RESEARCH
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A CLINICAL AND ETIOLOGICAL STUDY OF SEVERE ANEMIA (HAEMOGLOBIN%<7GM%) IN FEMALES (18-60) IN A TERTIARY CARE HOSPITAL

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Abstract
Background: Anemia is a major global health concern, especially in developing countries such as India. Despite being preventable and easily treatable, the illness is prevalent in young children, pregnant women, and nursing moms. [1] Approximately 30% of the global population suffers from anemia due to various causes. [2-4] The World Health Organization estimates that anemia affects [1].
OBJECTIVES: To study the clinical profile of female patients, aged 18-60 years, presenting with a hemoglobin level of less than 7 gm% in the study population.
MATERIAL & METHODS: Study Design: Hospital-based, cross sectional study. Study area: The study was conducted in the Department of General Medicine Shadan Institute of Medical Sciences & Hospital, Hyderabad, Telangana from March 2023 to August 2023. Sample size: Study consisted a total of 50 subjects. Sampling Technique: Simple Random technique. Study tools and Data collection procedure: 50 patients admitted to the medical wards meeting all the exclusion and inclusion criterion were studied. All the patients were subjected to a detailed history and physical examination. Their social and dietary habits were enquired. The details were recorded in the proforma. All the patients underwent a series of diagnostic investigations. They were hemogram, ESR, Blood urea, blood sugar, serum creatinine, serum electrolytes, complete urine examination, stool for ova and cysts, stool for occult blood and a chest X-ray. Additional investigations were done as required in the case for the establishment of diagnosis.
Results: About 21 patients had hepatomegaly of which 13 were congestive, 3 were due to lymphomas/leukemias, 3 patients out of total of 21 patients with nutritional anemia had hepatomegaly i.e., about 14% incidence one patient had malaria and the other one amoebic liver abscess. 19 patients had splenomegaly of which 5 had nutritional anemia, 8 had leukemia/ lymphoma hence, 8 of 9 patients with hemopoietic malignancy had splenomegaly and only 5 of the 21 patients with nutritional anemia had splenomegaly.
CONCLUSION: Malignancy both hemopoietic and non-hemopoietic accounted for about 40% of cases in 5th and the 6th decades. Presence of hepatosplenomegaly and / or lymphadenopathy points towards hemopoietic malignancy as the cause of anemia. Congestive heart failure is more frequently seen as the severity of anemia increases, being 60% in patients with hemoglobin less than 3 gm%.
Keywords: Hematocrit, iron deficiency anemia, megaloblastic anemia, hemoglobin.

INTRODUCTION

Anemia is a major global health concern, especially in developing countries such as India. Despite being preventable and easily treatable, the illness is prevalent in young children, pregnant women, and nursing moms. [1] Approximately 30% of the global population suffers from anemia due to various causes. [2-4] The World Health Organization estimates that anemia affects [1].

The fourth National Family Health Survey (NFHS) 2015-2016 found that 58.6% of children aged 6-59 months had anemia, with rural areas seeing higher rates than urban areas.[5] Estimates suggest that anemia affects 50% to 80% of high-risk Indian communities, with 10% to 20% experiencing moderate to severe cases.[6] The literature highlights several risk factors for anemia, including low family income, low maternal education, lack of access to healthcare, filthy living conditions, and inadequate iron consumption.[7,8]

Nutritional anemia is the most common type of anemia in underdeveloped countries. Iron deficiency is the leading cause of nutritional anemia, but additional causes include a lack of folic acid, vitamin B12, or a combination of these. Hemolytic anemia, either acquired or congenital, is among the various types. Congenital reasons include hemoglobin abnormalities, enzyme faults, and membrane defects. Acquired causes might be immune or non-immune. Additional types of anemia include aplastic anaemia, blood loss anemia, and chronic disease anemia.[9,10]

OBJECTIVES: To study the clinical profile of female patients, aged 18-60 years, presenting with a hemoglobin level of less than 7 gm% in the study population.

MATERIAL & METHODS:

Study Design: Hospital-based, cross sectional study.

Study area: The study was conducted in the Department of General Medicine, Shadan Institute of Medical Sciences & Hospital, Hyderabad, Telangana from March 2023 to August 2023.

Sample size: Study consisted a total of 50 subjects.

Sampling Technique: Simple Random technique.

Inclusion Criteria: Female patients between 18 and 60 years of age, with anemia and a hemoglobin of less than 7 gm% were included in the study.

Exclusion criteria:

- All the female patients and male patients not in the specified age group.
- Patients diagnosed as having renal failure and on treatment were excluded from the study.
- Patients who already had diagnostic work up elsewhere and on treatment were excluded from the study.

Study tools and Data collection procedure:

50 patients admitted to the medical wards meeting all the exclusion and inclusion criterion were studied. All the patients were subjected to a detailed history and physical examination. Their social and dietary habits were enquired. The details were recorded in the proforma.

All the patients underwent a series of diagnostic investigations. They were hemogram, ESR, Blood urea, blood sugar, serum creatinine, serum electrolytes, complete urine examination, stool for ova and cysts, stool for occult blood and a chest X-ray. Additional investigations were done as required in the case for the establishment of diagnosis.

Statistical analysis:

The data has been entered into MS-Excel and statistical analysis has been done by using IBM SPSS Version 25.0. For categorical variables, the data values are represented in terms of numbers and percentages. The chi-square test was used to assess group association. For continuous variables, mean and standard deviation of the data are displayed. The student's t-test was used to compare the mean differences between the two groups. All p values less than 0.05 are regarded as statistically significant.

OBSERVATIONS & RESULTS:

Table – 1: Age Distribution

Age Group	Number of Cases	%age of total
18-19	10	20
20-29	13	26
30-39	10	20
40-49	8	16
50-59	9	18

The age of the patients in this study ranged from 18-60 years with a mean of 33 years.

The duration of the illness ranged from 1 month to 9 years, with a mean of 10.56 months before presentation to the hospital, the range is very wide due to the varied etiological categories in the study.

Table – 2: Clinical Features

Symptoms	Number of patientshaving	% age of total
Fatigue	50	100
Tiredness	50	100
Giddiness	30	60
Dyspnea	21	42
Fever	21	42
Weight loss	16	32
Palpitations	14	28
Abdominal pain	12	24
Edema	10	20
Bleeding diathesis	10	20
Paraesthesis	8	16
Chest pain	7	14
Jaundice	6	12
Diarrhea	3	6
Blood loss	3	6
Focal neurological deficit	1	2

All the patients had easy fatigability and tiredness. 60% of them had giddiness followed by shortness of breath on exertion in 42%. 8 patients had paraesthesis and all of them had a megaloblastic marrow. One patient presented with sub-acute degeneration of spinal cord and a megaloblastic marrow. Overall 9 of the 21 patients (42.8%) with megaloblastic marrow had neurological symptoms on presentation. The varied symptomatology in the study might be due the varied etiological categories.

TABLE-3: Cardiovascular Signs & Symptomatology

Murmurs	No. of Pts	% age	Hemoglobin (gm%)			% age with murmurs		
			1-3	3.1-5	5.1-7	1-3,1	3.1-5.0	5.1-7
P ESM	33	66	5	14	14	100	66	58.3
A ESM	-	-	-	-	-	-	-	-
M PSM	5	10	2	2	1	40	10	4
Tricusp	-	-						

P ESM : Pulmonary ejection systolic murmur.
A ESM : Aortic ejection systolic murmur
M PSM : Mitral pan systolic murmur

About 33 (66%) patients had a P ESM and about 5 (13%) had a short (/mid) systolic murmur in the area. All the patients with short (mid) systolic murmur in the mitral area had P ESM.

CONGESTIVE CARDIAC FAILURE: The presence of congestive cardiac failure was established on the major/minor Framingham criterion for diagnosis of congestive heart failure.

TABLE – 4: Age Group

Age group	Number	Pts in CHF	% of pts having CHF
18-19	10	0	0
20-29	13	2	15%
30-39	10	2	20%
40-49	8	3	37.5%
50-59	9	6	67%

TABLE – 5: Hemoglobin

Hemoglobin%	Number	Pts with CHF	% of pts in CHF
1-3 gm%	5	3	60
3.1-5 gm%	21	6	28.6
5.1-7 gm%	24	4	16.6

The above two tables show a high incidence of CHF in patients who are in their fifth or sixth decade with about 67% of patients in the sixth decade having CHF. Only 2 patients below 30 years of life had CHF and these 2 had a very low hemoglobin concentration (<3gm%).

On the predictable lines about 60% of the patients with hemoglobin of less than 3 gm% had CHF, only 2 patients with hemoglobin less than 3 gm% did not had CHF and these 2 were very young (18 and 21 years old) the incidence of CHF decreased as the severity of anemia decreased being about 16.6% in patients with a hemoglobin of 5.1-7 gm%.

Table – 6: Etiology

Etiology	Number ofCases	% age of the total
Nutritional	21	42
Leukemia's	5	10
Lymphomas	4	8
Chronic malaria	4	8
Hookworm infestations	3	6
Chronic blood loss	3	6
Hemolytic	3	6
Secondary to non hemopoietic malignancy	3	6
Drug induced	23	4
Anemia of chronic disease	2	4

Table – 7: Clinical Features in Hemopoietic System

Clinical sign	Number of patients	% age
Hepatomegaly	21	42
Splenomegaly	19	38
Purpura/bleeding dis	10	20
Koilonychias	9	18
Lymphadenopathy	8	16
Bone (sternum) tenderness	4	8

About 21 patients had hepatomegaly of which 13 are congestive, 3 were due to lymphomas/leukemias, 3 patients out of total of 21 patients with nutritional anemia had hepatomegaly i.e., about 14% incidence one patient had malaria and the other one amoebic liver abscess. 19 patients had splenomegaly of which 5 had nutritional anemia, 8 had leukemia/ lymphoma hence, 8 of 9 patients with hemopoietic malignancy had splenomegaly and only 5 of the 21 patients with nutritional anemia had splenomegaly. 9 patients had koilonychias of which 5 had anemia secondary to chronic blood loss, 3 of them had nutritional anemia and one had a liver abscess.

Of the 17 patients with thrombocytopenia 9 had nutritional anemia i.e, about 42% of patients with nutritional anemia with aHb<7gm% had thrombocytopenia. 5 of the patients had hemopoietic malignancy and 2 had aplastic anemia with 1 having tuberculosis. 13 patients had leucopenia of these 5 had nutritional anemia, 5 had hemopoietic malignancy and 2 had aplastic anemia with tuberculosis being the cause in lone patient. 7 patients had pancytopenia, of which, aplastic anemia, hemopoietic malignancy and nutritional anemia accounted for 2 each. 1 was due to TB.

Table 8: PERIPHERAL SMEAR:

Peripheral smear	Number of patients	% age of patients
Microcytic hypochromic	27	54
Dimorphic	15	30
Normocytic normochromic	6	12
Macrocytic hypochromic	2	4

Majority of the patients (27 patients) had microcytic hypochromic picture on peripheral smear. Of these 10 were due to malignancy (hemo& non hemopoietic), 5 had anemia of chronic blood loss, 4 had nutritional anemia i.e., about 19% of nutritional anemias had a microcytic hypochromic picture, but also about 85% of the patients with a picture of microcytosis and hypochromia did not have nutritional anemia. All the patients with a dimorphic blood picture (i.e., both micro and macrocytosis) had nutritional anemia (15/15). 6 patients had a normocytic normochromic picture of these 3 had hemopoietic malignancy and beta thalassemia, aplastic anemia and hereditary spherocytosis accounting for one each. Both the patients with a macrocytic hypochromic anemia had nutritional anemia and a megaloblastic marrow.

DISCUSSION:

After evaluating 50 patients with severe anemia and a hemoglobin of less than 7 gm%, nutritional anemia was found to be the most common cause (42%) in this study. Hemopoietic malignancies accounted for the next largest group with 18% of the cases, followed by anemia due to chronic blood loss in about loss in about 12% of the patients. All the other causes were scattered in 2 or 3 patients in each.

In this study the age distribution was approximately equal in all the decades of life studied (2nd to 6th decade). But maximum number of patients were in their 3rd decade (13 pts) and minimum number was represented by the 5th decade (8 pts) of life. The hemopoietic and non-hemopoietic malignancies accounted for 41% of the cases in the 5th& 6th decades of life, in contrast to only 2 patients had malignancy as the cause of anemia in the 2nd and 3rd decades of life. The patients had hemopoietic malignancy.

It is observed in this study that nutritional anemia was still the major cause of severe anemia (Hb<7gm%) in males in all the decades of life studied. The nutritional deficiency as the cause of anemia was concluded in all the cases based on the megaloblastic picture of bone marrow and absent iron stores in the bone marrow. All these patients were thoroughly worked up for any other explainable cause of anemia. In a study done in this hospital (SIMS) 4 years back has shown nutritional deficiency as the most common cause of megaloblastic marrow, the nutritional deficiency was the cause in 30-50% of the patients in different decades of life.

In the present study it was also observed that nearly all patients with malignancy as the cause of anemia presented within 6 months from the onset of symptoms. In contrast 67% of the patients with anemia due to chronic blood loss presented after 6 months of onset of symptoms. Presentation of patients with

nutritional anemia did not follow any pattern, they came for consultation between 1 month to 2 years of symptomatology.

In this study all the patients had easy fatigability, tiredness as the most common symptoms. These were followed by the shortness of breath in 42% of the patients, majority of whom are in their 4th, 5th or 6th decade of life. About 32% of the patients had weight loss at presentation.

26% of the patients presented with congestive heart failure. The incidence of CHF increased as the age advanced and, was found to be highest (67%) in the sixth decade of life with a lesser incidence in earlier decades. No patient in the second decade presented with CHF.

60% of the patients with a hemoglobin level of less than 3 gm% presented with CHF, in contrast to 16% of the patients with hemoglobin of 5-7 gm%. When the hemoglobin concentration is less than 7 gm%, the cardiac output is usually increased. (Brannun et al.[11]). When it is less than 5 gm%, the increase in the cardiac index principally results from an increase in the stroke volume and to lesser extent on the heart rate specially during exertion or stress. In contrast, patients without anemia increase their cardiac index, primarily, by an increase in heart rate and to lesser extent on the increase in stroke volume, during exertion (Roy et al[12]). In children with anemia, however still the increased cardiac index is achieved by an increased heart rate mainly and to a lesser extent by increase in stroke volume (Cropp GJA et al[13]). Hence CHF is seldom seen in children solely due to anemia unless there is an underlying heart disease, but such is not the case in adults with hemoglobin of less than 5gm% (Roy et al[12]). Cardiac compensation may be marginal in patients with severe anemia and CHF may be precipitated on stress or blood transfusion. (Graettinger et al[14]). When the hemoglobin becomes less than half the normal (<7 gm%), the ventricular function is impaired, presumably because coronary blood flow has reached its maximum. (Casee et al[15]). This impaired function might be a contributing factor for the development of anemia in adults with severe anemia. The results of this study were consistent with the studies quoted above.

Clinical findings like hepatomegaly, splenomegaly, lymphadenopathy were associated with hemopoietic malignancy as the cause of severe anemia in this study. It was observed that more than 80% of the patients in the study with hemopoietic malignancy had either one or more clinical finding. In contrast hepatomegaly was seen in 14% and splenomegaly in 20% of patients with nutritional anemia, consistent with the findings by sarod et al[16]. Both hepatomegaly and splenomegaly were seen in only 2 patients in contrast to 60% with hemopoietic malignancy.

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 microcytic hypochromic picture. It was also found that close examination of peripheral blood smear was more useful than red indices in the diagnostic work up of a patient.

CONCLUSION:

Malignancy both hemopoietic and non-hemopoietic accounted for about 40% of cases in 5th and the 6th decades. Presence of hepatosplenomegaly and / or lymphadenopathy points towards hemopoietic malignancy as the cause of anemia. Congestive heart failure is more frequently seen as the severity of anemia increases, being 60% in patients with hemoglobin less than 3 gm%. Peripheral smear examination is better than red cell indices for characterization of the type of anemia and for diagnostic work up. Dimorphic picture on peripheral smear strongly correlates with the presence of nutritional deficiency as the cause of anemia.

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