



STUDY OF CLINICAL MANIFESTATION, COMPLICATION AND LABORATORY FEATURES OF SICKLE CELL SYNDROME.

Medicine

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ABSTRACT

AIM: To study the various clinical manifestation and complication of Sickle cell syndrome along with laboratory features.

METHODS: Patients with sickle cell syndrome admitted in RIMS, Ranchi were studied using random sampling method over a period of one year. Complete blood count, sickling test, Bone Marrow Examination, High performance liquid chromatography investigation were done to find out the result.

RESULT: The prominent clinical manifestation of sickle cell syndrome were yellowish discoloration of sclera, pain abdomen, fatigue, followed by fatigue and fever and then combination of fever and bodyache. In the study we found 15 cases of sickle cell disease presented with vasoocclusive crises, 4 patient with sequestration crisis and 2 patient with acute chest syndrome. In the laboratory parameters we found a significant correlation between hemoglobin S and serum iron and serum potassium with a p value of 0.001 and 0.035 respectively, most of the cases of sickle cell disease are associated with hypoxia with poa_2 approximately 85mmhg whereas those with sickle cell trait had poa_2 in the normal range.

CONCLUSION: Yellowish discoloration of sclera was the most prominent clinical manifestation and vasoocclusive crisis was the most common complication of sickle cell disease. There was a significant correlation between hemoglobin S and serum iron and serum potassium.

KEYWORDS

Sickle cell syndrome, vasoocclusive crisis, Hemoglobin S, Sickle cell trait, Acute chest syndrome

INTRODUCTION:

Sickle cell disease is a collective term for a number of genetic disorders in which hemoglobin is structurally abnormal, resulting in the episodic formation of sickle-shaped red blood cells and a wide range of clinical manifestation. It affects some 12500 people in the UK and millions world wide, particularly [1] those of black African and Afro-Caribbean descent, and also those from the Mediterranean, Middle East, and parts of India [2]. The underlying abnormality is a single nucleotide substitution in the gene for beta-globulin on chromosome 11, resulting in the replacement of a glutamic acid residue with valine on the surface of the protein [3]. It is now well established that sickle cell disease result from a single change of one amino acid, valine instead of glutamic acid at the sixth position among the 146 amino acids of the hemoglobin beta chain [4,5]. The clinical manifestation of sickle cell anemia begin early in life and continue with an increased incidence of adverse events coincident with the physiologic decline in fetal hemoglobin [6,7]. Three types of manifestation are primarily seen in sickle cell disease: Chronic hemolytic anemia, vasoocclusive phenomenon and infectious with a high sensitivity. Sickle red cell are abnormally adherent to many substrates, including endothelial cells [8], leukocytes, platelets [9], and extra cellular matrix molecules. Hebbel and colleagues found evidence decades ago that patients with more adherent cells were more likely to suffer vasoocclusive episode [10]. Chronic anemia and hemoglobin between 5gm/dl to 11gm/dl is found in steady state sickle cell anemia [11]. Anemia is normocytic normochromic in sickle cell disease in spite of an elevated reticulocyte count. Thrombocytosis is also considered to be a common condition associated with hyposplenism [12]. The major alteration in bone marrow examination is bone marrow hyperplasia [13].

Aims and Objective:

1. To study the clinical manifestation and complication of sickle cell anaemia.
2. To study various laboratory features of sickle cell syndrome

Methodology:

This study was performed on 32 patients of sickle cell syndrome admitted in Department of Medicine and Department of Pediatrics in Rajendra Institute of Medical Sciences over a period of one year from December 2014 to November 2015. High performance liquid chromatography was performed to differentiate sickle cell disease and sickle cell trait.

Inclusion criteria: Both male and female anemic patients diagnosed to have sickle cell syndrome based on sickling test and HPLC patients admitted in RIMS.

Exclusion criteria: patients suffering from any other cause of anemia such as chronic renal failure, liver disease, aplastic anemia, malabsorption syndrome, anemia of chronic disease, hemolytic anemia due to enzyme defect.

Statistical analysis:

Data obtained from all the admitted cases of sickle cell syndrome fulfilling the above mentioned criteria for inclusion was tabulated in Microsoft excel and then using SPSS version 23 has been statically analysed. Various test of significance like independent sample t test and bivariate correlation analysis and accordingly inference were drawn to establish the statistical significance of work done.

RESULT:

The most prominent clinical manifestation of sickle cell disease were yellowish discoloration of sclera, fatigue and fever, combination of fever and bodyache and pain abdomen. Maximum number of patient belonged to age group 21-30 years. The most common peripheral blood finding in sickle cell disease was normocytic hypochromic anisopoikilocytosis, followed by normocytic normochromic anisopoikilocytosis then microcytic hypochromic anisopoikilocytosis with tear drop cells. Sickle cell trait patient had microcytic hypochromic anisopoikilocytosis with tear drop cells. In all cases of sickle cell syndrome had anaemia with the minimum hemoglobin of 3.5gm/dl, maximum of 11.5gm/dl and mean hemoglobin of 6.88gm/dl. Most of the cases of sickle cell disease were associated with hypoxia with poa_2 approximately below 85mmhg whereas with those with sickle cell trait had poa_2 in the normal range. We found a negative correlation between poa_2 and hemoglobin S. The correlation is found to be statistically significant with a p value of 0.008 by Pearson's correlation. [Table no-II]. There exist a negative correlation between poa_2 and hemoglobin S. All patient of sickle cell disease had total leukocyte count in the higher range at the time of admission while sickle cell trait had total leukocyte count in the range between 6000 to 9000 cells/cumm. There is a correlation between hemoglobin S and TLC. [Table-I] Most of the patient of sickle cell disease have their neutrophil % above 75%. Neutrophil were within normal range for patient with sickle cell trait. There exist a positive correlation between the neutrophils and the hemoglobin S. The correlation is significant with a p value of 0.049. There exist a significant correlation between hemoglobin S and serum iron and serum potassium with p value of 0.001 and 0.035 respectively [Table no-III]. 15 cases of sickle cell disease had history of recurrent blood transfusion. Hydroxyurea therapy was newly started on 10 patients with sickle cell disease, 15 patients were taking it irregularly and 2 of them were complaint to the therapy. 15 patient of sickle cell disease presented in vasoocclusive

crisis, followed by 4 patients with sequestration crisis and 2 patient presented in acute chest syndrome. None of the patient had aplastic crisis.

DISCUSSION:

In present study patients suffering from sickle cell syndrome presented with yellowish discoloration of sclera, bodyache and fatigue as their predominant symptom. Rest of those with sickle cell anemia however had varied manifestation presenting with different combination of fever, joint pain, bone pain, pain abdomen fatigue and acute chest syndrome. These varied clinical manifestation has been quoted in various textbooks of medicine[14,15].In this study minimum and maximum hemoglobin was found to be 3.5gm/dl and 11.5gm/dl, with mean of 6.88gm/dl in patient with sickle cell syndrome. Hayes et al[11] had noticed chronic anemia with hemoglobin in the range of 5gm/dl to 11gm/dl in steady state sickle cell anemia which is corresponding to the result of the present study. The most common peripheral blood finding in sickle cell disease was normocytic hypochromic anisopoikilocytosis, followed by normocytic normochromic anisopoikilocytosis then microcytic hypochromic anisopoikilocytosis with tear drop cells. Sickle cell trait patient had microcytic hypochromic anisopoikilocytosis with tear drop cells. Similar finding has been reported by the study done by Beutler E, et al[16] that found normocytic cell in the peripheral blood smear of sickle cell anaemia. The present study revealed a negative correlation between poa2 and hemoglobin S with a p value of 0.008 (p value<0.01). A significant positive correlation has been found between total leukocyte count and hemoglobin S concentration by Pearson's correlation test with a p value of 0.00(p value<0.01). Buchanan GR et al have also observed the comparable result in sickle cell disease[17]. In this study we found a positive correlation between neutrophil and concentration of hemoglobin S with a p value of 0.049(p value<0.05). Boggs DR et al ,had observed result simulating that found in this study[18]. There exist a significant correlation between hemoglobin S and serum iron and serum potassium with p value of 0.001 and 0.035 respectively. In this study we found a negative correlation between hemoglobin S and serum iron levels and similar negative correlation has also been reported by Mohanty D et al[19], barring that they have taken into consideration that elevated ZPP/H ratios(>80micromol/mol) which is an indicator of microcytic anemia of iron deficiency.

CONCLUSION:

Yellowish discoloration of sclera was the most common presenting symptom of sickle cell disease. We must suspect a case of haemoglobinopathies (sickle cell syndrome) while clinically evaluating the patient presenting with anemia, jaundice, pain abdomen. body pain especially related to bony and joint pain. Complication related to vasoocclusive crisis, sequestration crisis, acute chest syndrome and aplastic crisis must be dealt promptly and adequately. The limitation of the study was small number of sample were included in the study. There is further need for research of newer and specific approach for proper management and radical cure of the disease.

Correlation between hemoglobin S and TLC Table no-I

	Hbs in %	TLC in cells/cumm
Hbs in % pearson correlation	1	.692**
Sig.(2-tailed)		.000
Sum of squares	3.720E4	5465728.643
and		
Cross product	907.428	133310.455
Covariance	32	
N		
TLC in pearson correlation cells/cumm	.692**	1
sig.(2-tailed)	.000	
Sum of squares	5.466E6	1.675E9
and Cross	1.333E5	4.084E7
product	32	32
Covariance		
N		

** correlation is significant at the level the 0,01 level(2-tailed)

Correlation between poa2 and hemoglobin S concentration Table no-II

	Hbs in %	Pao2 in mmhg
Hbs in % pearson correlation	1	-.405**
Sig.(2-tailed)		.008
N	32	32
Pao2 in Mmhg pearson correlation	-.405**	1
sig.(2-tailed)	.0008	
N	32	32

** correlation is significant at the 0.01 level (2-tailed)

Correlation between hemoglobin S concentration and serum iron and serum potassium Table no-III

	Hbs in %	Serum iron in microgm/dl	Serum potassium meq/l
Hbs in % pearson correlation	1	-.489**	.327
Sig(2-tailed)		.001	.035
N	32	32	32
Serum iron in Microgm/dl pearson correlation	-.489**	1	-.165
sig(2-tailed)	.001		.296
N	32	32	32
Serum potassium Meq/dl pearson correlation	.327	-.165	1
Sig(2-tailed)	.035	.296	
N	32	32	32

** correlation is significant at 0.01 level(2-tailed)

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