



Original Research Article

Seroprevalence of transfusion transmissible viral infections in blood donors of tertiary health care hospital in Karnataka

Jayanthi K J¹, Shanti Jyothi K^{1,*}

¹Dept. of Pathology, Sanjay Gandhi Institute of Trauma & Orthopedics, Bangalore, Karnataka, India



ARTICLE INFO

Article history:

Received 30-11-2019

Accepted 27-04-2020

Available online 11-06-2020

Keywords:

Sero prevalence

Transfusion transmitted infections

Blood donors.

ABSTRACT

Background: Blood transfusion and its components are significant in saving millions of lives around the worldwide every year. Few, but serious complications are associated with Blood transfusion such as exposure to transfusion -transmissible infections (TTI), in particular: Human immunodeficiency virus(HIV)Hepatitis B Virus(HBV), Hepatitis C virus (HCV). Therefore, methodical pre transfusion testing of blood units for transfusion transmissible diseases is compulsory as per National Aids Control Organization (NACO) guidelines.

Objective: To evaluate the prevalence of transfusion transmissible viral infections among blood donors in our tertiary health care hospital in Bangalore, Karnataka.

Materials and Methods: The study comprised of retrospective analysis of blood donor's records covering from January 2015 to December 2018 (4 years) in the department of Blood bank, Sanjay Gandhi institute of trauma and orthopedics, Bangalore.

Results: A total of 8728 blood donors were screened for TTIs between 2015 to 2018.

Conclusion: Although there were a smaller number of transfusion transmissible viral infection among blood donors, methodical and comprehensive screening of donor's blood for HIV, HBV and HCV using standard methods are essential to ensure the safety of blood to the recipients.

© 2020 Published by Innovative Publication. This is an open access article under the CC BY-NC license (<https://creativecommons.org/licenses/by-nc/4.0/>)

1. Introduction

Blood transfusion is a key element of modern health care. The aim of blood transfusion is to provide safe and effective blood and blood products.¹ Transfusion transmitted infections such as human immunodeficiency virus (HIV), and hepatitis B virus (HBV), and hepatitis C virus (HCV) are among the greatest threat to blood safety for the recipient and pose a serious public health problem.² Morbidity and mortality infected blood transfusion have far reaching consequences, not only for the recipients, but also for their families and wider society.^{3,4}

Increasing prevalence of HIV, HBV, HCV among the humans have raised the problems of blood safety. Hence, continuous monitoring of the magnitude of transfusion transmissible infections in blood donors is important for

estimating the risk of transfusion transmitted infections and optimizing donor recruitment strategies to minimize infectious diseases transmission.² Continuous improvement and application of donor selection criteria and sensitive screening tests reduce the risk of TTIs.⁵

Hence, the present study was carried out with the aim of determining sero-prevalence of TTIs among blood donors in our tertiary care hospital.

2. Materials and Methods

2.1. Study

Study was conducted at Sanjay Gandhi institute of trauma and orthopedics, Bangalore from January 2015 to December 2018 (four years).

* Corresponding author.

E-mail address: shantichandu@gmail.com (S. Jyothi K).

2.2. Type

Retrospective, cross sectional descriptive study.

2.3. Data collection

Data was collected about blood donor's age, sex, serological results of HCV, HBsAg, HIV, at the Time of Blood collection. This was done by using a structured questionnaire. Blood was collected from apparently healthy individuals of age 18-60 years with weight > 45 kg and hemoglobin concentration > 12.5gm%. All blood Donor samples were screened for hepatitis B surface antigen (HBs Ag), HCV and HIV. HIV, HBsAg, HCV were done by enzyme-linked immuno adsorbent assay(ELISA) procedure using third generation kits.

2.4. Laboratory Testing

From each blood donor bag, five milliliters of blood was collected in sterile test tube. Centralization at a speed of 3500 revolutions per minute(rpm) for 5 minutes was done to separate the serum. 2ml of collected from each sample in sterile hepatitis c vials. Each donor was tested for HBsAg, anti-HCV and HIV. HIV was screened by using 3rd- generation ELISA technique (HIV 1/2: HIV merilisa). Blood samples tested by using serological assays for HIV infection were screened by ID NAT testing. Hepatitis B virus was screened by using 3rd generation immuno assay ELISA (HBsAg merilisa) and ID NAT testing hepatitis C virus by using the human anti-HCV 3rd-generation ELISA, (HCV merilisa) and ID NAT testing.

2.5. Inclusion criteria

All blood donors who donated blood during the study period.

2.6. Exclusion criteria

All prospective donors who did not satisfy donor selection criteria of NACO guidelines.

2.7. Data management

Descriptive statistics was used to summarize the data where frequency tables and cross tabulations were used while describing the data in numbers and percentages.

2.8. Quality Assurance

Standard operational procedures were strictly followed and QC materials were used for all serological tests. Laboratory quality was assured by well trained professionals, training and supervision during sample collection and testing.

2.9. Ethical consideration

Consent of the donor was taken. Ethical clearance was obtained from the institute.

3. Results

Donor characteristics: Total donors comprised of 8728: of which 7474 (85.63%) were males and 1254 (14.36%) were females in the ratio of 5.9:1 in four years. (Table 1).

Prevalence of blood borne pathogens: Blood borne pathogens were detected among 73 (0.83%) of donors and 8655 (99.16%) of the donors were free from the three viral infections. Donors with positive result for HIV were 3/8728 (0.03%), HBV 69/8728 (0.79%), HCV 1/8728 (0.01%). The hepatitis B infection was the predominant infection among TTIs constituting 69 (94.52%) of all the TTIs. Multiple infections were not seen in present study. Prevalence of all the three infections were more common in 20-29-year age group constituting 37/73 (50.68%). (Table 2).

Sero prevalence rates of TTIs in voluntary and replacement donors in four years shows that TTIs are common among voluntary donors consisting of 43/73 (58.90%) as in Table 3.

Sero-prevalence of TTIs among males and females shows that males are affected more than females 64/73 (87.67%).

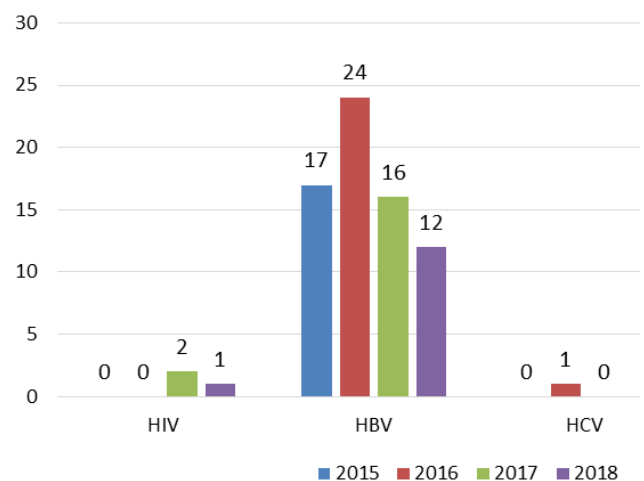


Fig. 1: Trend of TTIs year wise (2015-2018)

4. Discussion

WHO and NACO's aim is to achieve safe and appropriate blood supply by obtaining blood from healthy, voluntary, non-remunerated donors who have lower risk of TTIs compared to commercial and family replacement donors.

The aim of our study was to determine the seroprevalence of transfusion transmissible viral infection among blood

Table 1: Frequency of blood donors by gender and year wise

| Year | Male (%) | Female (%) | Total number |
|-------|--------------|--------------|--------------|
| 2015 | 1642 (81.52) | 372 (18.47) | 2014 |
| 2016 | 1817 (84.62) | 330 (15.37) | 2147 |
| 2017 | 1980(87.10) | 293 (12.89) | 2273 |
| 2018 | 2035 (88.70) | 259 (11.29) | 2294 |
| Total | 7474 (85.63) | 1254 (14.36) | 8728 |

Table 2: Age wise distribution of TTIs

| Age in years | HIV | HBS Ag | HCV | Total |
|--------------|-----|--------|-----|-------|
| < 20 | 0 | 08 | 0 | 08 |
| 20-29 | 02 | 34 | 01 | 37 |
| 30-39 | 01 | 16 | 00 | 17 |
| 40-49 | 0 | 10 | 0 | 10 |
| 50-60 | 0 | 01 | 0 | 01 |
| Total | 03 | 69 | 01 | 73 |

Table 3: seroprevalence rates of TTIs: voluntary vs replacement donors.

| Disease | Voluntary Number (%) | Replacement Number (%) | Total Number (%) |
|-------------|----------------------|------------------------|------------------|
| HIV | 01(1.36%) | 02(2.73%) | 03(4.10%) |
| Hepatitis B | 41(56.16%) | 28(38.35%) | 69(94.52%) |
| HCV | 01(1.36%) | 00 | 01(1.36%) |
| Total | 43 (58.90%) | 30(41.09%) | 73 |

Table 4: Gender distribution of TTIs.

| Disease | Male | Female | Total number |
|-------------|------------|-------------|--------------|
| HIV | 01 | 02 | 03 |
| Hepatitis B | 62 | 07 | 69 |
| HCV | 01 | 00 | 01 |
| Total | 64(87.67%) | 09 (12.32%) | 73 |

donors. Most of the donors in our study were males 7474(85.63%) aged between 18 and 60 years. This is similar to the studies of Buseri et al,⁶ Anjali et al,⁷ Pallavi et al,⁸ Tessema et al.² High deferral rates due to anemia, low body weight might be the reason for lower percentage of female donors.

In the present study, seroprevalence of transfusion transmissible infections(TTIs) was 73 (0.83%) which is similar to study by SriKrishna et al,⁹ Anjali et al,⁷ Pallavi et al.⁸

The seroprevalence of HIV, HBV, HCV were 0.03%, 0.79%,0.01%, respectively. This is similar to studies by SriKrishna et al,⁹ Anjali et al,⁷ Pallavi et al.⁸ The reason for lower prevalence of TTIs compared to other studies could be due to our efforts in creating the awareness among donors about TTIs before donation.

Higher HIV prevalence rates were observed in the age group of 20-29 (0.02%), followed by 30-39(0.01%). Prevalence of HIV detected in 20-29 years age group was higher compared to other age groups. This may be due to the high-risk behavior in younger generation such as multiple sex partners, unprotected sex and intravenous drug abuse.

The prevalence was more among females and replacement donors. This finding, in deviation to other studies may be random finding.

The prevalence of HBV, 0.79% is similar to studies by Adhikari et al,¹⁰ Sushma et al.¹¹ Higher HBV prevalence rates were observed in the age group of 20-29 (0.38%), followed by 30-39(0.18%). Prevalence of HIV detected in 20-29 years age group was higher compared to other age groups. This may be due to the high-risk behavior in this age group. HBV infection by gender distribution showed that the prevalence of HBV among males was higher than females. A higher seroprevalence rate among male donors than female donors might be due to risk behavior of males, such as outside socialization, multiple sex relationships etc. Higher prevalence rate was observed among voluntary donors compared to replacement donors. This may be due to the asymptomatic, carrier state nature of the disease. Many donors were not aware of the presence of infection.

The prevalence of HCV was seen in 0.01% of blood donors. It was seen in 20-29-year age group which is similar to study by Tigabu et al.¹² This might be due to high risk behavior in younger generation.

HCV infection by gender distribution showed that male had higher prevalence rate than females. This is similar to study by Tigabu et al.¹²

The trends in TTIs in blood donors tend to decrease in this study. HIV, HBV and HCV went from nil, 0.19%, nil, in 2015, nil, 0.27%, 0.01 % in 2016, 0.02%, 0.18%, nil in 2017, 0.01%, 0.13%, nil 2018 respectively, similar to other studies. The lower prevalence and decreasing trend TTIs in this study might be due to the awareness on the disease, modes of spread and prevention and our attempts in creating awareness among donors before blood donation.

5. Conclusion

The study reflects the sero prevalence of TTIs in general population in our area. Donor selection using standard methods and use of effective and sensitive screening tests like NAT assay would reduce the risk of TTIs.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. World Health Organization. Quality systems for blood safety: introductory module guidelines and principles for safe blood transfusion practice. In: Geneva: world health organization . Geneva; 2002. p. 65–75.
2. Tessema B, Yismaw G, Kasso A, Amsalu A, Mulu A, Emmrich F, et al. Seroprevalence of HIV, HBV, HCV and syphilis infections among blood donors at Gondar University Teaching Hospital, Northwest Ethiopia: declining trends over a period of five years. *BMC Infectious Diseases*. 2010;10:1–7.
3. World Health Organization (WHO), “Blood safety strategy for the African Region,” Tech Rep. WHO AFR/RC51/9Rev.1, World Health Organization, Regional Office for Africa, Braz-zaville, Congo; 2002.

4. World Health Organization (WHO), Status of Blood Safety in the WHO African Region: Report of the 2004 Survey WHO Regional Office for Africa, World Health Organization (WHO), Brazzaville, Congo; 2004.
5. Tiwari B, Ghimire P, Karki S, Rajkarnikar M. Seroprevalence of human immunodeficiency virus in Nepalese blood donors: A study from three regional blood transfusion services. *Asian J Transfus Sci*. 2008;2(2):66–8.
6. Buseri FI, Muhibi MA, Jeremiahza. Sero -epidemiology of transfusion -transmissible infectious diseases among blood donors in osogbo. *Blood Transfus*. 2009;(7):293–9.
7. Anjali H, Issac A, Anjali MR, Anish TS. Transfusion -transmissible infections among voluntary blood donors at government Medical College Thiruvananthapuram. *Asian J Transfus Sci*. 2012;6:55–6.
8. Pallavi P, Ganesh CK, Jayashree K, Manjunath GV. Seroprevalence and Trends in Transfusion Transmitted Infections Among Blood Donors in a University Hospital Blood Bank: A 5 Year Study. *Indian J Hematol Blood Transfus*. 2011;27:1–6.
9. Srikrishna S, Damodarp. How safe are our safe donors? *Indian J Pathol Microbiol*. 1999;42:411–6.
10. Adhikari L, Bhatta D, Tsering D, Sharma D, Pal R, Gupta A, et al. Infectious disease markers in blood donors at central referral hospital, Gangtok, Sikkim. *Asian J Transfus Sci* . 2010;4(1):41–2.
11. Chandekar SA, Amonkar GP, Desai HM, Valvi N, Puranik GV. Seroprevalence of transfusion transmitted infections in healthy blood donors: A 5-year tertiary care hospital experience. *J Lab Physicians* . 2017;9(04):283–7.
12. Tigabu A, Engda T, Mekonnen F. Seroprevalence of transfusion transmissible viral infections (HIV, HBV and HCV) among voluntary blood donors at University of Gondar Comprehensive Specialized Hospital, Gondar; Northwest Ethiopia. *BMC Infect Dis*. 2019;19:393.

Author biography

Jayanthi K J Assistant Professor

Shanti Jyothi K Blood Bank Officer

Cite this article: Jayanthi K J , Jyothi K S. Seroprevalence of transfusion transmissible viral infections in blood donors of tertiary health care hospital in Karnataka. *IP Arch Cytol Histopathology Res* 2020;5(2):131-134.