



Seroprevalence and Trends in Transfusion Transmitted Infections among Blood Donors in a Tertiary Care Hospital of Kashmir: A Hospital Based Study

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Abstract

Life is blood. Millions of lives are saved each year globally through the use of transfusions of blood and blood components, which also lower morbidity. Blood transfusions are known to cause a wide range of consequences, some of which are minor while others could be fatal, necessitating rigorous pretransfusion testing and screening, especially for Transfusion Transmissible Infections (TTI). The security of blood is under risk from these TTI. Therefore, ensuring the security, sufficiency, accessibility and effectiveness of the blood supply at all levels is the primary goal of BTS.

Keywords: Transfusion transmissible infections; Sufficiency; Blood supply; Transfusions of blood

Introduction

Blood Transfusion Service (BTS) is an integral and indispensable part of the healthcare system. The priority objective of BTS is to ensure safety, adequacy, accessibility and efficiency of blood supply at all levels. Despite the existence of World Health Organization (WHO) approved national hemovigilance protocols in most countries in the region, blood transfusion continues to carry a certain margin of risk for both patients and healthcare workers. Hypersensitivity reactions and direct or residual risk associated with a spectrum of Transfusion Transmissible Infections (TTI), including Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and syphilis-causing *Treponema pallidum* (*T. pallidum*) are the major concerns. Transfusion departments have always been a major portal to screen, monitor and control infections transmitted by transfusion of blood. Blood transfusion departments not only screen TTIs but also give clue about the prevalence of these infections in populations. Although advancements in technology has led to the development of

accurate methods to detect different markers of TTIs, the problems like false negative results, genetic variability in pathogen strains, window period of the disease, prevalence of asymptomatic carriers and technical errors continue to remain. This hospital based study was done to study the seroprevalence of TTIs for a period of 2 years in a tertiary care hospital. This gave vital information about the safety associated with blood transfusion and an accurate measurement of risks vs. benefits of blood transfusion [1].

We report the trends in the detected seroprevalence of Hepatitis B (HBV), Hepatitis C (HCV), Human Immunodeficiency Virus (HIV), syphilis and malaria over a period of 2 years from 2019 to 2020 in a tertiary care hospital based study. This provides information regarding the safety of blood transfusion and an accurate assessment of known risks versus benefits of blood transfusion.

Materials and Methods

This retrospective study was conducted after getting permission from institutional ethical committee. The study period was from January 2019 to December 2020. Data of blood donors who donated blood from January 2019 to December 2020 was collected from the blood bank of GMC and SMHS tertiary care hospital, Srinagar India. Blood donations over 2 years were revived retrospectively from the records of blood bank. A total of 19333 samples received during year 2019 and 2020 were tested for the presence of seromarkers of TTIs [2]. We had selected the donors strictly by donor selection criteria from which a detailed history had been taken, clinical examination was done had donor questionnaire forms filled and written consent was taken for blood donation. All the 19333 samples received during the year 2019 to 2020 were tested for the presence of seromarkers of TTI's. HBsAg and Anti HCV antibodies were tested by 3rd generation hepalisa and microlisa kits supplied by Mitra and Co. Pvt. Ltd. and HIV 1 and 2 antibodies were tested by using 4th generation microlisa kits by Mitra and Co. Pvt. Ltd. (Specific for both HIVAg+Ab) [3]. Syphilis was tested by RPR Carbong Ag kits supplied by Reckon Diagnostics Pvt. Ltd and malaria by rapid malaria antigen kits followed by slide examination for confirmation. The positive samples were discarded as per standard protocols and counselling was given to reactive donors who were advised to start treatment and take precautions by which spreading of infection can stop [4].

The family members, friends or relatives of the patients were categorized as replacement donors. People who donate blood without expecting any favor in return or in voluntary blood donation camps were classified as voluntary blood donors. Donors were screened by the standard criteria for donor fitness. They were carefully selected for donation by trained personnel after medical examination and a detailed pre donation questionnaire form which included the donor register form, information regarding risk factor such as history of surgery, previous illness, hospitalization and blood transfusion. The donors were included in the study after obtaining informed consent

Results

A total of 19333 units of blood were collected and screened from January 2019 to December 2020. From our results, 39 cases were found positive for various TTIs in a total of 10633 collections for year 2019 with a percentage of 0.36% [5]. Similarly, 38 cases were found to be positive with different TTIs in a total collection of 8700 for year

2020 with a percentage of 0.43%. Hence, for a two-year period, a total of 77 positive cases were reported in a total collection of 19333, giving overall two-year percentage of 0.39% (Table 1).

Year	No of blood units screened	TTI positive cases	%age of positive cases
2019	10633	39	0.36%
2020	8700	38	0.43%
Total	19333	77	0.39%

Table 1: Overall seroprevalence of TTIs in blood units screened for a period of 2 years.

Seroprevalence of different TTIs for a two year period as illustrated in Table 2 shows HBV tops the list with a percentage of (0.22 %) followed by HCV (0.14 %), syphilis (0.02%) HIV (0.01%) and malaria (0%) [6].

Type of TTI	Total TTI positive cases in two years	Total no of blood units screened in two year period	% of positive cases
HBV	43	19333	0.22%
HCV	28	19333	0.14%
HIV	2	19333	0.01%
Syphilis	4	19333	0.02%
Malaria	0	19333	0.00%

Table 2: Seroprevalence of different TTIs among blood donors for a two year period.

Same trends in seroprevalence of different TTIs can also be seen in year wise break up for 2019 and 2020 showing HBV contributing maximally to the infections transmitted by blood transfusion (Table 3).

Type of TTI	Total collection	Total +ve cases	% of positive cases	Total collection	Total +ve cases	% of positive cases
HBV	10633	28	0.26%	8700	15	0.17%
HCV	10633	8	0.07%	8700	20	0.22%
HIV	10633	0	0%	8700	2	0.02%
Syphilis	10633	3	0.02%	8700	1	0.01%
Malaria	10633	0	0%	8700	0	0%

Table 3: Percentage of seroprevalence of different TTIs in a year wise break up for 2019 and 2020.

The comparative data presenting a picture of TTI burden in India has come from the present and various other seroprevalence studies done in different parts of the country and is depicted in Table 4 [7]. The results of our study are comparable with results of most of these studies showing that seropositivity of HBV and HCV is much greater than sero-prevalence of other TTIs and also seropositivity was very less for HIV, syphilis and malaria in our study [8].

Place	HIV (%)	HBsAG (%)	HCV (%)	Syphilis (%)
Ludhiana	0.084	0.66	1.09	0.85
Delhi	0.56	2.23	0.66	
Lucknow (UP)	0.23	1.96	0.85	0.01
Southern Haryana	0.3	1.7	1.0	0.9
West Bengal	0.28	1.46	0.31	0.72

Bangalore, Karnataka	0.44	1.86	1.02	1.6
Present study	0.01	0.22	0.14	0.02

Table 4: Comparison of TTI prevalence rate in different parts of India.

Blood transfusion is an important therapeutic intervention that has a critical role in patient management but the unsafe transfusion of blood from infected donors to recipients puts millions of lives at risk [9]. Therefore, monitoring prevalence trends of a spectrum of TTIs in donor population remains a valuable index for evaluating the effectiveness of existing intervention strategies [10]. Effective screening for evidence of presence of the most common and dangerous TTIs can reduce the risk of transmission to a very low level [11].

India is still in the intermediate prevalence zone for HbsAg and has been estimated to be a home to over 40 million HbsAg carriers. Despite the fact that a safe and effective vaccine has been available since 1982, the HbsAg prevalence in India remains high. This is because hepatitis B vaccination is not a part of our national immunization programme. The wide variations of HCV seroprevalence in different studies in India might be due to the use of different generation of ELISA test kits, having different sensitivities and specificities [12]. Among the studies done, Garg et al. have reported an HCV prevalence of 0.28% in blood donors of Western India and similar low prevalence of 0.23% has been noted in our study.

In this study, an attempt was made to detect seroprevalence of HBV, HCV, HIV, syphilis and malaria among blood donors. Low seroprevalence of all the TTIs was observed compared to the rest of the country which is also depicted in NACO 2015 report. Low seroprevalence of viral markers (HBV and HCV) as compared to other parts of the country was also observed by Qureshi MZ et al. who conducted a 10 year study at a tertiary care hospital. This study is in accordance with the WHO classification, which reported Srinagar, J and K, India as a low prevalence zone (<2%) for HBV [13]. In this study among all TTIs, the seroprevalence of HBV was highest in comparison to other infections. Highest seroprevalence of HBV in comparison to other TTIs was also observed by Handoo S et al. In our study HCV seroprevalence among blood donors was found to be 0.14%. Mitrovic et al. observed HCV seroprevalence of 0.19% in their study [14]. In our study, only 2 cases (0.01%) of HIV were detected. This may be due to awareness and medical advancement that HIV positive patients are able to come forward and seek medical intervention or it may be because people of high risk behaviour are aware to a certain extent about how to prevent HIV infection and mandatory availability of triple serology tests to be done by patients before any surgical procedure. Moreover establishment of multiple numbers of Integrated Counselling and Testing Centres (ICTC) for HIV awareness and Opioid Substitution Centres (OST) for preventing spread of infection among drug abusers have also limited the cases of HIV in Srinagar, J and K, India. In this study seroprevalence of syphilis and malaria was 0.02% and 0.0% respectively.

With every unit of blood, there is 1% chance of transfusion associated problems including TTI. The risk of TTI has declined dramatically in high income nations over the past two decades, primarily because of extraordinary success in preventing HIV and other established transfusion transmitted viruses from entering the blood supply. But the same may not hold good for the developing

countries. The national policy for blood transfusion services in our country is of recent origin and the transfusion services are hospital based and fragmented [15].

Conclusion

To summarise TTI have a direct impact on the development of a nation. So there should be an establishment of a nationally coordinated blood transfusion services. All blood should be tested for compatibility and TTI's with reduction in unnecessary blood transfusion thus ensuring safe blood supply to the recipients. With the implementation of strict donor selection criteria use of sensitive screening tests and establishment of strict guidelines for blood transfusion it may be possible to reduce the incidence of TTI in the Indian scenario.

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