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Paediatrics

STUDY OF ABO BLOOD GROUP DISTRIBUTION IN ß-THALASSEMIA PATIENTS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: ß-thalassemia is an inherited hematological disorder caused by reduced or absent synthesis of ß globin chains of the hemoglobin, resulting in hemolysis and impaired erythropoiesis. Affected children require regular lifelong blood transfusions to prevent complications such as poor growth, skeletal abnormalities, and delayed puberty. Blood group identification is required for regular blood transfusions

Aim: 1.To study the prevalence of ABO blood groups in patients with transfusion dependent ß-thalassemia
2.To understand the regional demand for rare blood groups

Methods: This was an observational study in which 93 patients of ß-thalassemia were screened for their ABO blood groups after informed consent from the patient.

Results: Out of total 93, 55.91% were male patients and 44.08% were female patients. The prevalence of O blood group was highest at 48.38%, B at 24.73%, A at 20.43% , and AB 06.45%. The prevalence of Rh D +ve status was 93.54% and Rh D -ve was 06.56%. Frequency of Rh D +ve was higher in female patients 50.53% than male 43.01% and the frequency of Rh D -ve was higher in male patients 04.30% than in female patients 02.15%.

Conclusions: The frequency of blood groups was O > B>A >AB, and the frequency of Rh D was Rh D +ve >Rh D -ve. Rh D +ve female > male patients, while Rh D -ve male >female patients.

KEYWORDS : ß-thalassemia, Blood groups, Transfusion

The thalassemias (Greek: thalassa-meaning sea) are a group of single gene inherited autosomal recessive hematological disorders caused by defects in the synthesis of one or more of the hemoglobin chains that cause hemolytic anemia.1,2 Beta thalassemia is the major problem of concern for public health. Beta thalassemia is affecting millions both in developed and under developed countries (3). This numbers of thalassemia is increasing annually due to consanguineous marriages, lack of awareness, low literacy rates, low income status and high birth rates in population (4,). The thalassaemia syndromes are named according to the globin chain affected or the abnormal haemoglobin involved; β globin gene defects may give rise to β thalassaemia, while mutations of the α globin gene may cause α thalassaemia. Classification is by clinical severity or genotype, which can be quite variable (tables 1).Normal individuals have one active β globin gene on both copies of chromosome 11. (5,6).

Table: 1 Correlation between genotype and phenotype in β thalassaemi

Definition	Genotype	HPLC	Genotype and phenotype
Normal	β/β	Normal	Normal Hb, MCV and MCH. Clinically asymptomatic
β thalassaemia trait	-/β	Hb A2 >4%	Slightly anaemic, low MCV and MC. Clinically asymptomatic
β thalassaemia intermedia*	-/βo or β+/β+	High Hb F, variable	Anaemic, very low MCV and MCH. Splenomegaly, variable bone changes Variable transfusion dependency
β thalassaemia major	-o/-o	Hb F >90% (untransfused)	Severe haemolytic anaemia, very low MCV and MCH. Hepatosplenomegaly, chronic transfusion dependency

Hb=haemoglobin, HPLC=high performance liquid chromatography, MCV=mean corpuscular volume, MCH=mean corpuscular haemoglobin

Most cases do not need blood transfusions. ß-thalassemia major is the most severe form which causes hemolytic anemia, poor growth, delayed sexual maturation and skeletal abnormalities during infancy.(1) Symptoms of the disease appear in first year of life as HbF synthesis reduces. Complications that occur due to ß-thalassemia are due to overstimulation of bone marrow, ineffective erythropoiesis. Pallor is usually the first sign accompanied by splenomegaly of various severity, fever and failure to thrive.(2) Thalassemia is prevalent in both genders; however, it is more prevalent in male gender (7). Thalassemia patients need repeated blood transfusion to avoid anemia, to maintain growth and development and to sustain quality of life, however these repeated transfusion also cause complications which might reduce survival average age of thalassemia patients (8). This study is thereby an attempt to explore any relationship between blood group antigens and ß-thalassemia so that it will become very easy to predict the type of population which is more prone or resistant to ß-thalassemia. Also, the study of this relation between blood groups and the disease is extremely important for understanding the regional demand of rare blood groups and to tide over the massive demands.

The objective of this study was to study relation, affinity and family predisposition between ß-thalassemia and specific blood groups and to study the severity and onset in such patients in specific blood groups.

METHOD

This was an observational study performed in division of Pediatrics Hemato-Oncology, Department of Paediatrics, St.John's Medical College, Banglore, Karnatka, India in collaboration with thalassemia unit during a period of April 2019 to June 2019.

Blood group was determined by ID gel cards used for forward and reverse grouping of patients sample on an automated platform, The IH 500 in the department of Transfusion Medicine and immune-hematology, St. John's Medical College, Bangalore, Karnataka, India. Results prepared in table.

RESULTS

There were a total of ninety-three (93) registered patients of ß-thalassemia (52 males and 41 females). The age of patients ranged from less than 1 year to 18 year old. According to **(Table 2),** number of male patients was higher than female patients. Out of total 93, 55.91% (n=52) were male patients and 44.08% (n=41) were female patients. This study showed that the age group ≤ 5 years, which included 44.08% (n=41) thalassemia patients, was the largest group. The older age groups included less number of patients than younger age groups, 26.885 (n=25), patients were in age group of 5.1-10 years, 11 (11.82 %) patients were in age group of 10.1-15 years, and in age group of 15.1-18 years only 06.45% (n=06).

Table 2 also shows the pattern of ABO blood groups and Rh D factor in thalassemia patients. The prevalence of O blood group was highest 48.38% (n=45), the prevalence of blood group B was 24.73% (n=23), and blood group A was 20.43% (n=19), the least prevalent blood group

was AB 06.45% (n=06). The prevalence of Rh D Positive was at 93.54% (n=87) and Rh D negative was 06.56% (n=06). The pattern of ABO blood group according to frequency was O > B>A >AB, and the frequency of Rh factor was Rh D +ve>Rh D–ve.

Table 2. Distribution of thalassemia patients according to gender,age and frequency of blood groups.

Variable	N(93)	%
Gender		
Male	52	55.91
Female	41	44.08
Age(Years)		
<5	41	44.08
5.1-10	25	26.88
10.1-15	11	11.82
>15	06	06.45
Blood Groups		%
A	19	20.43
B	23	24.73
AB	06	06.45
O	45	48.38
Rh D Group		
Rh D +ve	87	93.54
Rh D -ve	06	06.56

(Table 3) shows the distribution of ABO blood groups with Rhesus factor in thalassemia patients according to gender. The similar pattern was observed in both male and female patients. O>B>A>AB. Overall frequency of O blood group was higher in male patients 25.80% than in female patients 22.58%. In contrast, the frequency of B blood group was higher in female patients 14 (15.05)% than in male patients 09(09.67)%. The frequency of A blood group in male was 11(11.82) % and in female 08(08.60)%. The frequency of AB blood group in male patients and female patients was equal 03(03.20) % . Frequency of Rh +ve factor was higher in female patients 47(50.53)% than male 40(43.01)% and the frequency of Rh negative was higher in male patients 04.30% than in female patients 02.15%.

Table 3 Distribution of ABO blood groups in β-thalassemia patients according to gender

Blood group	Male (%)	Female (%)
A	11(11.82)	08(08.60)
B	09(09.67)	14 (15.05)
AB	03(03.20)	03(03.20)
O	24(25.80)	21(22.58)
Rh D Factor		
Positive	40(43.01)	47(50.53)
Negative	04(04.30)	02(02.15)
Age (Years)		
<5	24(25.80)	17(18.27)
5.1-10	14(15.05)	11(11.82)
10.1-15	05(05.30)	06(06.45)
>15	04(04.30)	02(02.15)

DISCUSSION

According to **(Table 2),** number of male patients was higher than female patients. Out of total 93, 55.91% (n=52) were male patients and 44.08% (n=41) were female patients. Our study is in agreement with previous studies which suggest that the percentage of male patients were higher 59.49% than female children 39.51% (Z. A. Laghari, N. M. Baig et al 2017)(9) . The study revealed number of affected males were significantly higher 65.66% than female 34.33% (Bejaoui and Guirat 2013)(10). The study conducted at Banu, Pakistan found higher number of male patients 56.95% than female patients 43.05%(Khan, 2015)(11). Several other studies have also found the higher percentage of in male thalassemia patients, these range from 53.5% male patients than 46.5% female patients (Asadi-Pooya and Doroudchi 2004)(12), 62% male patients than 38|% female patients,(Balgir 1996)(13), 65.66% male patients than 34.36% female patients(Qurat-ul-Ain, 2011)(14). Our data and other studies indicate the higher prevalence of β-thalassemia in male patients; this needs further investigation since thalassemia is inherited as autosomal recessive manner with a singleβ-globin gene mutation.

Thalassemia patients need repeated transfusion so it is necessary to determine the frequency of ABO blood groups and any complication related with transfusion of blood with each blood group type.

In our study, the ABO blood groups and Rh positive factor in male and female patients showed the pattern of ABO blood group O > B > A > AB, and Rh D +ve > Rh D –ve. The association of ABO blood groups with diseases has previously been studied. Our study is in agreement with previous studies that showed patients have similar prevalence in A blood group 21.56% blood group, B blood group 30.63%, O blood group 41.56% and AB blood group 06.26%(Z. A. Laghari, N. M. Baig et al 2017)(11) . Our data is also consistent with previous studies showing the same pattern of ABO blood groups with slightly different prevalence in Iran (Roudbari, Soltani-Rad 2008)(15). While Mohammadali F et al(16),and Sinha PA et al (17) reported O +ve blood group to be common in the research of association of ABO and Rh blood groups to blood borne infections among blood donors. Mohssin MY et al, studied of frequency distribution of hemoglobin variant and ABO blood groups among thalassemia patients from Ibn-Al-Baladi hospital in Baghdad/Iraq and found O blood group being most common(59.1%)(1).

Another study showed that patients have higher prevalence in A blood group 33.93% blood group followed by B blood group 29.46%, O blood group 25.89% and AB blood group 9.82%. In contrast, the controls have highest frequency of O > B > A > AB (Verma, 2013)(18). Saha AK, et al found in their study of frequency and distribution of blood groups in the donors of a rural hospitals in West Bengal that blood group B was common in blood donors(19). Iqbal M et al, seen frequency of ABO and Rh blood groups in healthy donors had reported the same finding that B blood group is common among the donors(20). Our data also suggests that Rh D negative prevalence was significantly higher 04.30 in male than female patients, this need to be investigated in the future.

CONCLUSION

There was greater number of male children with thalassemia than female. No significant difference was found in the distribution of ABO blood groups between male and female patients. Female patients have significantly higher frequency of Rh D negative, particularly O Rh D negative.

This study will aid in making public health policies for blood availability for patients with thalassemia.

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