



Seroprevalence Of Transfusion Transmissible Infections In Voluntary Blood Donors In Tertiary Care Hospital, Kashmir, India: A 2 Year Retrospective Study

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Abstract

Abstract: Blood remains one of the sources of transmission of hepatitis B, hepatitis C, HIV, and syphilis. Most donors in our country are voluntary donors who are apparently healthy, but this study found that these diseases are prevalent among donors. This study reflects the seroprevalence of Transfusion Transmitted infections (TTIs) of the general population in our area which may be helpful in planning public health interventional strategies. Therefore, the role of screening programs and quality control of screening tests hold utmost importance for preventing of these infections. In our retrospective study of 3622 donors, we estimated overall prevalence of HIV, HBsAg, HCV, and syphilis were 0.027% 0.52%, 0.33%, and 0.0%, respectively. Methods to ensure a safe blood supply should be encouraged by increasing awareness about the possibility of TTIs and other transfusion related complications.

Keywords: blood, transfusion infections, hepatitis, screening

Introduction

Transfusion transmitted infections (TTI) are a great concern of safety for patients. Since the starting of blood transfusion scientifically in the early 1940s, various transfusion associated problems have come to the forefront for the scientific community. The

Indian subcontinent is classified as an intermediate Hepatitis B Virus (HBV) endemic (HBsAg carriage 2-7%) zone and has the second largest global pool of chronic HBV infections¹. India has a population of more than 1.2 billion with 5.7 (reduced to 2.5) million Human Immunodeficiency Virus (HIV) positive, 43 million HBV positive and 15 million HCV positive persons. The risk of transfusion transmission of these viruses may be alarming due to high seroprevalence of HIV, anti-HCV, and HBsAg (0.5%, 0.4%, and 1.4%, respectively) among blood donors.² Blood safety is of utmost importance in transfusion medicine. Transfusion-transmitted

infections (TTIs) hamper blood safety and cause a serious public health problem.³

Blood is one of the major sources of transmission of hepatitis B, hepatitis C, HIV, syphilis, and many other diseases.^{4,5} Discovery of these hazards brought a dramatic change in attitude of physicians and patients about transfusion of blood.⁶ It is mandatory to test each donor's blood for syphilis by a Venereal Disease Reference Laboratory (VDRL), and for HBsAg, anti-HCV, and anti-HIV. Screening TTI is also essential for blood transfusion safety and for protecting human life.⁷ Complications of blood transfusions may be mild or can be life-threatening and hence meticulous pretransfusion testing and screening for transfusion-transmissible infections is mandatory.⁸ These infections are a threat to blood safety, and so blood transfusion services have to ensure safe, adequate, accessible, and efficient blood supply at all levels. These infections also cause fatal, chronic, and life-threatening disorders.

The TTI's include human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis c virus (HCV) and syphilis. 12.5% of patients who received blood transfusion are at risk of posttransfusion hepatitis.⁹ To reduce risk of TTIs, careful selection of donors is needed so that the blood is safe and is not collected from the people who are likely to be carriers of infectious agents. Evaluations of TTI are essential for assessing the safety of blood supply and monitoring the efficiency of currently employed screening procedures.¹⁰ The present study was carried out with the aim of determining the seroprevalence of TTI among healthy blood donors in Associated Hospital of GMC Baramulla.

Materials and Methods

A retrospective study was conducted by Department of Pathology and Blood Bank in Government Medical College Baramulla and the data was analysed over a period of 2 years from January 2021 to December 2022. District Baramulla is one of largest districts in the union territory of Jammu and Kashmir, India and has a large outreach to north of Kashmir valley. Blood was collected from apparently healthy individuals after detail history and examination, aged 18–60 years with weight >45 kg with haemoglobin concentration >12.5 gm%. Careful clinical and physical examination was carried out as per NACO guidelines of the donors for selection. All blood donors' samples were screened for HIV, hepatitis B surface antigen (HBsAg), HCV, and syphilis. Blood bank donor cards were used as a source of information. HIV, HBsAg, HCV tests were

done by enzyme-linked immunosorbent assay (ELISA) procedure using the third-generation kits. Syphilis was diagnosed by performing the venereal disease research laboratory (VDRL) test. Blood donors were selected if they fulfilled all the criteria to be eligible for donation as described by the standard operating procedure of our blood bank.

Blood sampling Venous blood was collected in plain vacutainer tubes which was allowed to clot naturally at room temperature. Tests on donor blood were carried out according to manufacturer's instructions with positive and negative controls. Before drawing the blood, each donor was requested to fill blood donor's card. Confidentiality of reports was maintained as per standard guidelines.

Results:

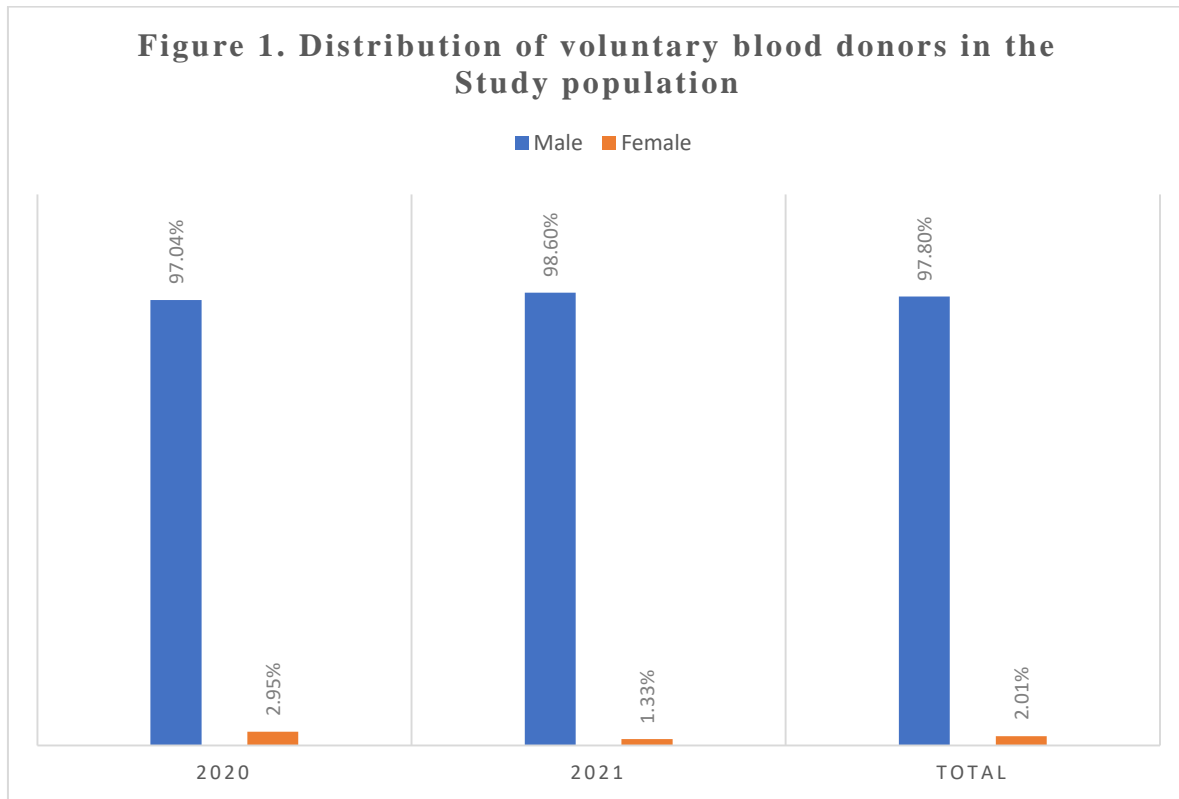
A total of 3622 units of blood were screened over the given period of two years. From the results it was found that 19 cases (1.24%) were positive for various TTIs in a total of 1523 collections during year 2020 and 13 cases (0.61%) were positive from total of 2099 collections during year 2021 with a total of 32 cases (0.88%) positive for TTIs during the study period of 2 years in the department. Among the various TTIs the incidence [Table 1] of Hepatitis B was highest in two years accounting for total of 19 cases (0.52%) followed by hepatitis C with 12 cases (0.33%). A Single case (0.027%) of HIV was also reported during the screening process. No cases of either syphilis or malaria were detected during the study.

Table 1. Incidence and Seroprevalence of TTIs in Blood Donors.

Year	Total donors	Reactive Donors (%)	HBsAg (%)	HCV (%)	HIV (%)	VDRL (%)	Malaria (%)
2020	1523	19(1.24%)	11(0.72%)	07(0.45%)	1 (0.06%)	0(0%)	0 (0%)
2021	2099	13(0.61%)	08(0.38%)	05(0.23%)	0(0%)	0(0%)	0(0%)
Total	3622	32(0.88%)	19(0.52%)	12(0.33%)	1(0.027%)	0(0%)	0(0%)

HBsAg = Hepatitis B surface antigen, HCV = Hepatitis C virus, VDRL = Venereal disease research laboratory, HIV = Human immunodeficiency virus

Among the donors 3549 (97.8%) were males and 73(2.01%) were females [Figure 1]. Trends of the TTIs were not reported as the study period was short.



Since most donors belong to 3rd decade and as result prevalence of infection in 3rd decade is also highest with 56.25% (18 cases) of overall infections. Among the TTIs Hepatitis B infection was prevalent with 19 (59.37%) of cases followed by Hepatitis C infection with 12 cases (37.5%). Only 1 case (3.12%) of HIV was identified during screening of a 45-year-old male. While above the age group of 50 years group only 2 cases (6.25%) of overall TTIs were identified. [Table 2].

Table 2: Distribution of blood donors with transfusion transmitted infections according to the age*

Age	HBsAg		HCV		HIV		Total	
	Count	%	Count	%	Count	%	Count	%
18-30	11	61.11%	07	38.88%	0	0%	18	56.25%
31-50	07	58.33%	04	33.33%	1	100%	12	37.5%
>51	01	50%	01	50%	0	0%	02	6.25%
Total	19	59.37%	12	37.5%	1	3.12%	32	100%

*Syphilis and *Malaria not included in table as no cases were detected

Table 3. Comparison of transfusion transmitted infections prevalence rate with other studies

Study	HIV %	HbsAg %	HCV %	Syphilis %
Present study (2022), Baramulla, J&K, India	0.027	0.52	0.33	0
Srikrishna <i>et al.</i> (1999), Bangalore, India	0.44	1.86	1.02	1.6
Pahuja <i>et al.</i> (2007), Delhi, India	0.56	2.23	0.66	-
Bhattacharya <i>et al.</i> (2007), West Bengal, India	0.28	1.46	0.31	0.72
Adhikari <i>et al.</i> (2010), Sikkim, India	0.32	0.78	0.27	0.27
Arora <i>et al.</i> (2010), Southern Haryana, India	0.3	1.2	1	0.9
Pallavi <i>et al.</i> (2011), Mysore, India	0.44	1.27	0.23	0.28
Anjali <i>et al.</i> (2012), Kerala, India	0.6	1.5	0.4	0.1
Nagalo <i>et al.</i> (2011), Koudougou	2.21	14.96	8.69	3.96
Matee <i>et al.</i> (2006), Tanzania	3.8	8.8	1.5	4.7
Fiekumo <i>et al.</i> (2009), Nigeria	3.1	18.6	6	1.1
Tafari <i>et al.</i> (2010), Italy	1.5	8.3	4.5	1.5
Tessema <i>et al.</i> (2010), Northwest Ethiopia	3.8	4.7	0.7	1.3
Stokx <i>et al.</i> (2011), Mozambique	8.5	10.6	0	1.2

Discussion.

The present study was conducted with the aim to assess the prevalence of possible TTIs in the healthy donors and henceforth prevent the transmission of the infections to recipients of the donations and understand the incidence of various infections in the area. It was noted majority of donors were males [Figure 1.] and most common possible TTI in the donors was hepatitis B. followed by Hepatitis C. The seroprevalence of the HIV, HBV, HCV, and syphilis [Table 1] were 0.02%, 0.52%, 0.33%, and 0.0%, respectively which is comparable with other studies such as Adhikari *et al.*,¹¹ Anjali *et al.*,⁸ Pallavi *et al.*,¹² Pahuja *et al.*,¹³ Arora *et al.*,¹⁴ Bhattacharya *et al.*,¹⁵ and Srikrishna *et al.*¹⁶ as shown in Table 3. However, this seroprevalence rate is lower than studies done by Matee *et al.*,¹⁷ Stokx *et al.*,¹⁸ Tafuri *et al.*,¹⁹ Tessema *et al.*,⁹ Nagalo *et al.*,⁷ Buseri *et al.* as shown in Table 3. The reason for the quite lower

prevalence of TTI compared to that in previous reports could be due to the reason that this study was carried in the academic institute where before donating blood awareness about TTI were given to donors. The prevalence of malaria and syphilis is low in the present study as these disease are not endemic in the region owing to environmental and socio-cultural aspects.

HBV incidence is higher in our population. HBV positivity indicates a carrier state or an active infection. These seropositive donors may progress to develop chronic hepatitis, cirrhosis, and even progress to hepatocellular carcinomas.^{19,20} Patients requiring blood transfusion are more prone to acquire HBV, HIV, HCV, and syphilis.²¹ HBV is highly contagious and easily transmitted from one individual to another by transfusion during birth, by unprotected sex and by sharing needles. Syphilis can be spread by sexual contact, blood transfusion and by vertical

transmission. Due to the nature of blood born virus, HCV is widely recognized as a major causative agent for posttransfusion non-A, non-B hepatitis. Other less common routes of transmission are sexual intercourse and mother to child transfer.²² In case of HIV, transmission during window period is possible even if each unit is tested for HIV antibodies. The possibility of window period transmission would be minimized if blood is collected from low-risk targeted public.²³ However, blood safety remains an issue of major concern in transfusion medicine. However, HBV and HIV can also be transmitted from person-to-person contact, especially HBV, which is transmittable from tears, urine, etc., Seroprevalence of HBsAg ranges from intermediate (2%– 7%) to high (>8%) levels in India. High prevalence rate of 10% has been seen in Southern China, Korea, Melanesia, the Philippines, India, Indonesia, Japan, and Pakistan have intermediate rates of endemicity. However, these rates may be inaccurate and possible the tip of the iceberg as rates of occult HBV infection are not included in this.²⁴

HBsAg seroprevalence in India is high despite a safe and effective vaccine has been available. Sexually transmitted infections constitute a major public health problem and are widespread in developing countries. Syphilis has also acquired a new potential for morbidity and mortality through association with increased risk of HIV infection, thus making safe blood more difficult to get. The residual transmission risk of HBV infection through a transfusion is higher due to a long window period between initial HBV infection and the detection of HBsAg during which the virus is transmissible.²⁵ Therefore selection of donors with low TTI risk and effective laboratory screening is the very important part in blood bank processing which has reduced the risk of transmission to very low levels.

Conclusion

Blood remains one of the sources of transmission of hepatitis B, hepatitis C, HIV, and syphilis. Most donors in our country are voluntary donors who are apparently healthy, but this study found that these diseases are prevalent among donors. This study reflects the seroprevalence of Transfusion Transmitted infections (TTIs) of the general population in our area which may be helpful in planning public health interventional strategies.

Therefore, the role of screening programs and quality control of screening tests hold utmost importance for preventing of these infections. In our retrospective study of 3622 donors, we estimated overall prevalence of HIV, HBsAg, HCV, and syphilis were 0.027%, 0.52%, 0.33%, and 0.0%, respectively. Methods to ensure a safe blood supply should be encouraged by increasing awareness about the possibility of TTIs and other transfusion related complications.

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