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Original research article

Study on seroprevalence of transfusion transmissible infections among blood donors at tertiary care hospital, Karnataka

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Abstract

Background: Blood transfusion is a life-saving procedure that saves millions of lives every year around the world, it can be transfused as whole blood for one patient or may be manufactured into blood-derived products to be provided for more than one patient. However, it is known that blood transfusion can be associated with risks of transmitting certain infections.

Objectives of the Study: To find out the seroprevalence of transfusion transmissible infections among voluntary blood donors at our tertiary care hospital.

Methodology: Blood grouping ABO and Rhesus was done by antigen antibody micro-agglutination test using commercially available standard antisera validated at National Blood Bank. Both forward (cell grouping) and reverse grouping (serum grouping) methods were used. The final blood group was confirmed only if both forward and reverse groups were identical. Donor's age, sex, location of blood donation, dates of donation and blood groups with Rh factors were tabulated in register book. HIV, HbSAg and HCV were tested by enzyme linked immuno sorbent assay (ELISA), Syphilis screening was done using Rapid Plasma Reagin card test and Malarial parasite screening was done using Rapid card test.

Results: The present study is a cross-sectional study conducted using 3 years (January 2019 to December 2021) data from our blood bank records. Out of 2069 voluntary blood donor's males were 2043 (98.64%) and females were 26 (1.25%). Out of 2069 blood donors, 2043 were males and 26 were females. 164 (7.9%) were in the age group of 18-20 years, 1333 (64.42%) were in the age group of 21-30 years, 427 (20.63%) were in the age group of 31-40 years, 134 (6.49) were in the age group of 41-50 years and 9 (0.43) were in the age group of 51-60. Majority of the blood donors were in the age group of 21-30 years representing 64.2% of the total blood donors (table 1and figure 1).We estimated the prevalence of transfusion transmitted infections among blood donors, we found the prevalence of 0.24% for HIV infections, 0.38% for Hepatitis B infections and 0.04% for Syphilis. None of the blood donors tested positive for Hepatitis C viral infections and malarial parasite.

Discussion and Conclusion: In our study, we found the prevalence of 0.24% for HIV infections, 0.38% for Hepatitis B infections and 0.04% for Syphilis. None of the blood donors tested positive for Hepatitis C viral infections and malarial parasite. The increase in public awareness regarding voluntary blood donation, meticulous donor screening, counselling and use of highly sensitive tests can help in reducing the risk of TTIs.

Keywords: Transfusion transmissible infections, enzyme linked immuno sorbent assay, human immunodeficiency virus, hepatitis B virus, hepatitis C virus, malaria and syphilis

Introduction

Blood transfusion is a life-saving procedure that saves millions of lives every year around the world, it can be transfused as whole blood for one patient or may be manufactured into blood-derived products to be provided for more than one patient. However, it is known that blood transfusion can be associated with risks of transmitting certain infections [1, 2].

These infections are known as Transfusion Transmissible Infections (TTIs), which defined as any infection that can be transmitted from person to person through parenteral administration of blood or any blood products. Thus, different outcomes may follow unsafe transfusion, as it can cause an acute clinical sickness; it can persist in the receiver as a carrier or cause asymptomatic infection [3].

These infections include viral, bacterial, parasites and prions. The most prominent among these are, Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV), due to

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their high prevalence rates. Other agents are Human T-cell Lymphotropic Virus (HTLV-I/II), Cytomegalovirus (CMV), Parvovirus B19, West Nile Virus (WNV) and Dengue Viruses, Trypanosomiasis, Malaria and Transmissible Spongiform Encephalopathy (TSE) [4].

The prevalence of TTIs among blood donations varies between high and low-income countries. It was reported that the prevalence of HIV, HBV, HCV and Syphilis in high-income countries are 0.003, 0.03, 0.02 and 0.05%, respectively. While in low-income countries, the prevalence of these infections is higher; 1.08, 3.70, 1.03 and 0.90%, respectively. These differences reflect the variation in the prevalence of these infections among the populations of these countries [5]. These variations are also observed between the World Health Organization (WHO) regions. As African and Pacific regions are the highest in HBV prevalence, Eastern Mediterranean region is the highest for HCV prevalence, Sub-Saharan Africa is the highest for malariaand scattered foci in southwestern Japan, Colombia and intertropical Africa are endemic for HTLV-1 [6, 7, 8].

Many global efforts are provided to ensure the safety of the whole blood transfusion process. These efforts include providing recommendations and guidelines to establish a national blood screening and surveillance system for the entire transfusion chain, i.e. haemovigilance system. Moreover, efforts are also provided for the establishment of the Global Database on Blood Safety (GDBS), aiming to improve transfusion services globally [9, 10].

Blood bank of The Oxford Medical College and Hospital is responsible for the provision of safe blood supply through the efforts provided to ensure that donated blood is free from infections. However, few local epidemiological studies are assessing the prevalence and trends of transfusion-transmitted infections among blood donors, comprehensively. Hence, conducting this study to assess transfusion transmissible infections among blood donors can provide a better understanding of the epidemiology of these infections, which can support strategies development to evaluate safe blood supply measures, in addition to the preventive and control measures that are needed to manage the burden of these infections in the community. Therefore, the study aims to assess the prevalence of the transfusion transmissible infections among blood donors during the period 2019-2021, in Blood Donor Center/ Blood Bank, The Oxford Medical College and Hospital.

Aim and Objectives of the study

To estimate the seroprevalence of transfusion transmissible infections among voluntary blood donors at our tertiary care hospital.

Methodology

Source of data: This study was conducted in the Dept. of pathology, The Oxford Medical College and Hospital, Bangalore, Karnataka.

Type of study: Cross-sectional study using the data from Blood Bank records.

Duration of study: 3 years from January 2019 to December 2021.

Data collection: Records of 2524 voluntary blood donors were reviewed. Prior to donating blood the donors were first assessed for physical and health wellbeing. The assessment criteria required that the donors were: body weight >45 kg; hemoglobin levels, male 13.5-17.0 g/dl and female 12.5-16 g/dl and a blood pressure of up to 160/90 mmHg were accepted. Only donors who satisfied these criteria were recruited.

Analysis: Blood grouping ABO and Rhesus was done by antigen antibody micro-agglutination test using commercially available standard antisera validated at National Blood Bank. Both forward (cell grouping) and reverse grouping (serum grouping) methods were used. The final blood group was confirmed only if both forward and reverse groups were identical. Donor's age, sex, location of blood donation, dates of donation and blood groups with Rh factors were tabulated in register book. HIV, HbSAg and HCV were tested by enzyme linked immuno sorbent assay (ELISA), Syphilis screening was done using Rapid Plasma Reagin card test and Malarial parasite screening was done using Rapid card test.

Statistical analysis: Data were extracted from the records and entered to Microsoft excel. Frequencies and percentages were used for the description of blood donors by gender, age groups and nationality.

Results: The present study is a retrospective observational study conducted using 3 years (January 2019 to December 2021) data from our blood bank records. Out of 2069 voluntary blood donor's males were 2043 (98.64%) and females were 26 (1.25%).

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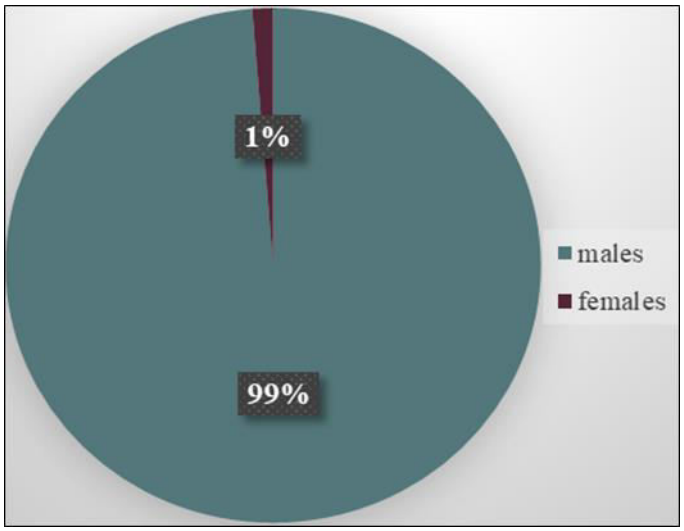

Fig 1: Shows gender wise distribution of voluntary blood donors

Table 1: Shows age wise and gender wise distribution of blood donors

Age group	Males	Females	Total
18-20 years	164	2	166
21-30 years	1318	15	1333
31-40 years	420	7	427
41-50 years	132	2	134
51-60 years	09	-	09
Total	2043	26	2069

Out of 2069 blood donors, 2043 were males and 26 were females. 164(7.9%) were in the age group of 18-20 years, 1333(64.42%) were in the age group of 21-30 years, 427 (20.63%) were in the age group of 31-40 years, 134 (6.49) were in the age group of 41-50 years and 9(0.43) were in the age group of 51-60. Majority of the blood donors were in the age group of 21-30 years representing 64.2% of the total blood donors (table 1and figure 1).

Table 2: Shows frequency and percentage of transfusion transmitted infections among blood donors

Blood Group	Number	Percentage
HIV	5	0.24
HbSAg	8	0.38
HCV	0	-
VDRL	1	0.04
MP	0	-

This table represents the prevalence of transfusion transmitted infections among blood donors, we found the prevalence of 0.24% for HIV infections, 0.38% for Hepatitis B infections and 0.04% for Syphilis. None of the blood donors tested positive for Hepatitis C viral infections and malarial parasite.

Discussion

The present study is a cross-sectional study conducted using 3 years (January 2019 to December 2021) data from our blood bank records. Out of 2069 voluntary blood donor's males were 2043 (98.64%) and females were 26 (1.25%). Out of 2069 blood donors, 2043 were males and 26 were females. 164 (7.9%) were in the age group of 18-20 years, 1333 (64.42%) were in the age group of 21-30 years, 427 (20.63%) were in the age group of 31-40 years, 134 (6.49) were in the age group of 41-50 years and 9 (0.43) were in the age group of 51-60. Majority of the blood donors were in the age group of 21-30 years representing 64.2% of the total blood donors (table 1and figure 1).

We estimated the prevalence of transfusion transmitted infections among blood donors, we found the prevalence of 0.24% for HIV infections, 0.38% for Hepatitis B infections and 0.04% for Syphilis. None of the blood donors tested positive for Hepatitis C viral infections and malarial parasite.

Even though blood transfusion saves millions of lives every year, unsafe blood remains a threat to the spread of infections. Moreover, it's also important to address the fact that safe blood is considered a universal right, and it should not cause any harm. Thus, it should be fully screened and ensured not be contaminated by any transmissible infection [11].

Blood donation centres are among valuable sources of data, as the prevalence of transfusion transmissible infections among blood donors differs throughout the world, and it can indirectly reflect the

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burden variations among these populations. This is because blood donors are usually representing the healthy members of the community so that it can have its inferences on the general population. Currently, the number of registered donors at Blood Donor Centers have increased noticeably as a result of the continuous promotion, motivation, guidance, and education efforts about the importance of blood donation, which led to the overall rise in the general public awareness.

In this study, it is evident that the predominance of blood donations were by males, which was consistent with several studies [12, 13]. Literature showed that women contribute less to blood donations than men due to many factors, including physiological factors such as menstruation, lactation and pregnancy [14]. However, some studies showed that this difference between gender is much less [15, 16]. The predominance of males' contribution to blood donations was also observed in regards transfusion transmissible infections positivity rates, as this study showed a consistent predominance throughout most of the years, in which rates were higher in male donors. These were similar to the findings from studies in the region [17, 18, 19, 20]. In general, the younger population seems to contribute more to blood donation, as it was shown in several studies, in which most donors were less than 30 years in age [12, 21, 22]. However, in this study, most of the blood donors found to be aged 21-30 years old.

In our study, HIV seropositivity was seen in 0.24% per cent donors which was comparable to other studies[23]from India, whereas some studies reported a lower prevalence of 0.1 and 0.08 per cent [25]. Fasola *et al*., [26] showed a significantly high prevalence of 13.2 per cent in Nigeria. The seroprevalence of HBV has also reduced from over a decade in comparison to the previous study conducted at the same institution. The HBV seroprevalence ranging from 1.25 to 1.96 per cent has been reported in other studies [27] however, two studies from central and north India reported a high prevalence of 2.63 and 2.90 per cent, respectively [28, 29]. In our study, HBV was the most prevalent life-threatening TTI indicating a need for an organized programme for hepatitis B vaccination and use of a highly sensitive technique for its detection like NAT.

Hepatitis C showed an increase in seroprevalence over the seven-year period with overall seroprevalence of 0.73 per cent. There was wide variation in prevalence reported in various studies ranging from 0.16 to 1.57 per cent. The wide variations of HCV seroprevalence in different studies from India might be due to the use of different methods for testing and use of different generation of ELISA test kits, having different sensitivities and specificities. None of the blood donors tested positive for malarial antigen and HCV.

Conclusion

In our study, we found the prevalence of 0.24% for HIV infections, 0.38% for Hepatitis B infections and 0.04% for Syphilis. None of the blood donors tested positive for Hepatitis C viral infections and malarial parasite.The increase in public awareness regarding voluntary blood donation, meticulous donor screening, counselling and use of highly sensitive tests can help in reducing the risk of TTIs.

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