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Clinicohematological profile of hemolytic anaemia in tertiary care hospital: A 100 case study

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Abstract
Introduction: Hemolytic anaemia is caused by destruction of red cell membrane which may be caused by many underlying pathologies. It may be caused by membrane defects, enzyme defects, hemoglobinopathies, immune destruction and non immune destruction. Specific laboratory tests can readily confirm the diagnosis of hemolytic anaemia.
Aims and Objectives: To study the clinicopathological profile of hemolytic anaemia among patients in a tertiary care hospital.
Materials and Methods: A total of 100 cases were collected over a period stretching from 01.11.2018 to 31.07.2019 at B.J.M.C. and Civil Hospital, Ahmedabad. All the newly diagnosed cases and old cases on follow up were included in the study.
Results: In the study, beta thalassemia trait 38% was found to be the most common, followed by sickle cell anaemia 20%, malaria 14%, beta thalassemia major 13%, beta thalassemia intermedia 4%, sickle beta thalassemia 3%, sickle cell trait, autoimmune hemolytic anaemia and G6PD deficiency with 2% each. 1case each of hereditary spherocytosis and HbD Punjab were observed. Male preponderance was noted in the study. Predominant peripheral smears finding were microcytic hypochromic red blood cells with various degree of poikilocytosis and anisocytosis. Other investigations like X ray, USG, CT scan, biochemical markers, diagnostic tests like sickling test, osmotic fragility test, G6PD screening, HbS, HbF values, etc. were also taken into consideration. Jaundice, splenomegaly, hepatomegaly, gall stones were the most common clinical picture seen in the study.
Conclusion: Clinicohematological study in hemolytic anaemia can be concluded by findings on peripheral smear with backing done by hemoglobin electrophoresis. Hemoglobin electrophoresis remains the investigation of choice in hemolytic anaemia. Hemoglobinopathies lead to serious health problems leading to severe morbidity and mortality in Indian population. It is important to emphasize the importance of diagnosing hemolytic anaemia to give definite plan of action regarding the diagnostic, preventive and therapeutic strategies which can be formulated to minimize serious complications.

Keywords: Hemolytic anaemia, thalassemia, clinicohematological profile

Introduction
Hemolytic Anaemia is caused by the destruction of the red cell membrane, causing hemoglobin release. There is abnormal breakdown of red blood cells which maybe extravascular or intravascular. It is caused by membrane defects (eg. hereditary spherocytosis), enzyme defect (G6PD deficiency), hemoglobinopathies (Sickle cell disease or beta thalassemia), immune destruction (Autoimmune hemolytic abemia) and non immune destruction [2].
They cause a high degree of morbidity, moderate to severe hemolytic anaemia among all age groups and several deaths in India [6]. Hemoglobinopathies affect 4.5% of the world population [3]. The prevalence of beta thalassemia trait varies between 3-17% because of consanguinity and other causes [6]. Every year, ten thousand children with beta thalassemia major are born in India, which constitutes 10% of the total number of the world [8]. The only form of treatment available are regular transfusions, iron chelation therapy in an attempt to prevent iron overload. Marrow transplantation also has an important role in selected cases [3].
This study is aimed to reveal the clinicohematological profile in hemolytic anaemia and for the same, 100 cases are studied in a tertiary care hospital of Ahmedabad, Gujarat.

Materials and Methods

In this study, a total of 100 cases were collected from 1.11.2018 to 31.07.2019 at B.J.M.C. and Civil Hospital, Ahmedabad. All the newly diagnosed cases as well as old cases were considered in this study. All the patients with evidence of hemolysis and significant history were included. Routine investigations like hemoglobin estimation, peripheral blood smear examination, reticulocyte count, serum bilirubin and serum ferritin were done. Special investigations included sickling test, osmotic fragility, G6PD screening test, Direct Coomb's test and HPLC were also studied. Ultrasonography of abdomen was done to detect organomegaly, gall stones or any other abnormality. X- Ray of skull was taken for Crew Cut appearance. Rapid diagnostic test for malaria was also done. Other secondary investigations done were CT scan, hepatitis markers, antinuclear anitbody, etc were also considered. Physical examination included hepatomegaly, splenomegaly, hemolytic facies, jaundice, anthropometric measurements and history of blood transfusions, consanguinity were also noted.

Results

A total of 100 cases on hemolytic anaemia were included in the study. Majority of the cases were in the age group 0-15 years with male preponderance (58%) Mean hemoglobin was found to be least in thalassemia major (5.2gm/dl) followed by Autoimmune Hemolytic Anaemia (6.8gm/dl), thalssemia intermedia (6.9gm/dl) and highest mean hemoglobin was found to be in sickle cell trait (9.2gm/dl). Jaundice (57%) was the most common finding followed by splenomegaly (47%), hepatomegaly (34%), gall stones (15%), growth retardation (12%). Direct Coomb's Test was only positive for AIHA.

Table 1: Prevalence of hemolytic anaemia in the present study (n=100)

Type of Anaemia	No. of Cases (%)
Beta thalassemia trait	38
Sickle cell anaemia	20
Beta thalassemia major	13
Beta thalassemia intermedia	4
Sickle beta thalassemia	3
Sickle cell trait	2
Autoimmune hemolytic anaemia	2
Malaria	14
G6PD deficiency	2
Hereditary Spherocytosis	1
Hb D Punjab	1

In table 1 as mentioned, the most common hemolytic anaemia was beta thalassemia trait, followed by sickle cell anaemia, malaria, beta thalassemia major, beta thalassemia intermedia, sickle beta thalassemia, two cases each of sickle cell trait, AIHA and G6PD deficiency and 1 case each of Hereditary spherocytosis and Hb D Punjab in the present study.

Table 2: Hematological profile in the study

Diagnosis	Hb (gm/dl)	S. Ferritin (ng/dl)	Total S. bilirubin (mg/dl)	Reticulocyte count
Beta thalassemia trait	7.2	573.2	1.9	3.2
Sickle cell anaemia	8.2	1386.2	2.9	4.1
Beta thalassemia major	5.2	1821.4	3.8	7.3
Beta thalassemia intermedia	6.3	205.3	2.8	3.6
Sickle beta thalassemia	7.0	210.7	3.1	3.3
Sickle cell trait	9.1	281.4	1.7	2.9
Autoimmune hemolytic anaemia	6.8	703.7	2.2	5.2
Malaria	7.7	1110.6	2.8	6.2
G6PD deficiency	7.6	134	3.4	4.3
Hereditary Spherocytosis	6.6	197.6	2.7	3.2
Hb D Punjab	6.9	189.8	2.5	3.8

In table 2, the mean hemoglobin was least in beta thalssemia major followed by beta thalassemia intermedia, Hereditary spherocytosis, AIHA, Hb D Punjab and the highest mean hemoglobin was seen in Sickle cell trait. 75 cases presented with hemoglobin in the range of 5-8gm/dl, 19 cases presented with hemoglobin less than 5gm/dl and 6 cases presented with hemoglobin in the range more than 8gm/dl. From the available biochemical parameters, the respective means of Serum ferritin and Serum bilirubin values were calculated. In the study, highest mean of S. ferritin was observed in beta thalassemia major (1821.4ng/dl) followed by sickle cell anaemia (1386.2ng/dl) and malaria (1110.6ng/dl). The highest Total serum bilirubin was observed in beta thalassemia major (3.8mg/dl), followed by G6PD deficiency (3.4mg/dl) and sickle beta thalassemia (3.1mg/dl). In the available values of HbS and HbF, HbS values were higher in Sickle cell disease followed by sickle thalassemia and sickle trait. The fetal hemoglobin values were found to be raised in thalassemia major, followed by thalassemia intermedia and sickle thalassemia. Beta thalassemia major

Table 3: Distribution of hemolytic anaemia according to sociodemographic variables

Diagnosis	Sex		Age group			
	Male	Female	0-15 years	16-30 years	31-45 years	46-60 years
Beta thalassemia trait	23	15	30	8		
Sickle cell anaemia	8	12	4	15		1
Beta thalassemia major	8	5	9	4		
Beta thalassemia intermedia	2	2	1	3		

Sickle beta thalassemia	2	1		3		
Sickle cell trait	1	1		1	1	
Autoimmune hemolytic anaemia	2		2			
Malaria	9	5		12	2	
G6PD deficiency	2		2			
Hereditary Spherocytosis	1		1			
Hb D Punjab	1			1		

In table 3, it is noted that there is male preponderance in the study with male to female ratio of 1.4: 1 Total of 49 cases were observed in 0-15 years, 47 cases in 16-30 years, 3 cases in 31-45 years and 1 case in 46-60 years age group. 5 cases had a positive family history in thalassemia major, 2 in sickle cell anaemia and 1 in hereditary spherocytosis. History in siblings with similar complaints was noted in 9 cases. There was history of consanguinity in 9 cases in the present study.

Table 4: Clinical profile of hemolytic anaemia patients (n=100)

Clinical profile	No. of cases presenting the condition
Growth retardation	8
Jaundice	57
Hepatomegaly	38
Splenomegaly	49
Hemolytic Facies	13
Edema	4
Gall stones	14
Thalassemic facies	29

In table 4 it is noted that most common clinical presentation is jaundice, followed by splenomegaly, hepatomegaly, thalassemic facies, gall stones, hemolytic facies, growth retardation and edema. Splenomegaly is noted in almost all cases of thalassemia major, sickle beta thalassemia and hereditary sphercytosis. Massive splenomegaly was observed in 19 cases. Hemolytic facies was observed in 13 cases in this study. The 'crew cut apperance' on X-ray was noted in 6 cases of thalassemia major. No history of splenectomy or death caused by complications of hemolytic anaemia were observed in this study.

Discussion

The distribution of hemolytic anaemia is not uniform in the Indian subcontinent. The frequency of beta thalassemia trait is noted highest to be in Gujarat 10-15%, followed by Sindhis 10%, Punjab 6.5% (6, 7, 8). The frequency of Sickle cell disorders is reported to have the highest frequency in Orissa 9%, Assam8.8%, Madhya Pradesh 7.4% and Uttar Pradesh 7.1% [4, 5]. The general incidence of thalassemia trait and sickle cell disease in India varies between 3-17% and 1-44 respectively [4, 5, 6].

In the present study, the most common hemolytic anaemia noted was beta thalassemia trait 38%, followed by sickle cell anaemia 20% and beta thalassemia major 13% which is similar to the study done by Venkateshwary *et al*. [9], in which thalassemia trait accounted for 28.26%, thalassemia major 16.45% and sickle cell anaemia 5.6%. Similar results were observed in Ambekar SS *et al*. [5] report as well in which beta thalassemia trait was found to be the most common. Whereas in studies done by Shivashankara *et al*. [9] showed most common congenital hemolytic anaemia was beta thalassemia major followed by thalassemia trait, sickle cell trait and sickle cell thalassemia. In another studies done by Preeti *et al*. [10] and Anusha *et al*. [13] similar findings were noted in which beta thalassemia major 46% was the most common hemolytic anaemia. In the present study, the least mean hemoglobin value among the hemolytic anaemia was noted in Thalassemia major with 5.2gm/dl followed by thalassemia intermedia with 6.3gm/dl and AIHA with 6.8 gm/dl. The highest reticulocyte count was noted in thalassemia major with mean value of 7.3 which is comparable to the study by Preethi *et al*. [11] where the reticulocyte count in thalassemia major was in the range 5-15%.

In the present study, beta thalassemia trait was highest with 38%, mean Hb was noted to be 7.2gm/dl, mean reticulocyte count to be 3.2 and mean HbA2 of 5.9% which was similar to Venkataswamy *et al*. [9] where it was 28.26% of all cases with respective mean Hb and HbA2 of 13.3gm/dl and 6.2%.The diagnosis of thalassemia trait was confirmed by detecting HbA2 levels by electrophoresis and peripheral smear finding. History of tranfusions was noted and mean HbF was noted to be less than 70%. Serum bilirubin was noted to be raised in almost cases, similar finding was noted in Preethi *et al*. [11].

Sickle cell anaemia was noted to be the second highest in the study with 20% of all cases, similar finding was noted in Venkataswamy [9] with 5.6% cases. The mean hemoglobin and reticulocyte count was 8.2 gm/dl and 4.2 which was similar to Venkataswamy [9] where mean values were 7.5 gm/dl and 14.6. HbS mean in the study was noted to be 69.7% which is similar to Ventaswamy [9] where it was 72.2%.

Beta thalassemia major had 13% cases in total with mean hemoglobin, reticulocyte count and HbF of 5.2gm/dl, 7.3 and 92% and similar findings were observed in Venkataswamy [9] where total cases were 16.45% and the mean Hb, reticulocyte count and HbF were 6gm/dl, 4.6, 96% and in Preethi *et al*. [11], the Hb ranged from 3-8.2 gm/dl, reticulocyte count from 4-18% and HbF mean was 75.2%. Similar finding was noted in Anusha R [13] study. Frequent blood transfusions was noted in the study which is similar to Venkataswamy [9] where 100% cases of beta thalassemia major required frequent transfusions.

Sickle cell thalassemia, in the present study was 3% with mean Hb, reticulocyte count and mean HbS of 7gm/dl, 7 and 54.6% which is similar to Venkataswamy [9] where it was 9% and Anusha R [13] where it was 6.2% with mean vaues of hemoglobin and retic count of 7.7gm/dl, 7.2 and 6.2gm/dl, 7% and mean of HbS of 60.4%. Total serum bilirubin in the study was 3.1mg/dl which is similar to Anusha R [13] study with 2.7mg/dl.

Thalassemia intermedia, 4% of all cases had mean hemoglobin, retic count and mean HbF of 6.3gm/dl,3.6 and 48% which is similar to Venkataswamy [9] and Anusha R [13] with mean vaues of 6.2gm/dl, 3.6 and 4.2gm/dl, 3.7 and mean of HbF noted were of 58.92 and 46%. Total serum bilirubin in the study was 2.8mg/dl which is similar to

Anusha R [13] study with 2.6mg/dl.

Sickle cell trait comprised of 2% of all cases with mean Hb and retic count of 9.1 gm/dl and 2.9. In Venkataswamy [9], sickle cell trait comprised of 1.55% of all cases with mean values of Hb and retic count of 10.8gm/dl and 1.95. The mean HbS in the present study was 43.2% which is similar to Venkataswamy [9] where the mean was 40%.

In the present study, one case of Hereditary Spherocytosis was observed with mean Hb and retic count of 6.6gm/dl and 3.2 which is similar to Anusha R [13] where the mean values were 6.4gm/dl and 7. Positive history was noted in the case. Osmotic fragility was increased in the case. 2 cases each of G6PD and AIHA were noted which was based on peripheral smear findings and G6PD estimation assay.

Direct Coomb's test was positive only in AIHA. One case of Hb D Punjab was noted which was diagnosed by the presence of a band at the region of HbS/D by electrophoresis.

Malaria was found to be the most common acquired hemolytic anaemia with 14% of all cases with mean Hb of 7.7gm/dl. In the study by Anusha R [13], malaria comprised of 21.9% of all cases with mean hemoglobin of 6.3gm/dl. The mean total serum bilirubin values noted in both the studies were 2.8 and 2.9mg/dl. Peripheral findings and rapid diagnostic test were found to be positive in all cases.

In my study, consanguinity was noted in 9 cases which is similar to the study done by Anusha R [13] in which 15 cases were observed and study by Preeti *et al.* [11] which showed consanguinity in 55% cases. The male to female ratio was noted to be 1.4 in the study which is similar to Chatopadhyay [12] and Preethi *et al.* [11]. Similar finding was observed in Venkataswamy [9] where the ratio was 1.75:1. Whereas in the study done by Anusha R study [13], the male to female incidence was 0.9 History of blood tranfusion and hepatosplenomegaly was observed in all the patients of beta thalassemia major, which to similar to Venkataswamy study [9]. Peripheral smear findings in hemolytic anaemia are microcytic hypochromic red blood cells, target cells, schistocytes, polychromatophilia, tear drop cells, elliptocytes, anisopoikilocytosis, sickle cells, normoblasts and final diagnosis is done by the hemoglobin electrophoresis.

Conclusion

The distribution of hemolytic anaemia in India is not even and its prevalence varies from state to state and community to community. Among all the hemolytic anaemias, thalassemia major follows a more severe course and requires frequent transfusions and highest rate of morbidity and mortality. In our country, major population is not aware of the condition and so more efforts should be made to bring awareness among the patients. It is important to take to have better screening methods so that preventive measures and proper treatment can be given as earlier as possible.

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References

1. Weatherall DJ, Clegg JB. The thalassemia syndromes, 4th edition: Oxford Blackwell scientific publications, 2001.
2. Henry's Clinical diagnosis and management, First South East Asian edition. 2016; 1:86-87.
3. Surhone LM, Tennoe MT, Henssonow SF. Congenital hemolytic anaemia, Saarbruken, Germany: VDM Verlog, Dr. Muller, 2010.
4. Chopra GS, Nair V, Gupta PK, Mishra DK, Sharma A. Spectrum of hemoglobinopathies in a tertiary care hospital of armed forces. MJAFI. 2008; 64:311-314.
5. Ambekar SS, Phadke MA, Balpande DN, Mokashi GD, Khedkar VA *et al*. The prevalence and heterogeneity of beta thalassemia mutations in the western Maharashtra population. IJHG. 2001; 1(3):219-223.
6. Balgir RS. The burden of hemoglobinopathies in India and the challenges ahead. 2000; 79(11):1536-47.
7. Balgir RS. Spectrum of hemoglobinopathies in the state of Orissa, India, a ten years cohort study JAPI. 2005; 53:1021-26.
8. Varawalla NY, Old JM, Sarkar R, Venkatasen R *et al*. The spectrum of beta thalassemia mutations on the Indian subcontinent: the basis of prenatal diagnosis. Bristish journal of haematology. 1991; 78(2):242-247.
9. Venkataswamy *et al*. Clinicohematological profile of hereditary haemolytic anaemia in tertiary care hospital in South India JCDR. 2017; 11(6):EC17-EC21.
10. Shivashankara AR, Jailkhani R, Kini A. Hemoglobinopathies in Dharwad, North Karnataka, A hospital based study JCDR. 2008; 2:593-599.
11. Preethi BP, Monika K, Maitrreyee DS. A hospital based study of hereditary hemolytic anemia in Davanagere district of Karnataka, India. Bangladesh journal of medical science. 2010; 9(3):154.
12. Chattopadhyay K, Biswas R. An epidemiological study on the clinicohematological profile of patients with congenital hemolytic anaemia in a tertiary care hospital of Kolkata. Indian J. Prev. Soc. Med. 2012; 43(4):373.
13. Anusha R, Sravanthi NL. Vijaylakshmi Clinico hematological profile of hemolytic anaemia in tertiary care hospital in rural Andhra Pradesh. 2016, 3(5).