ORIGINAL ARTICLE

SCREENING FOR HEMOGLOBINOPATHIES IN BLOOD DONORS FROM EASTERN UTTAR PRADESH

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ABSTRACT

Objectives: Study the prevalence of hemoglobinopathies in blood donors from eastern U.P. India.

Materials and Methods: In the present study 1200 non-remunerated blood donors, between 18-40 years age,were included . Both replacement and voluntary healthy blood donors included in the study. Blood Donor Selection criteria used as prescribed AABB Technical Manual. Screening for β thalassaemia was done by using D-10, Bio Rad, based on **H**igh **P**erformance **L**iquid **C**hromatography (HPLC).

Results: Among the 1200 blood donors 19 (1.58%) found positive for β -thalassemia. Out of these 19, β -thalassemia trait was most common (63.15%). In all donors blood groups, B + was commonest (44.08 %),but among the β-thalassemia trait A + blood group was most common (33.33 %) .

Conclusion: Screening for thalassemia trait should be included as part of a standard blood testing before blood donation and a national policy must be formulated to screen the blood used for transfusion. However, this needs further studies to look at red cell kinetic studies and the effects of donated thalassemic blood in transfused patient.

Key words: Hemoglobinopathies, Blood donors, India

INTRODUCTION

Hemoglobinopathies consist of thalassemias and variant haemoglobin. β-thalassemias are commonest monogenic disorders across India. The cumulative gene frequency of haemoglobinopathies in India is 4.2% with a population over 1 billion and over 12000 infants born each year with a clinically significant hemoglobinopathies. [1] The carrier state for β-thalassemia in India varies from 1-17% with average of 3.2%. [2] Various studies are being done for evaluating the prevalence of thalassaemia trait and haemoglobinopathies in different study groups. Patients homozygous for β-thalassaemia or α thalassaemia usually present with the symptoms of the disease whereas carriers for α or β thalassaemia are usually found during examination of the relatives of more severally affected patients as part of screening programmes or during the investigation of mild iron refractory hypochromic anaemia.Combined efforts of screening couples at risk and prenatal diagnosis can reduce the incidence of thalassaemia major birth rate substantially.[3] The study was conducted with an objective to find out the prevalence of hemoglobinopathies in blood donors from eastern U.P., India.

MATERIALS AND METHODS

The present study was carried out in the Department of Medicine, Department of Biochemistry and Blood Bank, University Hospital, Institute of Medical Sciences, Banaras Hindu University, Varanasi during the period of December 2007 to May 2009. 1200 non-remunerated blood donors, between 18-40 years age, were included in study. Both rpeplacement and voluntary healthy blood donors included in the study. Blood Donor Selection criteria used as prescribed AABB Technical Mannual .[4] A complete physical examination had been done in all donors. Data recorded on prescribed format. 4 ml of venous blood was collected in EDTA (K3) tubes and stored at 4 ^{0} C. Screening for β thalassaemia was done in Blood Bank using D-10, Bio Rad, based on High Performance Liquid Chromatography (HPLC) .

RESULTS

In our study male and female were 91.25% and 8.75% respectively. In our study most of the individuals were in age group of 21-30 yrs. (Table 1).

Table 1: Age distribution (n=1200)

Age	Individual (%)
18-20	270 (22.50)
21-30	610 (50.83)
31-40	320 (26.67)
Total	1200 (100)

Among the 1200 blood donors 19 (1.58%) found positive for β -thalassemia and none for α-thalassemia, out of these 19, β -thalassemia trait was most common (63.15%) followed by Hb-E hetrozygose (21.5%); one each for HbS, HbD (*punjab*), and HbD (*iran*).(Table 2).

Table 2: Distribution of Haemoglobinopathy in study (n-19)

Type of hemoglobinopathy	Number	Prevalence	Proportion of total haemoglobinopathies (n=19)
β-Thalassemia trait	12	1.00%	63.15
Sickle cell	1	0.08%	5.26
HbD Punjab Variety	1	0.08%	5.26
HbE Variant	4	0.33%	21.05
HbD Iran Variant	1	0.08%	5.26)

Among the blood groups, B $^+$ was commonest (44.08 %) followed by O $^+$ (37.33%) (Table-3) ,but among the β-thalassemia trait A $^+$ blood group was most common (33.33 %) followed by B $^+$ and O $^+$ (25%) (Table-4).

Table 3: Blood group distribution in blood donors

Blood group	Donors (%)
O (+)	448 (37.33)
A (+)	97 (8.08)
B (+)	529(44.08)
AB (+)	29 (2.42)
A (-)	34 (2.83)
B (-)	42 (3.50)
O (-)	17 (1.42)
AB(-)	04 (0.33)

Table 4: Blood group among βThalassemia trait positives (n=12)

Blood group	β Thalassemia trait (%)
A^+	4 (33.33)
B^+	3 (25.00)
AB^+	1 (8.33)
O^+	3 (25.00)
A^-	1 (8.33)

In this study it was found that the majority of blood donors had Hb 12.6gm % or above including those tested positive for hemoglobinopathy screen. MCV and MCH were below normal limits in the donors with haemoglobinopathies but in all remaining blood donors it was with in normal limits. RDW was in normal range in all the cases. RBC count and Serum ferritin were also normal.

DISCUSSION

The present study was conducted on 1200 non remunerated voluntary blood donors coming to Blood Bank of University hospital BHU. Majority of patients were males (91.75%); low number of female donors could be because of local social factors and physical health like anemia barring them from blood donation. Majority of blood donors under study were in reproductive age (21-30 yrs) of life. However since this study has included only blood donors (need to be adult as per law), age distribution may not be true representation of prevalence of thalassemia in the population. But surely this study concludes the importance of hemoglobinopathy among the so called healthy blood donors. Among the blood groups, B $^+$ was commonest (44.08 %) followed by O $^+$ (37.33%) and is the usual population concentration of groups in this part of the country (Table-3). Among the 1200 blood donors 19 (1.58%) tested positive of β -thalassemia and none for α-thalassemia. This study is similar to a Italian study in regards of percentage(1.81 %) , [5] but in regards to type of haemoglobinopathyies it is not supporting some studies .[6,7] Among the 19, β-thalassemia trait was common (63.15%) followed Hb-E hetrozygose (21.5%); one each for HbS, HbD (*punjab*), and HbD (*iran*). Analysis of data revealed that among the Bangalis community HbE hetrozygus, was most common .[8,9,10] In a similar study to screen and identify the types of thalassemia among blood donors at the Hospital Universiti Sains Malaysia, thalassemia was detected in 16.25% of the blood donors .[11] In present study A $^+$ blood group was most common (33.33 %) followed by B $^+$ and O $^+$ (25%) among the β-thalassemia trait. Genetics does have role in causation of hemoglobinopathy but role of different blood groups and genetic aberration seen in hemoglobinopathies needs further exploration. Transfusion of blood obtained from thalassemic trait seems to be one of the possible causes of ineffective transfusion. In a very recent study from Thailand showed that an imbalanced alpha/beta-globin chain as a consequence of either reduction or enhancement of beta-globin chain synthesis can cause abnormal RBC properties in mouse models. This can be extrapolated that RBC of thalassemia trait are defective and hence has short survival as compared to normal balance β, α globin chain RBC.[12]

CONCLUSION

Screening for thalassemia trait should be included as part of a standard blood testing before blood donation and a national policy must be formulated to screen the blood used for transfusion to otherwise healthy population without any kind of hemoglobinopathy. However, this needs further studies to look at red cell kinetic studies and the effects of donated thalassemic blood in transfused patien

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