IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 9 Ser.9 (September. 2019), PP 05-09
www.iosrjournals.org

Original Research Article: Clinical Profile and Pattern of Hemoglobinopathies and Thalassemias Among Children Admitted in a Tertiary Care Hospital, Assam, India.

Dr Dulal Kalita[1], Dr. P. Kalita[2], Dr A Kumar[3], Dr M Roy[4]
[1] *Associate Professor of Pediatrics, Tezpur Medical College and Hospital, Tezpur.*
[2] *Former Professor and Head of Pediatrics, Tezpur Medical College and Hospital.*
[3]*Registrar of pediatrics. Tezpur Medical College and Hospital.*
[4]*Senior Resident of Pediatrics, Tezpur Medical College and Hospital.*
Corresponding Author: Dr. Dulal Kalita

Abstract:
Introduction: *Inherited hemoglobin disorders (hemoglobinpathies and Thalassemias) constitute an important cause of mobidity and mortality in children. They impose a heavy burden on the affected families and the health sector. This is a public health problem in Assam and North Eastern states. Data pertaining to the pattern of the thalassemias and hemoglobinopathies are lacking in our state .Hence, this study was undertaken to know the clinical profile and pattern of hemoglobinpathies and thalassemias cases admitted in pediatrics department.*
Methods: *The present study was conducted in the department of Pediatrics , Tezpur Medical College and hospital,Tezpur,Assam over a period of one year from January 2017 to December 2017 . Total 75 children of inherited hemoglobin disorders (chronic hemolytic anemia) were included in this study. This was a retrospective study. We collected the bed head tickets (medical record files) of all children from medical record department of the hospital. Relevant data of the cases were collected , analyzed and interpreted accordingly.*
Results: *The present study included total 75 children of thalassemia and hemoglobinopathies admitted during the study period. Total number of patients admitted in the pediatric ward, during the study period were 1883. Out of 75 studied cases , 58.6% patients were male and 41.3% were female. In the present study, most common hemoglobin disorder was HbE trait (HbAS) 26.6% followed by Beta thalassemia trait 21.3% , Sickle cell trait (18.7%) , E beta thalassemia (9.3%) , HbE disease 8% and sickle cell disease (Hb SS) 8% respectively. The present study also showed that all cases of beta thalassemia major , E beta thal and Sickle cell diseases had presented with pallor , generalised weakness and hepatosplenomegaly., It was also seen that all the beta thalassemia major, E beta thalassemia and Sickle cell diseases patients required blood transfusions. It was observed that 46.6% of cases were malnourished/stunted and 29.3% children had skeletal changes.*
Conclusion: *The present study showed the pattern of thalassemias and hemoglobinopathies prevalent in Assam. We found that HbE trait/ HbE disease,Beta thalssemia major/trait,sickle cell anemia/trait , compound HbE beta thalassemia were prevalent in Assam and impose a big burden to the affected families as well as society. Further , many children remain undiagnosed at the community level due to lack of knowledge , poverty and lack of laboratory facility at tea garden and rural hospital. We know that this inherited hemoglobin disorder is a major cause of morbidity and mortality in children. Hence, mass education , genetic counselling, premarital counseling, neonatal screening and antenatal diagnosis are the mainstay for prevention and control of the disease. Further, Early diagnosis by HPLC , adequate management of the cases with blood transfusion, chelation therapy, nutritional supplementation and splenectomy will decrease the associated complications and improve the quality of life.*

Key words: *Anemia,Hemoglobinopathies, Thalassemia, Children, HPLC, Assam.*

Date of Submission: 03-09-2019 Date of Acceptance: 18-09-2019

I. Introduction

Hemoglobin is a tetramer consisting of 2 pairs of globin chains. Abnormalities in these proteins are referred to as hemoglobinopathies. More than 800 variant hemoglobins have been described. The hemoglobin gene clusters are involved in the production of hemoglobin and are located in the short arm of chromosome 16 and chromosome 11. During fetal life the major hemoglobin is Hb F. Though, Hb A first appears at 1 month of fetal life but it doesnot become dominant upto birth. The final hemoglobin distribution pattern that occurrs in childhood is not achieved until atleast 6 months of age and sometimes later. The normal hemoglobin pattern is > or equal to 95 % HbA , < or equal to 3.5 % HbA2 , and < 2.5 % HbF. [1].

Thalassemia refers to a group of genetic disorders of globin chain production in which there is an imbalance between the alfa globin and beta globin chain production. Beta thalassemia syndrome result from a decrease in beta globin chains. Beta + thalassemia indicates a mutation that makes decreased amount of beta globin chain . Beta 0 thalassemia refers to total absence of production of beta globin. Thalassemia major refers to severe form of homozygous beta thalassemia who require early transfusion therapy. Carriers with a single beta globin mutation are generally asymptomatic except for microcytosis and anemia. The primary pathology in the thalassemia syndrome from the quantity of globin produced whereas the primary pathology in Hb variant is related to the quality of beta globin produced. There are > 200 different mutation resulting in absent or decreased globin production. Although most are rare , the 20 most common abnormal alleles constitute 80% of the thalassemia worldwide. 3% of world's population carries alleles for beta thalassemia.[2].

Inherited hemoglobin disorders (hemoglobinpathies and thalassemia) constitute an important cause of mobidity and mortality. They impose a heavy burden on the affected families and the health sector. They were originally characteristic of the tropics and sub tropics but are now common world wide due to migration. The figures of world health organization estimate that approximately 5% of world's population are being carriers for the genetic hemoglobin disorder. Every year, there are over 42 million carriers and more than 12000 infants born with a major and clinically significant hemoglobinopathy Jan3, 2018..[3] . India has the largest number of children with thalassemia major in the world about 150000. There are almost 42 million carriers of beta thalassemia trait. While an average prevalence rate of 3-4 % has been established across the country , a higher frequency has been observed in certain communities. An estimated 10000 -15000 babies with thalassemia major are born every year. Hb E significantly contributes to the disease burden specially in West Bengal , Assam and other north eastern states. In certain communities in this region , the carrier frequency of Hb E is as high as 50%. The prevalence of sickle cell disease is variable with a very high frequency among many tribal communities and few states. However, it is not restricted to tribal community only due to inter marriage with Non tribals and migration of people , now found in all states.[4]. Among the common Hb variant, Hb E and beta thalssemia are commonly found in Assam and other north eastern states. The ICMR study showed that Hb E was mainly seen in Assam (23.9 %) and in Kolkata (3.9%) in West Bengal [5]. It is well established that the incidence of HbE gene in the north Eastern region of India is one of the highest in the world. [6]. Different states of the North Eastern region show a variable incidence of Hb E varing from 16.2 % to 47.3% .[7 & 8]. The migrant tea garden population of Assam from central, eastern and southern India , also shows a high incidence of Hb S. [9 , 10]. This inherited Hb disorder is a public health problem and a big burden to their families and even their communities. This genetic problem can be prevented by proper genetic counseling , premarital screening and by prenatal diagnosis. Very few studies were carried out in the state of Assam to find out the burden and patterns of this inherited disorder. In view of this , this study was conducted to know the clinical profile and pattern of hemoglobinopathy and thalassemia in our state.

II. Methods:

The present study was carried out in the pediatrics department , Tezpur Medical College and hospital, Assam over a period of one year from January 2017 to December 2017. This is a tertiary care hospital located in the middle part of the state of Assam. This hospital provides health care services mainly to the people of rural and tea garden areas in the nearby districts namely Sonitpur, Darrang, Odalguri and Nagaon districts. There are many Tea Gardens located in these districts. Most of the anemia cases from this tea garden hospital and rural hospital were referred to this hospital for proper investigations and diagnosis as there was lack of laboratory facilities in their hospital. This was a retrospective study. A total number of 75 hemolytic anemia (Inherited hemoglobin disorder) cases, admitted in pediatrics department were included in this study. We collected all bed head tickets (medical record files) from medical record department after taking permission from the concern hospital authority. All 75 medical files were evaluated thoroughly and relevant data were recorded accordingly. Inclusion criteria: All the patients of inherited hemoglobin disorder up to age of 12 years of age. Exclusion criteria: Those patients with laboratory findings point to other causes of anemia like Iron deficiency anemia, aplastic anemia etc were excluded from the study.

III. Results

Total number of patients admitted in the pediatric ward, during the study period from 1st January 2017 to 31st December 2017 = 1883. Thalassemias and hemoglobinopathies cases admitted during this period = 75

Age	No. of cases	percentage(%)
Less than 6 months	0	0
6 months to 1 year	0	0
1 year to 4 year	21	28 %
4 year to 12 year	54	72 %
Total. Cases	75	100%

Table:1: Showing age wise distribution of the cases. (n=75).

In this study, out of 75 hemoglobin disorder cases , 28% cases were 1 to 4 years age group and 72% cases above 4 years up to 12 years.

Sex	Number of cases	Percentage
Male	44	58.6 %
Female	31	41.3 %
Total	75	100%

Table 2: Sex wise distribution of cases.(n=75).

This Table:2: showed that 58.6% patients were male and 41.3% patients were female

Type of hemoglobinopathy/ Thalssemia	Number of cases	Percentage
Beta thalassemia major	5	6.7%
Beta thalassemia trait	16	21.3%
E beta thalassemia	7	9.3%
Hb E trait	20	26.6%
Hb E disease	6	8%
Sickle cell trait	14	18.7%
Sickle cell disease	6	8%
Hb S beta thalssaemia	1	1.3%
Alpha thalssaemia	0	0
Total	75	100%

Table: 3: Showing distribution of cases according to different types of inherited hemoglobin disorders.(n=75)

In the present study, most common hemoglobin disorder was HbE trait (HbAS) 26.6% followed by beta thalassemia trait 21.3% , Sickle cell trait (18.7%) , E beta thalassemia (9.3%) , HbE disease 8% and , Hb SS 8% respectively.

Symptoms & signs .	B thal major (n=5)	B thal trait (n=16)	E beta thal(n=7)	HbE disease (n=6)	HbE trait (n=20)	HbS Dis (n=6)	HbS trait N=14
Pallor Present	5(100%)	9(56.2%)	7 (100%)	2(33.%)	5(20%	100%	21%
Weakness/tiredness	5(100%)	8 (50%)	7(100%)	-----	----	100%	35%
Abdominal discomfort/ fullness	5(100%)	1(6.2%)	5(71%)	-----	-----	83%	----
Jaundice	1(20%)	Nil	2(28%)	------	-----	50%	----
Splenomegaly	----	2(12.5%)	7(100%)	1(16.6%	1(5%)	---	----
Hepatomegaly	----	--	--	-----	----	----	-----
Hepatosplenomegaly	5(100%)	---	7(100%)	------	----	100%	------

Table 4: Showing common clinical symptoms and signs of the admitted cases.

This Table showed that all cases of beta thalassemia major , E beta thal and Sickle cell diseases had pallor , generalised weakness and hepatosplenomegaly.

Anemia present	No of cases	Percentage
Mild anemia (> 9 gm%) or normal range	48	64%
Moderate anemia (6-9gm%)	15	20%
Severe anemia (below6 gm%)	12	16%
Total cases	75	100%

Table 5: Showing Hb% of the cases at the time of admission.(n=75).

In this study, 16% cases had severe anemia, 20% cases moderate anemia and 64 % had mild anemia or Hb% level were within normal range.

Type of hemoglobin disorders	Transfused	Untransfused	Total
Beta thalassaemia major	5(100%)	0	5
Beta thalassaemia trait	0	16 (100%)	16
E beta thalassaemia	7 (100 %)	0	7
Hb E trait	0	20 (100%)	20
Hb E disease	1 (16.6%)	5 (83.3 %)	6
Sickle cell trait	0	14 (100%)	14
Sickle cell disease	6 (100%)	0	6
Hb S beta thalssaemia	1 (100%)	0	1
Alpha thalssaemia	0	0	0
Total	20	55	75

Table 6 : Showing blood transfusion status of the cases.(n=75)

From table 6 , it is seen that all the beta thalassemia major , E beta thalassemia and Sickle cell diseases patients required blood transfusion.

Morbidity	Number of cases	percentage
Malnorished/stunted	35	46.6%
Skeletal changes present	22	29.3%
Splenectomy done	1 beta thal major,1 E beta thal	
Iron overload /toxicity	2	2.6%

Table 7: Showing some morbidity status of the studied cases.(n=75)

In this study, it is observed that 46.6% of cases were malnourished/stunted and 29.3% children had skeletal changes like frontal bossing, malar prominence, malocclusion of teeth.

IV. Discussion

The present study included total 75 children of thalassemia and hemoglobinopathies admitted during the study period. Total number of patients admitted in the pediatric ward, during the study period were 1883. Out of 75 studied cases , 58.6% patients were male and 41.3% were female. In the present study, most common hemoglobin disorder was HbE trait (HbAS) 26.6% followed by Beta thalassemia trait 21.3% , Sickle cell trait (18.7%) , E beta thalassemia (9.3%) , HbE disease 8% and sickle cell disease (Hb SS) 8% respectively. The incidence of thalassemia and hemoglobinopathies varies in different part of india. HbE is mainly prevalent in Assam and other North Eastern State of India. The ICMR studies (2013) also revealed that Hb E 23.9% in Assam [5]. Deka R, Reddy AP et al in their study reported that HbE gene in Assam and N E region is highest in the world. [6]. Various Researchers in their study in North Eastern state reported variable incidence of HbE from 16.2% to47.3% .[7, 8]. Whereas Manna AK et al (2009) observed beta thalassemia trait 44% is more common than HbE 18% in Kolkata, West Bengal.[12]. Another study done by Basu et al (2002) in Kolkata also reported Beta thalassemia trait 68% as the most commonly seen hemoglobin disorder followed by Hb E trait 25%.[11]. In our study, we observed 3 form of HbE variants namely Hb E homozygous/disease (Hb EE), Hb E heterozygous/trait (HbAE) and compound Hb E Beta thalassemia. This study showed that HbE detected across different ethnic groups in Assam like Ahom, Bodo-kochari, Sonowal, Koch , Mishing etc mainly among tribal population. Few cases were observed in Non tribal people may be due to intercaste marriages. 12 cases were seen among Muslim community. Beta thalssemia trait was detected in 21.3% of cases which is similar with the findings of different studies like ICMR study [5] and Baruah M K et al in 2014 [13]. Another common variety of hemoglobinopathy in our study was Sickle cell trait (18.7%) and HbSS disease (8%). This observations were comparable with the findings of the various studies conducted by various workers like Balgiri R S et al [9], Sharma S K et al [10] and Baruah M K et al [13]. This sickle cell trait and disease were observed mainly among Tea Garden labor communities. This Tea garden workers were brought to Assam by the British colonial Tea planters from central, Eastern and Southern India during mid -19th century.[10] . The present study showed that all cases of beta thalassemia major , E beta thal and Sickle cell diseases had presented with pallor , generalised weakness and hepatosplenomegaly., It was also seen that all the beta thalassemia major , E beta thalassemia and Sickle cell diseases patients required blood transfusion. In this study, it was observed that 46.6% of cases were malnourished/stunted and 29.3% children had skeletal changes like frontal bossing, malar prominence and malocclusion of teeth etc.

V. Conclusion:

The present study showed the pattern of thalassemias and hemoglobinopathies prevalent in Assam. We found that HbE trait/ HbE disease,Beta thalssemia major/trait,sickle cell anemia/trait compound HbE beta thalassemia were prevalent in Assam and impose a big burden to the affected families as well as society. Further , many children remain undiagnosed at the community level due to lack of knowledge , poverty and lack of laboratory facility at tea garden and rural hospital. We know that this inherited hemoglobin disorder is a major cause of morbidity and mortality in children. Hence, mass education , genetic counselling, premarital counseling, neonatal screening and antenatal diagnosis are the mainstay for prevention and control of the disease. Further, Early diagnosis by HPLC , adequate management with blood transfusion, chelation therapy, nutritional supplementation and splenectomy will decrease the associated complications and improve the quality of life.

Funding: None

Conflict of interest: None stated.

Limitation of the study: This was a hospital based study, hence the results inferred from this study was not the true reflection of the burden of the community. Many children are remain undiagnosed in the rural area. There fore, further studies are needed with large sample size at the community level to find out the exact burden.

References

[1]. Michael R , DeBaun, Mellisa J, Frei Jones, Elliot P, Vichin sky: Hemoglobinopathies: chapter 462: page 2336-2348: Nelson Text Book of Pediatrics, First south Asia edition:2016 : vol-2.

[2]. Michael R , DeBaun, Mellisa J, Frei Jones, Elliot P, Vichin sky: Thalassemia syndrome : chapter 462 .10: page 2349-2353: Nelson Text Book of Pediatrics, First south Asia edition:2016 : vol-2.

[3]. https// www. who.int./ : Bulletin of the World health organization: 2019 : Global epidemiology of hemoglobin disorders.

[4]. https// mohfw.gov.in : files pdf. : Ministry of Health and Family Welfare, Govt. of India, New Delhi, 7th August, 2018

[5]. Mohanty D, Colah RB, Gorakshakar AC, Patel RZ, Master DC,Mahanta J, *et al*. Prevalence of β-thalassemia and other haemoglobinopathies in six cities in India: A multicentre study. J Community Genet 2013;4:33-42.

[6]. Deka R, Reddy AP, Mukherjee BN, Das BM, Banerjee S, Roy M, *et al*.Hemoglobin E distribution in ten endogamous population groups of Assam, India. Hum Hered 1988;38:261-6.

[7]. Dash S, Chhanhimi L, Chhakchhuak L, Zomawaia E. Screening for haemoglobinopathies and G6PD deficiency among the Mizos of Mizoram: A preliminary study. Indian J Pathol Microbiol 2005;48:17-8.

[8]. De M, Halder A, Podder S, Sen R, Chakrabarty S, Sengupta B, *et al*. Anemia and hemoglobinopathies in tribal population of Eastern and North-eastern India. Hematology 2006;11:371-3.

[9]. Balgir RS. Epidemiology, population health genetics and phenotypic diversity of sickle cell disease in India. Internet J Biol Anthropol 2007;1:2.

[10]. Sharma SK, Mahanta J. Prevalence of haemoglobin variants in malaria endemic Northeast India. J Bio Sci 2009;9:288-91.

[11]. Basu S, Chakraborty A, Bhatacharya D, Roy Chowdhury N, Chowdhury A. Population screening and control of thalassemia in Eastern Indian Population - a preliminary report (May 1999 - March 2002): Diagnostic and Research Laboratory, Thalassemia Foundation, Kolkata. Pune:; February 2002.

[12]. Manna AK, Dutta SK, Chatterjee A. Relative incidence of different thalassaemias and haemoglobinopathies in South Bengal. Journal of Indian Medical Association. 2009 June; 107(6):347- 349.

[13]. Baruah M K, Saikia M, Baruah A : Pattern of hemoglobinopathies and thalassemias in upper Assamregion of North Eastern region of India: High performance liquid chromatography studies in 9000 patients.:Indian journal of Pathology and Microbiology,57(2), April to June2014.

Dr. Dulal Kalita. "Original Research Article: Clinical Profile and Pattern of Hemoglobinopathies and Thalassemias Among Children Admitted in a Tertiary Care Hospital, Assam, India." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 9, 2019, pp 05-09.