Original Research Article

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A study of etiological and clinical profile of patients with severe anemia in a tertiary care hospital

P. Dasharatham*, V. Samyuktha Reddy

Department of Department of General Medicine, MediCiti Institute of Medical Sciences, Ghanpur, Medchal, Telangana, India

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*Correspondence:

Dr. P. Dasharatham,

E-mail: ponnadasharatham@gmail.com

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ABSTRACT

Background: Though anemia due to iron deficiency is quite common in India there has been little wok done on the incidence of etiopathogenesis of severe anemia without apparent cause. Anemia is prevalent throughout the world. The objective of the present endeavour was to study the prevalence of severe anemia, to form an etiological categorization of anemia and to study the prevalence of heart failure in the study group

Methods: Total of 50 patients admitted to the medical ward of MediCiti Institute of Medical Sciences and meeting all the exclusion and inclusion criterion were studied. All the patients were subjected to a detailed history and physical examination. All cases were examined in detail according to proforma, investigations, pathological examination and other special tests were carried out.

Results: Female preponderance in a ratio of 3:2 was seen. Nutritional anemia was the most common etiology and all cases were seen only in females. Fatigue and tiredness were reported by all patients, hepatomegaly was the most in 42% of the patients. 38 (76%) were found to have cardiac murmurs. As the hemoglobin increased the proportion of patients with heart failure reduced. But this trend was not found to be statistically significant. The association between Hb level and presence of hepatomegaly or splenomegaly was not found to be statistically significant. Thrombocytopenia was the most common cytopenia found in 34%. Only 16% of the patients with severe anemia were found to have normocytic normochromic picture.

Conclusions: Severe anemia was found to be associated with morbidity. Hence early detection and prevention by vigorous treatment is important.

Keywords: Anemia, Clinical profile, Etiology, Heart failure, Prevalence

INTRODUCTION

Anemia is clinically defined as a condition where hemoglobin level in the blood is below the lowered extreme of the normal range for the age and sex of the individual. The standard given for anemia by Wintrobe MM is hemoglobin below 14gm% in adult males and below 12gm% in adult females.

The World Health Organization defines anemia as hemoglobin level less than 13g/dl in adult males and less than 12 g/dl in adult females and less than 11g/dl in pregnant females.²

Causes of anemia are varied and range fromiron deficiency, vitamin B12 and folic acid deficiency, malaria, hookworm infestations, schistosomiasis, renal diseases and other chronic infections that play an

important role in tropical climate. Nutritional anemia is a worldwide problem; its prevalence is highest in developing countries.³

Iron deficiency anemia is the commonest nutritional disease and second cause of nutritional anemia is folate deficiency closely followed by vitamin B12 and folic acid deficiency. Hemoglobin plays a key role in transporting oxygen to tissues and accounts for the decreased work capacity and physical performance of person with a decreased concentration. The biological basis of the impaired development and altered behaviour is unclear, although it may be related to certain functional changes at the cellular level e.g. alteration in certain iron containing enzymes. Anemia is not a disease, but it is a manifestation of underlying disease pathology. Compensatory mechanisms work till the hemoglobin drops to 7gm%. These patients become symptomatic and rapidly develop fatigue on exertion.⁴

Though anemia due to iron deficiency is quite common in India there has been little wok done on the incidence of etiopathogenesis of severe anemia without apparent cause. Anemia is prevalent throughout the world. Certain common patterns emerged from various studies conducted in many populations. Globally, anemia affects 1.62 billion people, which corresponds to 24.8% of the population. The highest prevalence is in preschool age children and the lowest prevalence is in adult male cohort. The population group with the greatest number of individuals affected is non-pregnant female cohort. Multicentric studies conducted by ICMR showed anemia prevalence in India in 16-70years age group was 47.9%. The age adjusted prevalence was 46.1%. The prevalence of anemia was higher among females than males. Prevalence of anemia was maximum (52.8%) in males of more than 45 years age whereas among females subgroup, younger females less than 30years age had higher prevalence of anemia.⁵

Present study was carried out to study the prevalence of severe anemia in different age groups, to form an etiological categorization of anemia in the study group and to study the prevalence of heart failure in the study group.

METHODS

Total of 50 patients admitted to the medical ward of MediCiti Institute of Medical Sciences and meeting all the exclusion and inclusion criterion were studied. All the patients were subjected to a detailed history and physical examination. All cases were examined in detail according to proforma, investigations, pathological examination and other special tests were carried out.

Inclusion criteria

Patients with age 18 years and above with anemia and hemoglobin of less than 7gm%.

Exclusion criteria

- All cases below 18 years of age
- Patients with renal failure and on treatment
- Patients who already had diagnostic workup elsewhere and on treatment
- Pregnant women
- Post traumatic cases.

Hemoglobin was estimated by Sahli's acid hematin method with Sahli's Hellige hemoglobinometer. Total red cell count was done using Hayem's diluents and cells were counted on the improved Neubauer's chamber. Packed cell volume was done by centrifuging exalate blood drawn from a vein in a Wintrobe haematocrit tube at 3000RPM for 30minutes.

Reticulocyte count was done by 0.3% alcoholic solution of Brilliant cresyl blue by the technique described by Wintrobe. Reticulocyte index was calculated by multiplying reticulocyte count with ratio of patient PCV with normal PCV and that was multiplied by the ratio of one by maturation time.

Reticulocyte index greater than two reflect adequate marrow function while less than two reflect hypo plastic marrow. Mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration was also calculated. Total leucocyte count was done by improved Neubauer counting chamber. Normal value is 5000-10000 cells per cumm of blood. Differential leucocyte count was done by preparing a thin and even film and staining with Leishman's stain. Special notes were made regarding the percentage of five or more lobed neutrophils and malaria parasites.

Platelet count was done by standard method described. ESR was done by using Westergeen's method. Red cell osmotic fragility test was based on creeds technique. Peripheral blood film was prepared by prickling the left middle or ring finger tip.

It was stained using Leishman's stain. The air dried film was covered with Leishman's stain (0.15gm% in 100ml of methyl alcohol) for a minute. An equal volume of buttered water at pH 6.8 WAS ADED. This was allowed to remain for 7-10 minutes and washed with buffered water thoroughly. This was dried and examined under light microscopy using both low power and oil immersion lens.

Bone marrow aspiration cytology was done using standard methods. Stool was examined microscopically for 4-5 consecutive days. Benzedrine test was used for detecting occult blood in stool. Complete urine examination was also done. Serum protein and A/G ratio was done. SGOT/SGPT was done to rule out liver disease. Blood urea and serum creatinine was done to rule out renal disease. Chest X ray PA view was done routinely in all cases.

RESULTS

Age of patients ranged from 18-60years with a mean of 33.02±12.79years.

Table 1: Distribution of study subjects as per causes of severe anemia.

Etiology	Male	9	Fema	ale	Tota	l
Etiology	No.	%	No.	%	No.	%
Nutritional	0	0	21	100	21	42
Leukemia	5	100	0	0	5	10
Lymphoma	5	100	0	0	5	10
Chronic blood loss	1	33.3	2	66.7	3	6
Chronic malaria	1	25	3	75	4	8
Non hemopoitic malignancy	1	50	1	50	2	4
AOCD	1	50	1	50	2	4
Hookworm infestation	2	66.7	1	33.3	3	6
Hemolytic anemia	2	66.7	1	33.3	3	6
Drug induced	2	100	0	0	2	4
Total	20	40	30	60	50	100

Table 2: Clinical features of severe anemia among the study subjects.

Clinical feature	S	Number	0/0
	Fatigue	50	100
ļ	Tiredness	50	100
	Giddiness	30	60
	Dyspnoea	21	42
	Fever	21	42
	Weight loss	16	32
	Palpitations	14	28
Crimintoma	Abdominal pain	12	24
Symptoms	Edema	10	20
	Bleeding diathesis	10	20
	Paresthesia	8	16
	Chest pain	7	14
	Jaundice	6	12
	Diarrhoea	3	6
	Blood loss	3	6
	FND	1	2
	Hepatomegaly	21	42
	Splenomegaly	19	38
Clinical signs	Purpura/bleeding	10	20
	Koilonychias	9	18
	Lymphadenopathy	8	16
	Bone tenderness	4	8

Female preponderance in a ratio of 3:2 was seen. Nutritional anemia was the most common etiology and all cases were seen only in females. No cases were seen in males. Leukemia, drug induced, and lymphoma were

absolute in males with zero cases in females. Other causes were similarly distributed between males and females.

Table 3: Association between hemoglobin levels and presence of cardinal murmur in CVS.

Murmurs	Hemoglo	Total	0/0		
Murmurs	1-3	3.1-5	5.1-7	Total	70
pulmonary	5	14	14	33	66
ESM	(15.2%)	(42.4%)	(42.4%)	33	00
Mitral PSM	2 (40%)	2 (40%)	1 (20%)	5	10
Total	7 (18.4%)	16 (42.1%)	15 (39.5%)	38	76

Fatigue and tiredness were reported by all patients this was followed by giddiness (60%), dyspnoea and fever in 42% each, weight loss by 32%, palpitations by 28% and abdominal pain by 24% of the subjects with severe anemia. Among clinical signs, hepatomegaly was the most common found in 42% of the patients followed by splenomegaly in 38%.

Table 4: Association between hemoglobin levels and heart failure.

Hemoglobin	t failur	failure			Total	
(gm/dl)	Yes		No		Tota	_
(giii/ui)	No.	%	No.	%	No.	%
1-3	3	60	2	40	5	10
3.1-5	6	28.6	15	71.4	21	42
5.1-7	4	16.7	20	83.3	24	48
Total	13	26	37	74	50	100

 $X^2 = 4.163, p = 0.124747$

Table 5: Association between hemoglobin levels and hepatomegaly.

Homodobin	Hepatomegaly				Total	
Hemoglobin (gm/dl)	Yes		No		Total	
(giii/ui)	No.	%	No.	%	No.	%
1-3	3	60	2	40	5	10
3.1-5	7	33.3	14	66.7	21	42
5.1-7	11	45.8	13	54.2	24	48
Total	21	42	29	58	50	100
$X^2 = 1.4573, p = 0.482558$						

Table 6: Association between hemoglobin levels and splenomegaly.

Hemoglobin	Splen	Splenomegaly			Total	Total	
level	Yes		No		Total		
(gm/dl)	No.	%	No.	%	No.	%	
1-3	1	20	4	80	5	10	
3.1-5	6	28.6	15	71.4	21	42	
5.1-7	11	45.8	13	54.2	24	48	
Total	18	36	32	64	50	100	

 $X^2 = 2.0658$, p = 0.355979

Out of 50 patients studied with severe anemia, 38 (76%) were found to have cardiac murmurs. Among them, majority i.e. 66% were having pulmonary ESM. Among these 33, five patients had hemoglobin between 1-3gm/dl and remaining patients had hemoglobin between 3-7gm/dl. 10% of the patients were found to have mitral PSM. Among them four had hemoglobin level less than 5 gm/dl and one patient had hemoglobin between 3-7 gm/dl.

Table 7: Distribution of study subjects as per presence of cytopenia.

Cell line	Number	0/0
Thrombocytopenia	17	34
Leucopenia	13	26
Pancytopenia	7	14
Total	50	100

Table 8: Distribution of study subjects as per characteristics of peripheral smear.

Peripheral smear	Number	%
Microcytic hypochromic	27	54
Dimorphic	15	30
Macrocytic hypochromic	2	4
Normocytic normochromic	8	16
Total	50	100

It has been seen from above table that as the hemoglobin increased the proportion of patients with heart failure reduced from 60% in Hb value of 1-3 gm/dl to only 16.7% in Hb value of 5.1-7gm/dl. But this trend was not found to be statistically significant.

The incidence of hepatomegaly with lowest hemoglobin level was 60% which dropped to 33.3% among those with Hb level of 3.1-5gm/dl. But this incidence increased to 45.8% among those with Hb level of 5.1-7gm/dl. This association was not found to be statistically significant.

Out of 5 only one case was having splenomegaly with Hb level 1-3gm/dl. With Hb level between 3.1-5gm/dl 28.6% were having splenomegaly and with Hb level between 5.1-7gm/dl, 45.8% were having splenomegaly. This association was not found to be statistically significant. Thrombocytopenia was the most common cytopenia found in 34% of the cases followed by leucopenia in 26% of the cases. 14% were found to have pancytopenia.

Only 16% of the patients with severe anemia were found to have normocytic normochromic picture. Majority presented with microcytic hypochromic picture followed by dimorphic peripheral smear in 30% of the cases. Only two patients had macrocytic hypochromic anemia.

DISCUSSION

After evaluating 50 patients with severe anemia nutritional anemia was the most common cause found in

42% of the cases. Similar findings were given by Baker SJ et al.⁶

Authors found that majority i.e. 26% of the patients with severe anemia belonged to the age group of 20-29years. But in a study done by Kumar S et al, the most common affected age group was 0-20years. This difference in the observation among the two studies may be due to the fact that the present study has taken patients of severe anemia only above the age of 18years.

Gawrikar et al, in their study observed that the prevalence of anemia was 82.9% in the age group of 12-18 years with formal education, but this prevalence increased to 92.7% in the same age group of children without formal education.⁸

Authors found that females were more commonly affected than men. The male to female ratio was 1:1.6. other studies have shown a slightly more prevalence among the males compared to females except one study by Kumar R et al, who found that the prevalence of anemia was twice as common among males as females.⁹⁻

Authors observed that the most common symptom of severe anemia was fatigue and tiredness as reported by all cases, pallor was present in all cases, fever was seen among 40% cases and splenomegaly was seen among 36% of the cases. Vineetha et al, also noted that the most common symptom was generalized weakness followed by pallor in 83.5%, fever in 53.5% and splenomegaly in 18% of the cases. ¹⁴ Gayathri et al, had more similar observations compared to the present study like 89% with generalized weakens, 92% with pallor, 46% with fever and 30% with splenomegaly. ¹²

It was observed that nutritional anemia was the most common cause of severe anemia in the present study. Among these patients with nutritional anemia, iron deficiency was the most common cause. Similar findings were given by Milman N et al.¹⁵

Total 60% of the patients with Hb level <3gm/dl presented with heart failure in contrast to 16% with Hb level 5-7gm/dl. The cardiac output usually increased when Hb is <7gm/dl. When it is <5gm/dl the increase in the cardia index principally results from an increase in the stroke volume and to lesser extent on the heart rate especially during exertion or stress.¹⁶ In contrast, patient without anemia, increase their cardia index primarily by an increase in heart rate and to lesser extent on the increase in stroke volume during exertion. In children with anemia, however still the increased cardia index is achieved by increased heart rate mainly and to a lesser extent by increase in stroke volume as described by Horwich T et al, hence CHF is seldom seen in children solely due to anemia unless there is an underlying heart disease. But such is not the case with adults having Hb <5gm/dl.17

On peripheral blood smear examination dimorphic anemia correlated strongly with the presence of nutritional anemia all the patients with hemopoietic malignancy had either microcytic hypochromic or a normocytic normochromic picture. All the patients with anemia due to blood loss had a microctic hypo chromic picture. It was also found that close examination of peripheral blood smear was more useful than red cell indices in the diagnostic work of a patient. The peripheral smear picture in the present showed all the four variants of anemia i.e. 54% patients showed microcytic hypochromic picture which is in line with the study done by Verma et al.¹⁸

Authors found that seven patients had pancytopenia of which aplastic anemia, hemopoietic malignancy and nutritional anemia accounted for two each. One case of pancytopenia was due to tuberculosis. In studies by Verma et al, pancytopenia was due to aplastic anemia whereas in studies by Khunger et al, Gayathri et al, the most common cause of pancytopenia was megaloblastic anemia. Pancytopenia can arise out of various underlying etiologies as evidenced by the studies described above. In the subset of patients suffering from non-Hodgkin's lymphoma showing pancytopenia the present study had a comparable result i.e. 2% of patients had pancytopenia in association with non-Hodgkin's lymphoma with the study done by Khunger et al (1%).

Hepatomegaly and splenomegaly in the study population in relation to megaloblastic anemia was arrived at. It was found that 10.5% of the study population was having splenomegaly whereas hepatomegaly was seen in 19.05% of the cases. The results were comparable if not fully to the study done by Ishtiaq O et al, who noted 17.9% of his sample population to have hepatomegaly whereas 15.4% had splenomegaly.¹⁹

In the present study, 42% patients had blood picture of B12 deficiency. The clinical feature of all these patients ranged from pallor to ataxia. In a study done by Nafil et al, pallor was recorded in 63.3% of their cases.²⁰

CONCLUSION

The most common cause of severe anemia was nutritional anemia. Females were found more affected than males. Malignancy of both hemopoietic and non-hemopoietic accounted for about 40% of the cases in 5th and 6th decades of life. Presence of hepato splenomegaly and/or lymphadenopathy points towards hemopoietic malignancy as the cause of anemia. Congestive heart failure was seen more frequently in the later decades of life and was not seen in patients below 20 years of age without underlying heart disease. Congestive heart failure was more frequently seen as the severity of anemia increased, being 60% in patients with hemoglobin less than 3gm%. Dimorphic picture on peripheral smear strongly correlates with the presence of nutritional deficiency as the cause of anemia.

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Institutional Ethics Committee

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