that can provide adequate iron and vitamins ^[20]. About 23% male patients in the age groups of 0-20 and 41+ shown higher TLC values (Table No 3). About 12-15% female patients between 0-40 years of age shown lower TLC (Table No 4). Only 19% female patients in the age group of 0-20 yrs shown high PCV value (Table No 4). About 88% male patients under age group 0-20 yrs shown lower MCV where as 75% to 85% female patients between age groups 21-40 and 41+ yrs had lower MCV (Table No 3 and 4). Higher MCV was seen in male patients between the age group of 21- 40 years (Table No 3).



The central pallor of the area of red cells increases due to reduction in Hb contents inside RBCs and reduction in MCV below 80femtoliter (fl) are the hallmark to diagnose HA and are mainly associated with conditions like IDA and thalassemia [16]. In our present study, MA and HA were found more common in female patients than in male patients (Table No. 5 and Bar chart 3).

Our investigation revealed that in the age group of 0-20 years, microcytic and normochromic anemia was higher in male than female whereas macrocytic, hypochromic, normochromic, RBC fragments, target cells, anisocytosis and anisopoikilocytosis were higher in female than male. Target cells also called as acodocytes or Mexican hat cells appear as a central hemoglobinized area surrounded with pallor area had been found associated with liver disease, alpha & beta thalassemia, sickle cell anemia [21]. The decreased range of MCV had been reported in male patients associated with IDA and Thalassemia [22]. Similarly, the concentration of hemoglobin level had been observed lower during postmenopausal period in female [23-24].

In age group 21-40 yrs, normocytic and normochromic anemia were more in male patients where as microcytic, macrocytic, hypochromic, RBC

fragments, target cells, anisocytosis and anisopoikilocytosis were more in female. The occurrence of normocytic and normochromic anemia had been detected in renal insufficiency and hemolysis [13]. Similarly, increased in reticulocytosis had been seen in association with hemolysis condition [25].

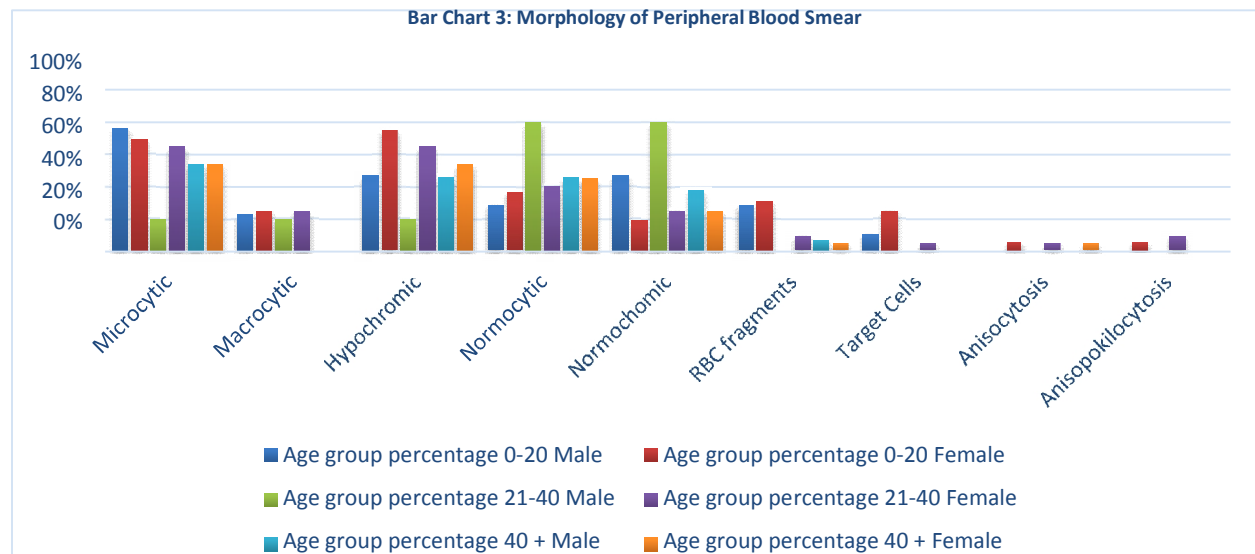
In old age group (41+ yrs), HA and anisocytosis conditions were higher in females and normocytic, normochromic and RBC fragments were more in male. In older age group, the hemoglobin level seen lower in female patients. This may be due to continuous blood loss through urine and feces [26].

Macrocytic means large cells with greater MCV i.e., more than 100 fl. This is associated with abnormal nucleic acid metabolism in red blood cells due to deficiency of folate and vitamin B12 that interfere with maturation of RBCs [27-28].

Normocytic and normochromic cases were documented, however the Hb were lower than reference range due to sudden loss of blood, long term disease such as kidney failure and aplastic anemia [29]. In this anemia, Hb and MCV is usually normal (80-100 fl) but MCH rises above reference range which had been seen associated with hemolytic anemia, liver disease, acute blood loss and aplastic anemia [24].

Table No 5: No of patients (%) that showed abnormal red cell in peripheral blood smears

Cell morphology on PBS	Age group percentage					
	0-20		21-40		41 +	
	Male	Female	Male	Female	Male	Female
Microcytic	76%	69%	20%	65%	54%	54%
Macrocytic	23%	25%	20%	25%	0%	0%
Hypochromic	47%	75%	20%	65%	46%	54%
Normocytic	29%	37%	80%	40%	46%	45%
Normochromic	47%	19%	80%	25%	38%	25%
RBC fragments	29%	31%	0%	10%	7%	5%
Target Cells	11%	25%	0%	5%	0%	0%
Anisocytosis	0%	6%	0%	5%	0%	5%
Anisopokilocytosis	0%	6%	0%	10%	0%	0%



RBC fragments commonly known as schizocytes had been diagnosed in patients with intravascular hemolysis [30].

Microcytic Anemia and Hypochromic Anemia is one of the most common cases that can be observed in these regions Sargur, Mysore district. The prevalence of this type of anemia is higher in these areas in general more predominant particularly in females of age group of 0-20 years and 41+ group.

CONCLUSION

Microcytic and hypochromic anemia is the most common anemia prevalent in India. This study highlighted the importance of Peripheral Blood Smear (PBS) and Complete Blood Cell Count (CBC) in the study of various anemic patients to categorize the type of anemia. Our studies showed the occurrence of

anemia in male and female patients of various age groups is prevalent in the area Sargur, Mysore District. This studies therefore supported the dominance MA and HA in female whereas microcytic and normochromic anemia in male. This study further suggests to bring awareness in people living in rural area to improve their health and related issues so that the incidence of this anemia can be lowered.

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