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KEY WORDS:
Haemoglobinopathies, HPLC, Thalassemia major.

HPLC STUDIES IN HAEMOGLOBINOPATHIES AT TERTIARY CENTER IN MAHARASHTRA, INDIA

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ABSTRACT

INTRODUCTION: Thalassemia and other structural haemoglobinopathies are major genetic disorder prevalent in certain parts of the World including India.

MATERIAL AND METHODS: Prospective observational study conducted at tertiary care hospital from January 2015 - November 2016.Total187 patients of haemoglobinopathies satisfying the inclusion and exclusion criteria were enrolled. HPLC3 (High profile Liquid chromatography):- was done on collected blood sample by BIO-RAD VARIANT Beta thalassemia Short programme.

RESULTS: Most common type of haemoglobinopathy was Beta thalassemia major 171(91.4%), followed by Sickle cell disease 12 (6.4%). In Thalassemia major most common age group was 6-12 year 116(62%) and in sickle cell disease also had most common age group 6- 12 year . 44 (23.5%) with history of consanguineous marriage in their parents.

CONCLUSION: In our study most common type of haemoglobinopathy in age group 6-12 years was Beta thalassemia major with male prepordance with 23.5% consanguity seen in Maharashtra, India.

INTRODUCTION

Thalassemia and other structural haemoglobinopathies are major genetic disorder prevalent in certain parts of the World including India. 3 lakh infants born worldwide every year with haemoglobinopathies. Their families and even the community. They can be manage by bone marrow transplantation, which is expensive and not everyone can afford in our country[1]. Haemoglobinopathies are a group of genetic disorders of haemoglobin (Hb). Haemoglobin is a complex molecule contained within erythrocytes that binds to and transports oxygen and carbon dioxide in the body. Defects in genes of haemoglobin can produce abnormal haemoglobins and anemia, which leads to conditions, termed as "haemoglobinopathies". Abnormal haemoglobins appear in one of two basic circumstances: decreased production of one of the globin chain e.g. thalassemia, abnormal globin chain e.g. sickle cell disease[1]. **B-thalassemia** is a heterogeneous group of inherited disorder of haemoglobin synthesis, characterized by a reduction of (β+) or absence (β) of synthesis of beta globin chains of haemoglobin. This results in an imbalanced chain synthesis, which determines the severity of the disease[1]. These hereditary disorders of haemoglobin pose a massive health problem in many countries including India [2]. The frequency of β- thalassemia in India ranges from 3.5 to 15 % in general population.

AIMS AND OBJECTIVE

To study the prevalence of haemoglobinopathies and consanguity in Maharashtra, located in the mid part of India

MATERIAL AND METHODS

Design: Prospective observational study.

Setting: Tertiary care GMCH.
Period: January 2015 -November 2016.

INCLUSION CRITERIA: All the cases of haemoglobinopathies in the age group between 6 month to 12 years diagnosed by High Performance Liquid Chromatography.

EXCLUSION CRITERIA: All other cases of hemolytic anemia other than haemoglobinopathies.

Approval of institutional ethical committee was obtained no: Pharma/IEC-GMCA/445/2014. Total 187 patients of haemoglobinopathies who were diagnosed by HPLC who were visiting in paediatric O.P.D. and I.P.D. Tertiary Care Hospital and satisfying the inclusion and exclusion criteria were enrolled in the study after obtaining written informed consent from parents. Detailed history with demographic details and clinical examination were noted in **HPLC[3]:-** was done on collected blood sample in Pathology department by **BIO-RAD VARIANT Beta thalassemia Short programme.** Diagnosis of different types of haemoglobinopathies was done with following reference range-

- **Thalassemia major:-** Presence of raised HbA2- 3.7- 7.0% with HbA- 10-30% and HbF- 92-95%[3]
- **Thalasssemia intermedia:-** HbA2-3.7- 7.0% variable, HbF up to 100%
- **Beta thalassemia trait:** HbA2 elevated (>3.5); HbF normal or elevated (>2.5)
- **Sickle cell disease:-** HbS = 55 to 90% HbA2 >3.5% HbF = <10 to >20%
- **Hb C disease:-** HbC >95% HbA2 2.5% HbF 0.5%
- **Hb E disease:-** HbE >95% HbA2 2.5% HbF <3%
- **Sickle beta+thalassemia:-** HbS >55% HbF >20% HbA2 >3.5%
- **Sickle beta0 thalassemia:-** HbS >80% HbF <20% HbA2 >3.5%
- CBC, Peripheral Smear, Liver Function Test was done.
- Serum ferritin level done at 6 month interval,

All the collected data was entered in Microsoft Excel sheet. It was then transferred to SPSS version 21 software for statistical analysis. Quantitative data represented as mean and standard deviation.

RESULTS

Table no.1:- Table showing distribution of patients with different types of haemoglobinopathies cases

Haemoglobinopathy	No. of cases	% of distribution
Beta thalassemia major	171	91.4%
Sickle cell disease	12	6.4%
Sickle beta thalassemia	1	0.5%
Beta thalassemia trait	1	0.5%
Beta thalassemia intermedia	1	0.5%
Sickle cell trait	1	0.5%
Total	187	100%

Table no. 2:-Table showing age wise distribution of cases among different haemoglobinopathies

Age in years	Group						Total
	Thal. Major	SCD	SBT	Thal Inter	Thal Trait	Sickle trait	
6month-2year	11 (5.8%)	0 (0%)	0 (0%)	1 (0.5%)	1(0.5 %)	0 (0%)	13 (7%)
2-5year	44 (23%)	5 (2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	49 (26.2%)
6-12year	116 (62%)	7 (3.7%)	1 (0.5%)	0 (0%)	0 (0%)	1 (0.5%)	125 (66.8%)
Total	171 (91.4%)	12 (6.4%)	1 (0.5%)	1 (0.5%)	1 (0.5%)	1 (0.5%)	187 (100%)

Table no. 3:- Table showing sex wise distribution of cases among haemoglobinopathies

Sex	Group						Total
	Thal. Major	SCD	SBT	Thal Inter	Thal Trait	Sickle trait	
Female	75 (44%)	4 (2%)	0 (0%)	0 (0%)	0 (0%)	1 (0.5%)	80 (43%)
Male	96 (56%)	8 (4%)	1 (0.5%)	1 (0.5%)	1 (0.5%)	0 (0%)	107 (57%)
Total	171 (91.4%)	12 (6.4%)	1 (0.5%)	1 (0.5%)	1 (0.5%)	1 (0.5%)	187(100%)

Table no. 4:-Table showing distribution of cases with history of consanguineous marriage in parents among different haemoglobinopathies

Consanguinity	Group						Total
	Thal. Major	SCD	SBT	Thal Inter	Thal Trait	Sickle trait	
Absent	131(70 %)	10(5.3 %)	1(0.5 %)	1(0.5 %)	0(0%)	1(0.5 %)	144(76.5%)
Present	41(21.9 %)	2(1%)	0(0%)	0(0%)	1(0.5 %)	0(0%)	44(23.5%)
Total	171(91.4%)	12(6.4 %0	1(0.5 %)	1(0.5 %)	1(0.5 %)	1(0.5 %)	187(100%)

In present study from 187 subjects of haemoglobinopathies, we found 44 (23.5%) with history of consanguineous marriage in their parent, all of them were found to have 3rd degree consanguineous marriage. The percentage of consanguineous marriage from all haemoglobinopathies was as –Beta thalassemia major with 41(21.9%) cases, sickle cell disease 2(1%) cases, thalassemia trait had 1(0.5%) cases.

DISCUSSION

There are very few studies observed from central Maharashtra (Marathwada). In our study we observed 187 cases of haemoglobinopathies , most common was beta thalassemia major 171(91.4%) followed by sickle cell disease 12(6.4%) and other haemoglobinopathies sickle beta thalassemia, sickle cell trait, thalassemia intermedia, thalasemia trait had very low percentage 1(0.5%) each presented with us. As the percentage of haemoglobinopathies like Sickle beta thalassemia,Sickle cell trait,Beta thalassemia intermedia,Beta thalassemia trait was very low it was not possible to co-relate them all .We correlate Beta thalassemia major 171(91.4%) and Sickle cell disease 12(6.4%) cases as they were commonest.

In present study we observed most common haemoglobinopathy was Beta thalassemia major 171(91%),and second common haemoglobinopathy was sickle cell disease 12(6%), followed by Sickle beta thalassemia,Thalassemia trait,Thalassemia intermediaand Sicklecell trait with 1(0.5%) case each. **Balgir et al 2003**[4], studied 1015 cases from age group 0 to 45+ years, they found most common haemoglobinopathy as sickle cell trait 303(29.8%),second most common was thalassemia trait of 185(18.2%) cases, followed by sickle cell disease of 77(7.6%) cases. **Chopra et al**[6] **2006** studied spectrum of haemoglobinopathies in 258 cases from age group 0 to 46+ years, they found most common haemoglobinopathies were beta thalassemia intermedia and sickle cell disease with 43(17%) cases, second most common was sickle cell trait with 6(2.3%) cases, followed by Hb ET and Hb D with 2(1.%) cases each. **Chattopadhay et al**[7] **2002** studied epidemiology and clinico haematological profile of haemoglobinopathies in 297 cases from age group 15-25 years,They found most common haemoglobinopathy was thalassemia major with 70(23.6%) cases, second most common was beta thalassemia trait with40(13.5%) cases, followed by haemoglobin E disease with 22(7.4%)cases.This difference in observations of all above mentioned studies were because of different age groups and different geographical area taken into consideration while studying condition.

In present study we observe clinical profile of haemoglobinopathies in 187 cases from age group 6 months -12 years. Most cases 125(66.8%) were from age group between 6-12 years, followed by 49(26.2%) were from age between age 2-5 years, 13(7%) were of age between 6 months- 2 years. **Amita Trehan et al** [8]**2007** studied clinical and demographical profile in 964 childrens of thalassemia major from age 0-12 years. They were divided in 5 age group, most 305(31.6%) cases were found in age group6-12 months, followed by 295(30.6%) cases from age group 12-24months,173(17.9%) cases were from age group 3-6 months, 164(17%) cases were from age group>24months,25(2.5%) cases were from age group 0- 3 months. **Chattopadhyay et al** [7]**2011** studied epidemiological & clinico haematological profile of hymoglobinopaties in 297 cases from age 15-25 yrs. They were devided in 3 age groups. Majority of cases 139(46.8%) were from age group <17years, followed by 106(35.7%) cases were from age group 18-21 years, 52(17.5%) cases were from >21 years. **Patel et al** [9]**2006** studied prevalence of haemoglobinopathies in Gujarat from all age group which was divided in 2 categories,most common age group was<18 years of 92(60%) cases and age group>18 years of 71(40%) cases. **Chopra et al** [6] **2006** studied spectrum of haemoglobinopathies in 258 cases from all age groups and divided them in 3 age groups as , most common age group was16-45years of 152(59%) cases, followed by 0-15 year age group of 90(35%) cases, age group >46years of 15(6%) cases.

In present study, we found 107(57%) male and 80(43%) female with ratio of 1.3:1 showed male predominance. In Thalassemia major we observed male predominance with 96(56.1%)male and 75(43.8%) female with ratio of 1.2:1.In Sickle cell disease male predominance with 8(66.6%) cases and 4(33.3%) female with ratio of 2:1.**Chattopadhyaya et al**[7] **2011** observed male predominance with155(60.3%) and 142(39.7%)female with ratio of 1.5:1.**Chopra et al**[6] **2006,** observed male predominance with 136(53%) male and 122(47%) female with ratio of 1.12:1.**Dipty jain**[10] **2012** found most cases of male194 (61.3%) and 122(38.6%) female in Sickle cell disease with ratio1.59:1**Amita Trehan et al**[8] **2007** found most of the cases of male 688(71.3%) and female 276(28.6%) with ratio 2.49:1.In similar studies **Balgir et al**[5] **2002** observed that 521(52%) of female were affected in his study and 481(48%) male with ratio of 0.9:1 Our study was comparable to above mentioned 4 studies Chattopadhyay yet al, Chopra et al[6], Dipty Jain et al[10], Amrita Trehan et al[8], with male predominance.

CONCLUSION:

In our study most common type of haemoglobinopathy in age group 6-12 years was Beta thalassemia major with male prepordance with 23.5% consanguity seen in Maharashtra, India.

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