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ORIGINAL ARTICLE

Blood Transfusion Transmitted Infections in Multiple Blood Transfused Patients of Beta Thalassaemia

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Abstract Transfusion Transmitted Infection (TTI) continue to be a problem in many parts of world and multi-transfused patients of beta thalassaemia major are at a particularly increased risk of TTI. This study is aimed to estimate the prevalence of blood TTI in multiple blood transfused patients of beta thalassaemia major. Cross-sectional study of 200 multi-transfused patients of beta thalassaemia major, who were interviewed using a structured questionnaire and history was taken regarding sero-status of HIV (Human Immunodeficiency Virus), HBV (Hepatitis B Virus), HCV (Hepatitis C Virus) infection from their case papers. This study was conducted at the department of Pathology, M.P. Shah medical college, Jamnagar and Thalassemia ward, G.G. Hospital, Jamnagar (Gujarat, India) from March to May 2010. Out of 200 multiple blood transfused patients 7% patients were infected with TTI. Total 9 male patients and 5 female patients were infected with TTI. The seroreactivity for HIV was 3% (06/200); 1% (02/200) were males and 2% (04/200) were females. The seroreactivity for HBV was 2% (04/200) all were males. The seroreactivity for HCV was 2% (04/200); 1.5% (03/200) were males and 0.5% (01/200) was female. HIV, HBV, HCV infections are most prevalent TTI among multiple blood transfused patients of beta thalassemia major, and remains a major health problem for these patients.

Keywords Transfusion transmitted infection · Multiple blood transfused patients of beta thalassemia major · Human immunodeficiency virus · Hepatitis B virus · Hepatitis C virus

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Introduction

Transfusion Transmitted Infection (TTI) is a major challenge to the transfusion services all over the world. The problem of TTI is directly proportional to the prevalence of the infection in the blood donor community. In India HIV, HBV, HCV, Syphilis, Malaria, Hepatitis A, Hepatitis G, Epstein Barr Virus, Cytomegalo Virus (CMV), Parvo virus B-19, Human T Lymphocytic virus (HTLV-1 and HTLV-2) and bacterial infection are important causes of concern. Post transfusion hepatitis B and C is a major problem in India because of low viraemia and mutant strains undetectable by routine ELISA. HIV prevalence among blood donors is different in various parts of country. Current tests for syphilis may not be sensitive but it should be continued to exclude high risk donors. Malaria is a real problem for India due to the lack of simple and sensitive screening tests. Incidence of bacterial contamination is greatly reduced due to improved collection/preservation techniques and use of antibiotics in patients. However, proper vigilance and quality control is needed to prevent this problem. Use of sensitive laboratory tests may help Indian blood transfusion services to reduce incidence of TTIs [1].

Blood TTIs mainly occur in patients who are dependent on blood transfusion. Multiple blood transfusions are required mainly in patients of thalassaemia, sickle cell anemia, hemophilia, aplastic anemia, patients on chronic hemo-dialysis. Our study was limited to multiple blood transfused beta thalassaemia major patients. Beta thalassaemia, also known as Cooley's anemia, is a chronic recessive hemoglobinopathy, characterized by severe hemolysis.

Thalassaemias are a group of hemolytic anemia which result from an inherited abnormality of globin chain production. About 150 million people i.e., 3% of world population carry beta thalassaemia gene. Thalassaemia is considered the most common genetic disorder worldwide. It occurs in a particularly high frequency in a broad belt extending from the Mediterranean basin through the Middle East, Indian subcontinent, Burma, Southeast Asia, Melanesia and the island of the Pacific. Thalassaemia syndromes result from defects in the rate of synthesis of alpha or beta chains. Clinical and hematologic features of these cases are due to reduced hemoglobin production and accumulation of alpha and beta globin chains. Clinical syndrome varies from totally asymptomatic carriers to severe anemia. Thalassaemia is considered to be a quantitative defect of globin chain synthesis, since no structurally abnormal hemoglobin is synthesized. The most severe form is defined as beta thalassaemia major and is characterized by transfusion dependent anemia. [2]

Aims and objectives

The aims of this study are:

1) To estimate the prevalence of Transfusion Transmitted Infections amongst multiple blood transfused patients of beta thalassaemia.
2) To evaluate information regarding blood transfusion dependent beta thalassemic patients in relation to age, sex, blood group, total number of transfusion.
3) To determine association of TTIs in relation to number of transfusions.

Materials and methods

We present the study of seroprevalence of HIV, HBV, HCV infections in total 200 multiple blood transfusion dependent thalassaemia major patients.

This prospective study was conducted at the department of Pathology, M. P. Shah medical college, Jamnagar and Thalassaemia ward, G.G. Hospital, Jamnagar (Gujarat, India) from March to May 2010. Prospective study of multiple blood transfusion dependent patients of beta thalassaemia coming to thalassaemia ward. They are receiving regular transfusions of two units of blood per month at interval of 15 days in order to maintain the hemoglobin level above 10 G/dl. Patient's age ranged between 0 and 25 years. Patients of all age groups were interviewed using a structured questionnaire. Information regarding serostatus of HIV, HBV and HCV infection was obtained from their case papers. In thalassaemia ward all patients were regularly tested for HIV, HBV and HCV infection every 3 monthly. Tests for HIV, HBV, HCV are done by ELISA(Enzyme Linked Immunosorbent Assay). HIV status was detected by Micro well ELISA test for detection of Antibodies to HIV-1and HIV-2 in Human serum/plasma (COMBAIDS-RS Advantage-ST test kit which is dot immunoassay indented for the qualitative detection of IgG/IgM). HBV status is detected by Qualisa or HEPALISA (Micro well Enzyme Immunoassay, ELISA for the detection of Hepatitis B surface antigen (HBsAg) in human serum or plasma). HCV status is detected by HCV-MICROLISA (micro well ELISA TEST for detection of Antibodies to Hepatitis C virus in Human Serum/plasma). Every thalassaemic patient was given vaccine for Hepatitis B on very first day before starting of first blood transfusion, when he/she came for blood transfusion. Serum used in the study was obtained just before packed red blood cells transfusion. All information and test results were kept confidential. Written consent was taken from all patients or from their relatives in case of minor for this study. Permission from Ethical Committee for this study was obtained before starting the study.

Inclusion criteria

Known cases of β-Thalassaemia major, those who were transfused at least ten units of blood, irrespective of their age, sex were included in this study.

Exclusion criteria

Patients who had been transfused less than 10 units of blood as a part of their management were not included in this study, and patients who had received blood transfusion from private blood bank.

Observation

See Tables 1, 2, 3, 4, and 5.

Table 1 Overall distribution of patients according to gender ($n = 200$)

Gender	No. of patients	TTIs
Male	130	09
Female	70	05
Total	200	14

Out of 200 patients there were 130 males and 70 females, from which 14 (9 males and 5 females) were seropositive

Table 2 Distribution of patients according to age group and gender

Age group (years)	Male	Female	Positive cases					
			HIV		HBV		HCV	
			Male	Female	Male	Female	Male	Female
0–5	26	17	0	0	0	0	0	0
6–10	56	24	1	1	1	0	0	0
11–15	40	24	1	2	2	0	2	1
16–20	08	04	0	1	1	0	0	0
21–25	00	01	0	0	0	0	1	0
Total	130	70	2	4	4	0	3	1

Table 3 Distribution of patients according to blood group

Blood group	No. of patients	Positive cases					
		HIV		HBV		HCV	
		Male	Female	Male	Female	Male	Female
A +ve	43	0	0	1	0	0	0
A neg	03	0	0	0	0	0	0
B +ve	62	1	1	3	0	1	1
B neg	01	0	0	0	0	0	0
O +ve	61	1	3	0	0	2	0
O neg	05	0	0	0	0	0	0
AB +ve	24	0	0	0	0	0	0
AB neg	01	0	0	0	0	0	0
Total	200	2	4	4	0	3	1

There is no correlation between blood group and occurrence of TTIs

Result

Out of 200 multiple blood transfused beta thalassaemia patients 7% (14/200) patients were infected with TTI. Out of 14 patients 9 patients were males and 5 patients were females. The seroreactivity for HIV was 3% (06/200); 1% (02/200) were males and 2% (04/200) were females. The seroreactivity for HBV was 2% (04/200) all were males. The seroreactivity for HCV was 2% (04/200); 1.5% (03/200) were males and 0.5% (01/200) were females.

Discussion

As per Table 6, HIV seropositivity reported by various authors in India ranges from 0.7 to 3% and that reported by various authors from world ranges from 0 to 2.9% (excluding India). HBV seropositivity reported by various authors in India ranges from 2 to 69.2%, because of high incidence reported in 1995, however the recent study reported in 2003 incidence was 5.7%. HBV seropositivity reported by various authors from world ranges from 0.75 to 19% (excluding India). HCV seropositivity reported by various authors in India ranges from 2 to 35.9% and that reported by various authors from world ranges from 4.5 to 42% (excluding India).

Table 4 Average no of transfusions and TTIs

No of blood transfusions	Total no of patients	Positive cases of TTIs		
		HIV	HBV	HCV
0–25	15	0	0	0
26–50	16	0	0	0
51–75	18	0	1	0
76–100	21	0	0	0
101–125	16	1	0	0
126–150	23	1	0	0
151–175	17	1	0	0
176–200	13	0	0	1
201–225	23	1	0	1
226–250	13	0	0	1
251–275	09	0	1	1
276–300	04	0	1	0
301–325	03	1	0	0
326–350	04	0	0	0
351–375	00	0	0	0
376–400	01	0	0	0
401–425	01	0	0	0
426–450	00	0	0	0
451–475	01	0	0	0
476–500	01	1	1	0
501–525	01	0	0	0
526–550	00	0	0	0

There is no correlation between number of transfusions and TTIs

Table 5 Result of the study according to gender ($n = 200$)

TTI	Male no. (%)	Female no. (%)	Total no. (%)
HIV	2 (1)	4 (2)	6 (3)
HBV	4 (2)	0 (0)	4 (2)
HCV	3 (1.5)	1 (0.5)	4 (2)
Total	9 (4.5)	5 (2.5)	14 (7)

The decrease in seropositivity amongst multitransfused patients is because of implementation of measures such as (1) donor education, (2) strict standards for donor selection criteria, (3) improved serological screening protocols and (4) improved blood collection and transfusion techniques. Serological screening of every multitransfused patient is carried out at 3 months regularly and at the time of first transfusion in our institute. Few cases which were found HBV positive were detected at the time of first transfusion and in such all cases there was a history of previous

Table 6 Comparision of findings reported by various authors from different parts of world with present study

No.	Author	Place	Duration	HIV +ve %	HBV +ve %	HCV +VE %
1	George P et al. [3]	Athens, Greece	1971–1975	–	5.7	–
2	Daniele P et al. [4]	Italy	1989–1990	2.9	–	–
3	Benerjee D et al. [5]	East Zone, India	1990	0.8	22.1	–
4	Choudhary N et al. [6]	India	1993	2.6	17.9	23
			1994	2.6	35.9	30.7
			1995	2.6	69.2	35.9
5	Mollah A et al. [7]	Bangladesh	2000–2001	–	13.8	12.5
6	Sheyyab M et al. [8]	Amman, Jordan	2001	–	3.5	40.5
7	Hussain H et al. [9]	Pakistan	2002–2003	–	–	41.7
8	Singh H et al. [10]	Lucknow, India	2003	–	5.7	20
9	Ikram et al. [11]	Rawalpindi, Pakistan	2003	–	–	42
10	Shekhar H et al. [12]	Bangladesh	2003–2004	0	19	16.7
11	Erich V et al. [13]	Brazil	2005	17	0.8	16.7
12	Lopez L et al. [14]	Uruguay	2005	–	1.0	12.7
13	Kapoor C et al. [15]	Ouetta, India	2006	0.7	14	30
14	Ocak S et al. [16]	Turkey	2006	0	0.75	4.5
15	Present study	Jamnagar, India	2010	3	2	2

transfusion elsewhere. Out of 200 patients, majority of patients are on iron chelating therapy, while few are on parental (i.v/s.c) therapy, where strict aseptic precautions are observed to avoid infection by these routes. Few patients have yet not started iron chelation therapy. In relation to blood group and occurrence of TTIs, it is found that there is no correlation between particular blood group and TTIs. In relation to gender and occurrence of TTIs, it is found that there is no correlation between gender and TTIs. In relation to number of transfusions and occurrence of TTIs, it is found that there is no correlation between number of transfusions and TTIs.

Liver disease is a leading cause of death in patients with transfusion dependent beta thalassaemic patients [17]. Transfusion associated hepatotropic infections, especially HBV and HCV infection and hepatic siderosis can act either synergistically or independently in promoting chronic liver disease and they may induce cellular damage through similar oxidative pathways [18].

Conclusions

HIV, HBV, HCV infections are prevalent TTIs among multiple blood transfused patients of beta thalassaemia and remain a major health problem for these patients. The implementation of measures such as donor education programs, standards for donor selection criteria and of improved serological screening protocols, paralleled the decline in the prevalence of TTI, especially of HCV, observed in multiple blood transfused beta thalassaemic patients, understanding the importance of such measures for the reduction of residual risk of TTIs.

In order to reduce further the incidence of liver infection in multiple blood transfused patients, we should recommend an active immunization for HBV and HCV to all patients on repeated blood transfusion therapy.

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