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Clinical hematological and bone marrow study of severe anaemia

Dr.Pogula Nagarjuna Reddy , Dr.Vinaya Swami P.M

Department of Pathology , J.J.M.Medical College , Davanagere,Karnataka, India

Corresponding author :Dr.Vinaya Swami P.M

Abstract

Background and Objective : Anaemia is the most significant health problem worldwide especially in India. In this study we tried to find out the prevalance clinical & hematological features of severe anaemia (i.e. Hb < 7 gm%), and bone marrow study was done.

Methods : We have evaluated all the patients presenting to the medical wards of J.J.M. college,davanagere. for a period of 2 year between 2012 to 2014, 50 patients are selected randomly with a Hb level of < 7 gm%.. Clinical examination has been done and were investigated through a complete hemogram& bone marrow examination.

Results : Specific signs like nail changes, peripheral neuropathy were case specific. Severe anaemia was more common in female in the age group of 21 to 50 yrs. macrocyticanaemi seen in 56% of cases, microcytic hypochromic(18%), dimorphic anemia(20%), normocytic normochromic (6%). vitamin B12 and folate deficiency are more significant than iron deficiency anaemia.

Conclusion : According to our study nutritional anaemia and anaemia due to chronic blood loss still form a major etiological cause of severe anaemia. As these factors are easily modifiable by food supplementation and regular gynecological check up, a major cause of severe anaemia can be reduced. Also this study shows the worrying trend of increasing cause of severe anaemia due to chronic disease and hematological malignancies as compared to earlier studies and shows an urgent need to evaluate the cause of this trend.

Key words : Anaemia, Iron deficiency, Megaloblastic anemia

Introduction

Anemia literally means 'without blood' but is clinically defined as a condition where hemoglobin (Hb) level in the blood is below the lower extreme of the normal range for the age and sex of the individual.[1] The standard value given for anemia by Wintrobe MM are Hb below 14 gm% in adult male and Hb level below 12 gm% in adult female.[2]

Anemia may be caused not only by a deficiency of iron, vitamin B12 and folic acid deficiency but by other conditions, such as malaria, hookworm infestations, schist-osomiasis, chronic infection, renal diseases and other infections play a important role in tropical climate. Congenital hemolytic anemias such as Sickle cell anemia and thalassemia are often found in certain populations particularly in Africa, Asia and some Pacific islands, although they rarely constitute a significant public health problem.[3]Although Nutritional anemia is a worldwide problem, its prevalence is highest in developing countries.[4] , [5]Hemoglobin plays a key role in transporting oxygen to tissues, accounts for the decreased work capacity and physical performance of person with a decreased concentration of haemoglobin.[6] Anemia is not a diagnosis in

itself but merely an objective sign and symptom complex of some underlying disease. Because of its high morbidity rate, anemia has immense socio-economical and psychological problems.

Compensatory mechanisms work till the hemoglobin drops to 7 gm%. These patients becomes symptomatic and thus is the time the patients comes to the doctor due to affection of working capacity.[7]The socioeconomic consequences of high prevalence of anemia are thus enormous especially in a developing agricultural country like India.[8]With the accumulation of data on prevalence have come an increased understanding of the detrimental effect of anemia, greater knowledge of other metabolic disorder produced by these anemia and development of laboratory technique for the investigations and diagnosis of the anemia. Unfortunately these scientific advances have so far had little impact on the control of anemia which remains a major public health problem in many parts of the world.[9]

Though iron deficiency anemia is the commonest anemia in our country[3] there had been little work done on the incidence of etiopathogenesis of severe anemia in which cause of severe anemia is not apparent.

Methodology

During the present study 50 cases of severe anaemia have been studied. All cases have been taken from patients admitted to Medical ward to District Hospital and Bapuji Hospital attached to J.J.M. Medical College, Davangere.

Inclusion criteria :

- The cases selected were of severe anaemia with hemoglobin 7 gm% or less.

Exclusion criteria :

- Age group below 13 years.
- Presence of a severe bleeding disorder which may lead to serious bleeding after the bone marrow aspiration.
- Pregnant women.

Methods :

All the cases included were interrogated and examined in detail according to preplanned proforma. Investigations pathological examinations and other special tests carried out :

Socioeconomic status :

Socioeconomic status has been calculated by modified BG Prasad classification –

Reticulocyte count :

It was done by 0.3% alcoholic solution of Brilliant cresyl blue by the technique described by Wintrobe.[10]

Peripheral blood film (PBF) :

Bone marrow (BM) aspiration cytology :

The site selected for aspiration was the manubrium of sternum. Using the bone marrow aspiration needle (Salah) under all aseptic precautions and under mild sedation bone marrow aspiration was performed in all cases. The tissue was spread on glass slides and films prepared. They were studied with Leishman's stain and examined under oil immersion lens.

Stool examination : Stool are examined microscopically for 4 to 5 consecutive days, Benzidine test was used for detecting occult blood in stool.

Results

Age of the patients in the present ranged from 13 years to 75 years. Majority of the cases were below 50 years and most of the patient

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are in the age group of 21 – 50 years accounting for 76%.

In the present study there were 23 (46%) male and 27 (54%) female patients

Most of the patients monthly income is between 773 – 1546 (class IV) accounting for 38% and 1547 – 2577 (class III) accounting for 36% reflecting low socioeconomic status in many of the patients.

Prevalence of anemia is more in vegetarian accounting for 60% and 40% in mixed diet.

Most of the patients of severe anaemia are alcoholic accounting about 40%.

Most the patients in the present study presented mainly with general symptoms of anaemia. Accordingly general weakness and fatigability was present in all the cases (100%). Palpitation and chest pain in about (32%) of the patients. Breathlessness was present in about 84% of patients. and about 70% of patients have headache and dizziness as present complaints. About 34% of the patients had paresthesia.

Accordingly pallor was present in all the cases. Knuckle pigmentation in 60% of cases. Glossitis in 30%, haemic murmur was present in 88% of the patients, liver was palpable in 58% of patients and spleen palpable in 36% of patients.Neurologic deficits were seen in very severe anaemia in about 16% of cases.In the present study hemoglobin value levels varied from 2.0 to 7 gm%. Most of the patients Hb was between 5-6 gm% accounting 40% and 8% of patients have Hb between 2 – 2.9 gm%.

In the present study almost all cases had a PCV value of less than 30%. Most of the patients had PCV between 11 – 20% accounting 68%. Only 1 patient had PCV >30 accounting 2%.In the present series of cases ESR values ranged from 12 mm/1st hour to 80 mm/1st hour. Most of the patient ESR was between 31-50 accounting for 46%.

Most of the patients have reticulocyte count between 1 – 1.5 accounting 56%. 22% of patients have reticulocyte count >1.5 as they have been treated with iron / B12 supplementation.

Most of the patients have WBC count less than 4000. 16% between 1000-3000/mm^3, 18% between 3000-4000/mm^3 and 16% between 4000 – 5000/mm^3.

Most of the patients have thrombocytopenia i.e. less than 1,50,000 with 26% of patients having platelet count between 51,000 – 1,00,000.

RBC morphological types present were macrocytes, marked degree of anisocytosis and poikilocytosis in most of the cases. Anisocytosis and poikilocytosis accounting for 90% and 76% have Macrocytosis and 20% Microcytosis.

Most of the patients have erythroid hyperplasia of about 94% and 68% have patient have reversal of myeloid : erythroid ratio and megaloblastic erythropoiesis respectively.

Discussion

In the present study an attempt has been made to find out the clinical presentation and etiology of severe anaemia in patients admitted to District hospital and Bapuji Hospital, Davangere. In this study random 50 cases of severe anaemia with Hb concentration of ≤ 7

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gm% have been evaluated clinically and investigated with regards to the clinical, hematological and bone marrow study as far as possible in our setting.

Age incidence :

In the present study maximum incidence was found in third to fifth decade i.e. between 21 to 50 years and most of patients are between age group 41-50 years. This was not different from similar studies done by Krishna Das KV in Trivandrum and by Choudhary TS in Bikaner, who also found the incidence most common in this age group.[4,12]

Sex incidence :

Anemia is more prevalent in females than in males accounting for 54% and 46% respectively, this difference can be due to blood loss in menstruation (or) pregnancy.

Dietary habits :

30% were vegetarian as compared to only 20% being non vegetarian. This trend was even further enhanced when only nutritional anemia was seen and was found to be present in 60% cases among vegetarian. Similar results were seen in the study by Choundary TS.[12]

Symptoms :

Tiredness, lassitude, easy fatigability and generalized weakness are the most common and often the earliest symptoms of anemia[1]

Dyspnea and Palpitations :

Most common symptoms are dyspnea or exertion and palpitation followed by angina pectoris and intermittent claudication.[76] 84% of the patients presented with exertional dyspnea and 32% presented with complaints of palpitations and chest pain.

Other symptoms :

Passage of hookworm in 3 patients, history of lymphadenopathy in 4 patients and history of paresthesia's in 8 patients. These were limited to the group of diseases and were the least common of symptom in the present study.

Signs :

Generalized pallor is the most prominent and characteristic sign. It may be seen in skin, nail bed, mucous membranes and conjunctiva. Pallor of the skin creases of palm are a more reliable sign then skin pallor elsewhere.[1] This sign was seen in all 100% of cases of severe anaemia

Glossitis was more commonly seen in patients with macrocytic and dimorphic anaemia in 30% of these patients as compared to patients with microcytic anemia. These findings correlate to those of Chatterjee JB.[13]Total of 12 patients presented with nail changes of which 10 had koilonychia while 2 had platynychia. Of these 8 were seen in patients with microcytic hypochromic blood picture, while 04 had dimorphic blood picture. So of the patients with microcytic picture 52% had nail changes, this co-related to the study of Krishna Das KV.[4]

signs of hyperdynamic circulation like collapsing pulse, tachycardia was most common in 60% patients and hemic murmur (most commonly short systolic murmur in pulmonary area) in 44% of cases. Fundal changes including pallor of the disc and retinal hemorrhages (only 4 cases) was most common seen in 8% of cases. This correlates with the study of Krishna Das KV where fundal changes were seen in 34.4% cases.[4] Paresthesia's and peripheral neuropathy / myelopathy may be commonly seen with pernicious (vit B12 deficiency). These were seen only in 8 patients in the present study.

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Morphological pattern of severe anaemia :

According to the peripheral blood film and red cell indices the patients were divided in the following groups.

- Macrocytic anaemia – 56%
- Microcytic hypochromic anaemia – 18%
- Dimorphic anaemia – 20%
- Normocytic normochromic – 6%

Bone marrow studies showed :

- Hypercellular in 94% cases
- Normocellular in 2% cases
- Leukemic reaction 2% cases
- Hypocellular – 4% cases

Megaloblastic reaction was seen in 26 cases, microcytic in 10% cases, megaloblastic / normoblastic in 9 cases and normoblastic in 2 cases. Cases of anaemia due to an underlying disease were diagnosed by certain investigations as per clinical suspicion 2 patients of CRF were diagnosed by high serum creatinine levels and small contracted kidney size on Ultrasonography. The anaemia in renal failure is due to depression of erythropoiesis due to deficiency of erythropoietin as well as due to increased destruction of red cells.[1] All 2 patients of CRF presented with normocytic morphology.

In anaemia of chronic diseases the basic pathogenesis is the inability of the bone marrow to increase production sufficiently to compensate for mild degree of increased red cell destruction. The impaired marrow response may be due to

a. Inappropriately decreased erythropoietin production.
b. Impaired flow of iron from the reticuloendothelial system to erythroblasts.[14]

Malaria was seen in 1 in which peripheral blood film showed plasmodium falciparum infection. The cause of anaemia in these patients due to hemolysis i.e. increased destruction of red cells.[15]Nutritional anaemia was diagnosed when no other causes could be ascertain and when the patients general physical examination showed definite evidence of chronic malnutrition. Nutritional anaemia was the most important and common cause of severe anaemia. 28 patients had macrocytic anaemia i.e. due to vitamin B-12 and folate deficiency, followed by 18 had microcytic blood picture with iron deficiency anaemia

These etiological findings are grossly different from those of Krishna Das KV (1980), whose study showed 80-85% due to nutritional factor, with iron deficiency anemia of upto 70% cases[4] as compared to only 45% cases of nutritional anaemia.

In the present study of which megaloblastic anaemia due to Vit B-12 and folate deficiency forming major bulk as compared to iron deficiency in previous study.

Another study by Chaudhary TS (1998), showed more similar results to our present study with megaloblastic forming 31% cases, followed by microcytic anaemia.[16]This changing trend may be due to

- Better iron supplementation in present period.
- Changing socioeconomic status in society.
- Difference in the study group and area in the older and the present study.
- Involvement of a tertiary care Centre in the present study.

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Conclusion

Anaemia is still highly prevalent in developing countries like India, affecting the work output and hence having massive socio economic impact on the nation. In our study we evaluated 50 cases of severe anaemia and found nutritional anaemia as a major etiological factor for severe anemia with vitamin B-12 and folate deficiency more commonly seen as compared to iron deficiency.

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