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Original Article

Prevalence of HIV, HBV, and HCV Markers in Multi-transfused Patients

Vijay Kapse[1], Chandrakala Joshi[1], Ashok Verma[2]

[1]Associate Professor, Department of Pathology, Pt. Jawaharlal Nehru Memorial Medical College, Raipur, Chhattisgarh, India, [2]Postgraduate Resident, Department of Pathology, Pt. Jawaharlal Nehru, Memorial Medical College, Raipur, Chhattisgarh, India

Abstract

Background: Transfusion-transmitted infections (TTIs) are a major challenge to the transfusion services all over the world. The problem of TTIs is directly proportional to the prevalence of the infections in the blood donor community. Proper vigilance and quality control are needed to prevent this problem.

Materials and Methods: The study was conducted in the Department of Pathology, Pt J.N.M. Medical College and DR. B.R.A.M. Hospital, Raipur C.G., from January 2012 to August 2013 among the patient who are admitted for blood transfusion and are having a history of multiple blood transfusions. Serological detection of HIV-1 and 2, HBV, and HCV was done by third-generation enzyme-linked immunosorbent assay method.

Results: The study included 100 multi-transfused patients (MTPs), 56 (56%) were of sickle cell anemia, 26 (26%) were of thalassemia, 14 (14%) were of leukemia, and 4 (4%) were of aplastic anemia. 64 were males and 36 were females, with M/F ratio of 1.77:1. Majority were in age group of 6-10 years (36%). Out of 100 MTPs, 13 patients (13%) were found seropositive for viral markers. Out of 13 seropositive patients, 3 (3%) were seropositive for HIV 1 and 2, 10 (10%) were seropositive for HBV, and none of the patient was seropositive for HCV.

Conclusion: The overall prevalence of anti-HIV, HBsAg, and anti-HCV in MTPs was found to be 3%, 10%, and 0%, respectively. Possible risk factor for seropositivity of MTPs may be blood transfusion as elicited by taking a history of the patient. Thus, the results of this study "raise an alarm to the existence of a significant risk" of TTIs in our society.

Key words: Leukemia, Multi-transfusion, Seropositivity, Sickle cell, Thalassemia, Transfusion-transmitted infections

INTRODUCTION

Every day, millions of people require blood transfusion. This requirement of blood could be met only by its collection from human sources. Safe blood is the blood, which is antigenically compatible, and free of all transfusion-transmitted infections (TTIs) - HIV, hepatitis B, hepatitis C, syphilis, and malaria. TTIs are a major challenge to the transfusion services all over the world. The problem of TTIs is directly proportional to the prevalence of the infections in the blood donor community.[1] Infusion of blood and blood product is one of the most efficient means of transmission of these infections. Blood donors may carry a variety of pathogens in their blood despite their apparent healthy status.[2] Knowledge of prevalence of TTIs among multi-transfused patients (MTPs) in developing countries is an appropriate indicator of the risk of TTIs. Furthermore, a thorough understanding of the epidemiological characteristics of TTIs in MTPs may be of major assistance in elucidation of important aspects of the transmission chain of these infections, and so further improvement in the safety of the blood supply. These studies enabled the identification of useful procedures for further increasing the safety of blood.[3]

The present study is under taken to assess the seroprevalence of HIV, HBV, and HCV in relation to multiple transfusions of blood and blood products.

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Corresponding Author: Dr. Chandrakala Joshi, Tulip 274, Block A Talpuri International Colony Talpuri Bhilai - 490 009, Chhattisgarh, India. E-mail ckj242@gmail.com

Aims and Objectives

The aims of this study are as follows:

1. To evaluate the prevalence of HIV, HBV, and HCV infections in MTPs.
2. To identify possible risk factors related with the prevalence.

MATERIALS AND METHODS

This is a retrospective and prospective study.

Study Area

The study area was the Department of Pathology, Pt J.N.M. Medical College and DR. B.R.A.M. Hospital, Raipur, Chhattisgarh, India.

Study Duration

The period of study is 20 months, from January 2012 to August 2013.

Inclusion Criteria

Known cases of sickle cell anaemia, thalassemia, aplastic anemia, leukemia, hemophilia, and patients on chronic hemodialysis and those who have received at least 3 units of blood and blood products, 3 months before the day of sampling were included in the study.

Exclusion Criteria

Patients who have been transfused less than three units of blood were excluded from the study.

Methods

After obtaining informed/written consent of the patients and/or from parents, complete bio-data including postal address and phone number (mobile/telephone no) obtained for timely follow-up.

A thorough medical history with relevant clinical data with emphasis on age at diagnosis, age at first transfusion, frequency of transfusion, status of Hepatitis B vaccination, any other positive history for risk of HIV, HBV, and HCV infection, and serostatus of HIV, HBV, and HCV infection is taken.

Physical examination is carried out on each patient, which included checking for pallor, jaundice, pulse rate, lymphadenopathy, and organomegaly.

Procedure

3 ml of venous blood is collected in a plain glass test tube and is allowed to clot at room temperature, to yield serum or 3 ml venous anticoagulant blood is collected and centrifuged, to yield plasma from each patient, for screening of virological marker. Serum or plasma obtained is utilized for serological detection of HIV-1 and 2, HBV, and HCV by the third-generation enzyme-linked immunosorbent assay method.

Observation

The study included 100 MTPs, 56 (56%) were of sickle cell anemia, 26 (26%) were of thalassemia, 14 (14%) were of leukemia, and 4 (4%) were of aplastic anemia (Table 1). 64 were males and 36 were females, with M/F ratio of 1.77:1 (Figure 1). Majority were in age group of 6-10 years (36%) (Figure 2).

Table 2 shows that, out of 100 MTPs, 13 patients (13%) were found seropositive for viral markers. Out of 13 seropositive patients, 3 (3%) were seropositive for HIV 1 and 2, 10 (10%) were seropositive for HBV, and none of the patients was seropositive for HCV.

Table 3 shows diseases-wise distribution of seropositivity in MTPs: It was found highest (50%) in leukemia patients which was highest in age group of 16-20 years (40%). Prevalence was higher (15.62%) in male patients, with M/F ratio of 1.87:1.

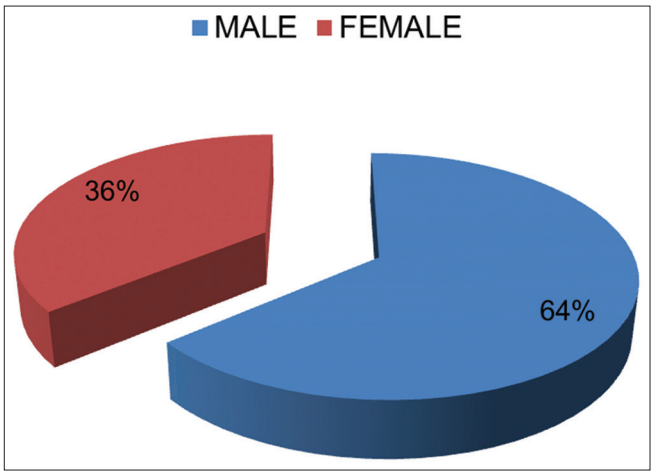

Figure 1: Gender wise distribution of Multi-Transfused Patients

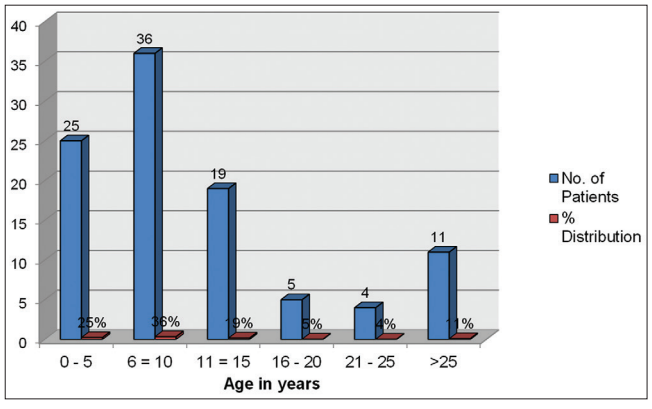

Figure 2: Age wies distribution of Multi- Transfused Patients

Distribution of seropositivity for different viral markers in multi-transfused sickle cell anemia patients: Out of 56 multi-transfused sickle cell anemia patients, 3 patients (5.35%) were found seropositive for viral markers. Out of 3 seropositive patients, one (1.78%) was seropositive for HIV 1 and 2, 2 (3.57%) were seropositive for HBV, and none of the patients was found seropositive for HCV. Seropositivity was found highest in the age group of 0-5 (25%) and 16-20 years (25%). Prevalence is higher (5.88%) in male patients compared with female (4.54%), with M/F ratio of 1.29:1.

Distribution of seropositivity for different viral markers in multi-transfused thalassemia patients: Out of 26 multi-transfused thalassemia patients, 3 patients (12%) were found seropositive for viral markers. Out of 3 seropositive patients, one (4%) was seropositive for HIV 1 and 2, 2 (8%) were seropositive for HBV, and none of the patients was found seropositive for HCV.

Seropositivity was found highest in the age group of 6-10 years. Prevalence was highest (17.64%) in male, and none of the female patients was seropositive.

Distribution of seropositivity for different viral markers in multi-transfused leukemia patients: Out of 14 multi-transfused leukemia patients, 7 patients (50%) were found seropositive for viral markers. Out of 7 seropositive patients, one (7.14%) was seropositive for HIV 1 and 2, 6 (42.85%) were seropositive for HBV, and none of the patients was found seropositive for HCV. Seropositivity was found highest in the age group of 16-25 years. Seropositivity was equal in both sexes (Table 4).

Rate of HBV seropositivity in unimmunized MTPs was 14.08%, while in immunized MTPs, it was 0% (Table 5).

- There was no correlation between number of transfusions and percentage of seropositivity.

Table 1: Disease-wise distribution of MTPs (*n*=100)

Diseases	Number of patients	% Distribution
Sickle cell anemia	56	56
Thalassemia	26	26
Leukemia	14	14
Aplastic anemia	04	04

MTPs: Multi-transfused patients

Table 2: Distribution of seropositivity for different viral markers in MTPs (*n*=100)

Viral markers	Number of seropositive	% of seropositivity
HIV 1 and 2	3	3
HBV	10	10
HCV	0	0
Total	13	13

MTPs: Multi-transfused patients

DISCUSSION

Blood transfusion still remains the mainstay of treatment for children with thalassemia, sickle cell anemia, aplastic anemia, and leukemia which present them with an increased risk of TTIs.[4] This study was designed to evaluate the prevalence of HIV, HBV, and HCV Infections in MTPs and to identify possible risk factors.

The probability of acquiring TTIs is related to the probability of being exposed to the infected units of blood. This probability depends on the prevalence of carriers among the blood donors in the population and the number of units transfused. Thus, the infection rate of TTIs increases with age in subsequent years.[5]

In the present study, overall seroprevalence of anti-HIV in MTPs was found to be 3%, and this was quiet comparable with the study of Vidja *et al.* 2011 from Jamnagar, India (3%),[1] Choudhary *et al.* 1998 from Lucknow, India (2.6%),[6] Kumar *et al.* 2010 from Pune, India (2%),[7] and Shah *et al.* 2010 Ahmadabad, India (2%).[8]

In the absence of treatment, the median time from HIV seroconversion to the onset of AIDS in transfused patients is about 7-11 years. Factors affecting progression include symptomatic primary infection, age at infection, and viral load.

The study done in India and abroad in MTPs indicates the seroprevalence for HBV varying from 0% to 41%. In the

Table 3: Diseases-wise distribution of seropositivity in MTPs (*n*=100)

Diseases	Number of patients	HIV 1 and 2	HBV	HCV	Number of seropositive	% of seropositivity
Sickle cell anaemia	56	1	2	0	3	5.35
Thalassemia	26	1	2	0	3	11.53
Leukemia	14	1	6	0	7	50
Aplastic Anemia	04	0	0	0	0	0
Total	100	3	10	0	13	13

MTPs: Multi-transfused patients

Table 4: Distribution of HBV seropositivity in MTPs in relation to status of hepatitis B vaccination

Status of vaccination	Number of patients	Number of seropositive	% of seropositivity
Immunized	28	0	0
Unimmunized	71	10	14.08
Not know	01	0	0

MTPs: Multi-transfused patients

Table 5: Frequency distribution of seropositivity rate for different viral markers in blood donors (year 2012) (*n*=8900)

Virus markers	Number of seropositive	% of seropositivity
HIV	13	0.14
HBsAg	96	1.07
HCV	4	0.04

MTPs: Multi-transfused patients

Table 6: Comparison of prevalence of anti-HIV, HBsAg, and anti-HCV in blood donors with MTPs

Virus marker	Prevalence of seropositivity in blood donor	Prevalence of seropositivity in MTPs
HIV	0.14	3.00
HBsAg	1.07	10.00
HCV	0.04	0.00

MTPs: Multi-transfused patients

present study, overall seroprevalence of HBsAg in MTPs was found to be 10%, and this was quiet comparable with a study of Vinelli and Lorenzana 2005 from Honduras (11%),[9] Mollah *et al.* 2003 from Bangladesh (13.85%),[4] and Kapoor *et al.* 2007 from Quetta, India (14%).[2]

Hepatitis B is a special problem in India since it is a medium endemic area. Routine HBsAg screening in blood units does not eliminate the risk of transmission. HBsAg test may be negative in the window phase of HBV infection, in the convalescence phase and also in chronic HBV infection, with very low viremia. Prevention of post-transfusion hepatitis starts with selection of non-remunerated blood donors[5] and an active immunization for HBV to all patients on repeated blood transfusion therapy.[1]

A study done in India and abroad in MTPs indicates the seroprevalence for HCV varying from 2% to 59.4%. In the present study, overall seroprevalence of HCV in MTPs was found to be 0%. Hence, it could not be compared with other study. However study done by Vidja *et al.* 2011 from Jamnagar, India[1] showed lowest prevalence rate (2%). Zero seropositivity for HCV in our study may be due to the relatively very low prevalence of HCV infection in this region, and hence, in the blood donor, and probably due to limited number of patients are being included.

In blood donors, there is high seroprevalence of HBsAg (1.07%) and HIV (0.14%), while seroprevalence of HCV (0.04%) is very low (Table 6).

Above finding shows that prevalence of TTIs in MTPs is higher as compared to donor population.

CONCLUSION

The risk of transmission of an infection is always associated with any transfusion and remains a major health problem for the patients. The implementation of measures such as donor education programs, stringent donor selection criteria, and improved serological screening protocols reduces the risk of TTIs. To further reduce the incidence of liver infection in multiple blood transfused patients, we should recommend an active immunization for HBV to all patients on repeated blood transfusion therapy. The results of this study "raises an alarm to the existence of a significant risk" of TTIs in our society. "Hence, we recommend more advance technique, like nucleic acid testing, for donor screening program."

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