Original Research

Sero Prevalence of Transfusion Transmissible Infection in Blood Donors: North Goa District Hospital Based Study

Shruti Shetye[1], Priyanka Mashelkar[1], Misbah Shaikh[1], Krupa Jog[2]

[1]Consultant pathologist, [2]Senior Pathologist, Blood Centre, North District Hospital, Mapusa, Goa.

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Abstract

Transfusion transmissible infections (TTIs) have emerged as one of the significant public health problems globally in blood transfusion . The morbidity and mortality associated with TTIs have highlighted the need for improving blood safety. The present study aims to investigate the sero prevalence of various TTIs among blood donors in the North Goa District Hospital.

This study was a retrospective cross sectional study conducted from January 2021 upto September 2023. A total of 5,426 blood donors were included in this study. Relevant demographic and clinical data were obtained from the donors. Enzyme-linked immunosorbent assay (ELISA) was used to detect the presence of various TTIs such as HIV, HBV, HCV, and Syphilis.

The mean age of the donors was 32 years, with the majority being males (87.4%). Out of the 5,426 donors, 11 tested positive for HIV, 32 for HBV, 30 for HCV, and 1 for Syphilis. The overall sero prevalence of TTIs was found to be 1.36%.

This study highlights the importance of regular screening of blood donors to ensure blood safety. The results of this study can be utilized to develop and implement effective donor selection strategies, which will help in reducing the transmission of TTIs through blood transfusion.

So far no such study has been published from Goa.

Keywords: TTI, Enzyme-linked immunosorbent assay (ELISA) , syphillis, Hepatitis B,Hepatitis C, HIV , Goa

Introduction

Blood transfusion is an indispensable component of the health care system. It helps in saving lives in emergency as well as routine conditions[1,2]. Blood transfusion may be required in patients with Hemoglobinopathies, patients undergoing surgery, pregnancy, anemia, in a patients with acute blood loss or a case of a road traffic accident . Hence, the need for blood and blood components is continuous and this demand can be met by maintaining blood stock inventory in licensed blood centres [3].

It is the right of the patient to get safe and quality blood in times of need. It is the duty of the Blood Bank to ensure high quality and safe blood is made

Corresponding Author: Krupa Jog, Consultant Pathologist, Blood centre, North District Hospital, Peddem, Mapusa, North Goa.

E-mail: krupsjog@gmail.com

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available to the patient. As per the utilization, the blood supply needs to be continuously replenished as it has a limited shelf life. Voluntary blood donors are the resources of a safe supply of blood and blood products [3,4].

Aim

1. To determine the prevalence of TTIs among blood donors in North District Hospital, Blood Centre, Goa.
2. To determine the age group which has highest incidence of TTIs.

Materials and Methods

This is a district hospital based retrospective study which was conducted for the period from January 2021- September 2023. This study includes all the blood donors who donated blood, which includes voluntary and replacement donors in the blood bank as well as voluntary blood donation camps.

The collected blood was screened for TTIs namely HIV, HBsAg, HCV, Syphilis and malarial parasite. HIV, HBsAg and HCV screening was done using the ELISA method. Syphilis Screening was done using the RPR method. Smears were examined for malarial parasite.

Inclusion Criteria

All voluntary donors between the age of 18-65 years weighing more than 45kg, who were found to be physically and mentally fit were subjected to a detailed questionnaire along with vital examination such as Pulse, Blood Pressure, Temperature and Hemoglobin were included in this study.

Pre donation screening included history taking about past illnesses, medical treatments, high risk behaviour, time since last donation if applicable, along with a brief physical examination . A written consent was taken from every donor as a routine practice. The aim of such predonation screening is to ensure blood safety as a preliminary step.

Exclusion Criteria

All voluntary donors not fulfilling criteria for donation as per DGHS (Directorate General of Health Services) guidelines were deferred after donor screening [5].

TTI testing - After a donor passed pre-donation screening, blood units were collected in blood collection bags with anti coagulant. Every unit of blood collected was screened for five TTIs namely HIV, HBsAg, HCV, Syphilis and malarial parasite.

HIV screening was done using CDSCO approved 4th generation ELISA kit which qualitatively detects HIV p24 antigen and antibodies to Human Immunodeficiency Virus type 1 and type 2 (HIV-1 and HIV-2) in human serum or plasma.

HBsAg screening was carried out using CDSCO approved 4th generation ELISA kit which is a solid phase Enzyme Linked Immunosorbent Assay, used for detection of Hepatitis B surface Antigen (HBsAg) in human serum or plasma.

HCV screening was carried out using CDSCO approved 3rd generation ELISA kit which is an Enzyme Immunoassay used for the qualitative determination of antibodies to Hepatitis C virus in human serum or plasma.

The kits used for testing had a sensitivity of >99.5% and a specificity of 100%.

Syphilis screening was done by the slide flocculation method which determines Reagin antibodies in human serum or plasma.

Smears stained with Leishman stain were examined for malarial parasite.

Any of the donor who screened positive for the TTIs were informed telephonically to report to the blood bank. Upon arrival at the blood bank, post donation counselling was provided to the donor at our blood centre wherein the donor was explained about the test results, need for confirmation of the results and its health implications . Any doubts and concerns raised by the donor were clarified. The donor was also provided necessary information and precautions for preventing the transmission of infection to others. This was carried out in our blood centre in a safe environment maintaining strict confidentiality and privacy. The seroreactive donors were referred for further investigation and management, if necessary.

Quality control- Kit validation was done for every new Lot of kit opened before being used for testing. Internal quality controls (Positive and

Negative controls) were run with every batch of testing provided alongwith the kit.

Results

During this study period, we screened 5,426 donors for TTIs of which 74 were seroreactive. Among the seroreactive donors 66 were males and 8 were females as shown in the table below (Table 2).

The prevalence of Hepatitis B (0.58%) was the highest followed by Hepatitis C (0.55%) , HIV (0.2%) and Syphilis (0.01%).

Yearly prevalence of serore activity among donors was 1.9% (28), 1.33 % (28) and 0.96% (18) for three consecutive years from 2021 to 2023. (Table 1)

Table 1: Year wise distribution and overall incidence of Transfusion Transmissible Infections

Year	2021	2022	2023	Total	Overall Incidence
HIV	09	02	Nil	11	0.20%
HCV	07	15	08	30	0.55%
HBsAg	12	11	09	32	0.58%
VDRL	Nil	Nil	01	01	0.01%
SMP	Nil	Nil	Nil	Nil	
Year wise Incidence	1.9%	1.33%	0.96%		

Of the 5,426 donors screened, 5,292 (97.5%) were voluntary donors and 134 (2.5%) were replacement donors (Table 3). Total number of donors per year for the year 2021, 2022 and 2023 (till September) were 1468, 2094 and 1864 respectively.

The number of voluntary donors has shown a rising trend as depicted by the figures in table 3, and at the same time the number of replacement donors has been showing a decreasing trend over the study period. This implies motivation among the donors who come forward to donate blood voluntarily to help the community.

Table 2: Gender based seroreactivity in blood donors

	Male	Female
HIV	09	02
HCV	27	03
HBsAg	29	03
VDRL	01	00
	66 (89.2%)	08(10.8%)

Table 3: Voluntary vs Replacement Donors

Year	Voluntary Donors	Replacement Donors	Proportion (V:R)
2021	1376	92	15:1
2022	2059	35	58:1
2023	2094	07	300:1

The highest number of seroreactive donors in our study belonged to 20-30 years age group (Table 4).

HBsAg reactive donors accounted for majority of the seroreactivity among donors followed by HCV, HIV and syphilis respectively. Youngest HBsAg reactive donor was a 21 year old female and 23 year old male and oldest HBsAg reactive donor was a 47 year old male.

HCV reactive donors were in the 20-40 year age group. The youngest case was reported in 21year male donor and eldest in 57 year old male donor. The female donors were 22 and 37 years old respectively. Among the males, most of the cases were in the age group of 31-40 years and one case was reported in a 58 year old male.

HIV reactivity was higher in males as compared to females. Most of the HIV reactive donors were young males. Two female reactive donors in their 20's were reporte.

During this study period, one case of Syphilis was detected in a 43 year old male donor.

Table 4: Age wise distribution of TTIs

	HIV	HCV	HBsAg	VDRL	SMP	total
20-30 years	5	11	18	-	-	35
31-40 years	4	14	8	-	-	26
41-50 years	-	4	5	1	-	10
>50 years	1	2	-	-	-	3

Discussion

This study aims at studying the incidence of TTIs among blood donors for the period from January 2021 to September 2023.

Majority of the donors were voluntary (97.5%) with a male predominance (87.4%). This is comparable with the studies conducted by Chandekar SA et al [6] and Matee MI et al [7]. In contrast predominance of replacement donors was seen in studies done by Kakkar N et al [8]and Pahuja S et al [9].

The rate of seropositivity was high among male donors with 89.2% and 10.8% among the female donors. Our results were comparable with the study done by Shrestha AC et al [10].

In this study the sero prevalence of HIV, HBsAg, HCV and Syphilis was 0.2%, 0.58%, 0.55% and 0.01% respectively. These findings in our study were comparable with the studies done by Pallavi P et al [11] showing prevalence of HIV (0.44%), HBsAg (1.27%), HCV (0.23%) and Syphilis (0.28%) and Chandra T et al [12]showing prevalence of HIV (0.23%), HBsAg (1.96%), HCV (0.85%) and Syphilis (0.01%).

HBV incidence was seen to be higher among our donors. HBV infection is caused by Hepatits B DNA virus which belongs to hepadnavirus. HBsAg reactive donor indicates a carrier state or an active infection. These seropositive donors may progress to develop chronic hepatitis, cirrhosis, and may even progress to hepatocellular carcinomas in some cases.[13, 14]

The transmission of Hepatitis B can be prevented by vaccinating the population. The vaccine is safe and effective and usually given soon after birth with boosters after a few weeks. It offers nearly 100% protection against the virus. Vaccine for adults given in 3 doses followed by booster is also highly effective in preventing spread of the disease. This is the basis for strengthening and prioritizing vaccination in the community. WHO organizes annual World Hepatitis Day campaigns to increase awareness and understanding of viral hepatitis[15]. National Viral Hepatitis Control Program for prevention and control has been rolled by the Government which aims at combating Hepatitis in the community.

The overall incidence of HIV reactivity was 0.2%, this was comparable to the studies carried out by Arora D et al[16] (0.3%), and A Srikrishna et al[17] (0.44%). HIV reactive donors are counseled and permanently deferred from blood donation in the future.

The incidence of Syphilis was 0.01% in our study, which is comparable to the study conducted by Chandra T et al[12] with an incidence of 0.01%.

Over the study period, no donor was detected with malaria. Similar finding was observed by A Srikrishna et al [17] and Pallavi P et al [11] during their study in which no donor with malarial parasite was detected.

Serosurvey is one of the means to determine the prevalence of TTIs in the community. This helps to assess the age and gender distribution of TTIs for epidemiological studies.

Conclusion

Our study shows an increasing trend among voluntary donors over the course of study period with a male predominance. To ensure safe supply of blood to the recipient, donor selection criteria should be strictly adhered to followed by screening of the collected blood for TTIs.

We have observed a high prevalence of Hepatitis B in this study in young adults between 20-40years. Hepatitis B being a vaccine preventable disease it is necessary to take steps for public awareness and increased rate of vaccination for all newborn babies followed by booster doses to reduce the morbidity

and mortality associated with Hepatitis B and to prevent transmission of the disease.

Screening of the population for vaccine preventable disease can go a long way in helping us reduce the percentage of blood wastage due to seroreactivity encountered at the time of screening blood for transfusion transmissible infections.

Limitation

Donors who are in window period of infection cannot be ruled out. To avoid missing these cases NAT testing is essential which will pick up the viral DNA. These advanced techniques are not available in our Blood Centre.

No conflicts of interest: There are no conflicts of interest.

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Ethical clearance has been taken from institutional ethics committee.

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