

ORIGINAL RESEARCH

Seroprevalence of transfusion transmitted infections among voluntary non-remunerated blood donors and replacement donors at a tertiary care maternity hospital in south India

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ABSTRACT

Background: Worldwide most deaths and disability related to blood transfusion is still caused by the transfusion transmitted infectious agents; viruses, bacteria or protozoa. The DGHS of India and CDSCO mandated 5 tests for blood to be transfused that are HIV, HBV, HCV, Malaria and Syphilis.^{2,3} In this retrospective study we are going to find out the Seroprevalence of transfusion transmitted infections among voluntary non-remunerated blood donors and replacement donors. **Methods:** The retrospective study was carried out in the blood centre, IOG&WCH, MMC, Egmore cennai-08. The study period is 5 years (June 2018 to December 2022). The HIV, HBV and HCV are tested by ELISA method (HIV 4th generation & HBV, HCV 3rd generation ELISA) by using commercially available kits as per the instruction manuals. **Result:** The seroprevalence among the VNRBDs is 3/14448 (0.02%) for HIV, 85/14448 (0.6%) for HBV, 7/14448 (0.04%) for HCV, and 5/14448 (0.03%) for Syphilis. Similarly the reactivity rate among the replacement donors is 11/8855 (0.12%) for HIV, 130/8855 (1.5%) for HBV, 16/8855 (0.18%) for HCV, and 8/8855 (0.09%) for Syphilis. **Conclusion:** Highly sensitive screening techniques along with implementation of NAT, appropriate donor counseling and education, proper implementation vaccination will help to enhance the quality of blood and blood products.

Key words: TTI seroprevalence, HIV, HBV, HCV, Syphilis, blood donors, TTI reactive, Referral, response rate.

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INTRODUCTION

Worldwide most deaths and disability related to blood transfusion is still caused by the transfusion transmitted infectious agents; viruses, bacteria or protozoa. As civilization encroaches upon undeveloped forest and jungle, the evolving suburban wilderness and global travel ensures the emergence and spread of 'new' blood borne pathogens. Microbial adaptation, climate and weather changes, war and famine and spectrum of bio terrorism raise the concern of emerging infectious threats to blood supply. The agents responsible have the following characteristics: recurrence or persistence in blood donor's circulation; a susceptible recipient population; the ability to cause asymptomatic infections giving

rise to carrier or latent stages; stability in stored blood, in many cases, in plasma fractions. Ideally blood for transfusion should be tested for all pathogens that are prevalent in the given population and can cause serious diseases, or treated to inactivate all such agents.¹

Tests to mass screen the blood donations are available for many transfusion transmitted infections. However, even most sensitive tests do not detect all infectious donors. The chance of becoming carrier to a particular agent varies widely and risk of transmitting an agent can be minimized appropriate selection of donors. Malarial parasites can be transmitted by all blood components except cell free plasma. HBV can be transmitted by cell free plasma and plasma fractions

as well as cellular fractions. HIV found in both mononuclear cells and plasma. HBV, HCV and HIV are stable in stored and even in frozen red cells and plasma.¹ An efficient method to prevent transmission of TTIs is notifying and counseling of TTI reactive donors by counseling so that they can understand the information and guide them for future treatment.^{17,18}

The DGHS of India and CDSCO mandated 5 tests for blood to be transfused that are HIV, HBV, HCV, Malaria and Syphilis.^{2,3} In this retrospective study we are going to find out the Seroprevalence of transfusion transmitted infections among voluntary non-remunerated blood donors and replacement donors.

Aim and Objectives:

To find out the seroprevalence of TTIs among blood donors.

To correlate the seroprevalence between VNRBDs and Replacement donors.

To calculate the seroprevalence of HIV, HBV, HCV, Syphilis and Malaria.

To find out the response rate and referral rate of seroreactive donors.

MATERIALS AND METHODS

The retrospective study was carried out in the blood centre, IOG&WCH, MMC, Egmore cennai-08. The study period is 5 years (June 2018 to December 2022). The HIV, HBV and HCV are tested by ELISA method (HIV 4th generation & HBV, HCV 3rd generation ELISA) by using commercially available kits as per the instruction manuals. Malaria is screened by peripheral smear using Leischman's stain and Syphilis is tested by Rapid card method as per the standard operating procedures of our blood centre. Once positive, the blood bags are discarded after autoclaving the same following biomedical waste disposal protocols. The reactive donors are counseled and referred to concern departments for further follow up.

Statistical Analysis

Microsoft word used for article and Microsoft excel is used to analyze the data and to formulate Charts from the data.

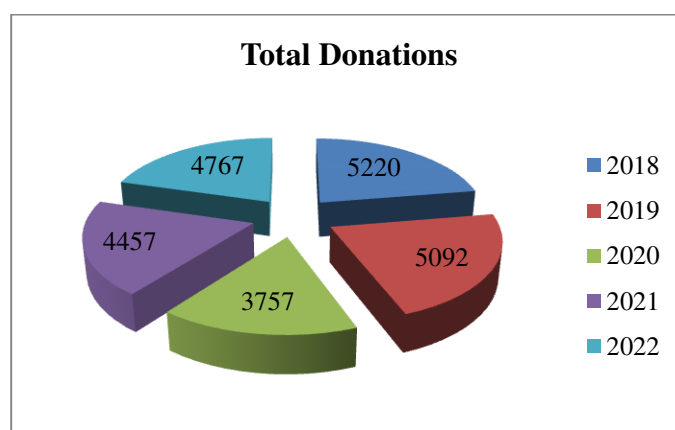
RESULT

A total of 23303 donors have donated whole blood during the time period (Jan2018 to Dec 2022). In which 23069 (99%) were male donors and 234 (1%) were female donors. Out of which 14448 (62%) were voluntary donors and 8855 (38%) were replacement donors. The increase in replacement donation might be due to Covid 19 crisis, during that 3 years the blood donation camps limited and are done with protocols, hence the number of voluntary donors are low compared to previous years.

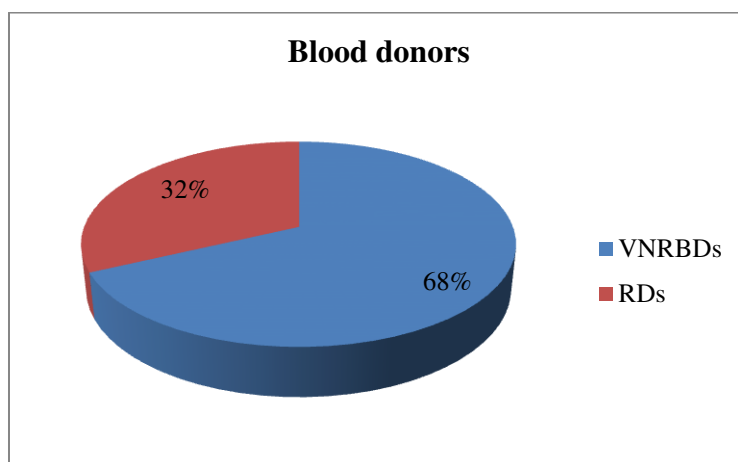
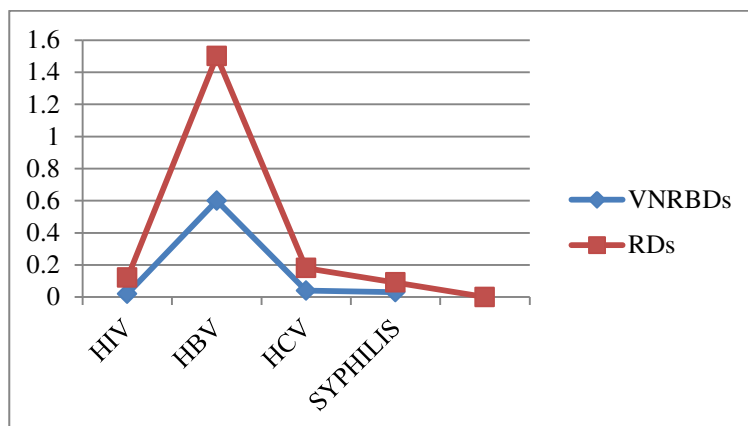
Age group more than 80% falls in 18-30 years of age with male preponderance.

Among 23303 donations a total 268 (1.15%) samples were tested reactive, in which 14/23303 (0.06%) were HIV reactive, 215/23303 (0.92%) were HBV reactive, 23/23303 (0.10%) were HCV reactive and 13/23303 (0.05%) were RPR reactive, No malarial parasites were detected in peripheral smear. 2 donors were found reactive to multiple infections (1 HIV&HBV, 1HIV&HCV) 2/23303 (0.008%). The seroprevalence among the VNRBDs is 3/14448 (0.02%) for HIV, 85/14448 (0.6%) for HBV, 7/14448 (0.04%) for HCV, and 5/14448 (0.03%) for Syphilis. Similarly the reactivity rate among the replacement donors is 11/8855 (0.12%) for HIV, 130/8855 (1.5%) for HBV, 16/8855 (0.18%) for HCV, and 8/8855 (0.09%) for Syphilis.

Among the 268 reactive donors 188 (70%) donors responded to call and the remaining 80(30%) are non responders phone number is switched off, not picking up the call or the given phone number is wrong. . Among the 188 responders 158 (59%) have come to blood centre for counseling and were referred to appropriate departments. The remaining 110 (41%) turned out to be non responders after 1st phone call. The reactive donors follow up rate is 16/16 (100%) for HIV & HIV with other TTIs, for HBV 128/215 (60%), for HCV 9/23 (40%) and for Syphilis 5/13 (35%).



TTI Reactivity among VNRBDS & RDS



DISCUSSION

An ultimate goal of a quality Transfusion services in a tertiary care hospital is to provide utmost safe blood transfusion. The seroprevalence of TTIs among the blood donors in a well structured health care system with good blood centre services can be used as a reliable tool for statistical estimation of these infectious agents in the general population.⁴

In the present study, a total 23303 donations were made; in which 23069 (99%) were male donors and 234 (1%) were female donors. In the studies done by Dhivya NS et al, and Dr.Ishan arora et al the percentage of female donors donating blood is 2% and 5% respectively.^{5,14} In a study by Uma S et al the number of male donors is 93% and female donors is 7%.⁹ In our study VNRBDs constituted about 62% of all donors. In a study done by Rawat A et al, total number of voluntary blood donation is 74.17% and replacements donation is 25.83%.¹¹ On comparing with previous years there is a decline in the voluntary blood donation and outdoor blood donation camps (2020 -2022), which is possibly due to Covid 19 crisis, Similarly in a study done by Dhivya et al there was a decline in out-door donation, blood collection, deferral, demand and issue during covid 19.⁷ and also lack of understanding among the general population about voluntary blood donation. Among our blood donors, about 80% falls in 18-30 years of age with male preponderance. Similarly in a Nigerian study the

mean age of blood donors was 28±8.5 years, majority were male 89.2%.⁸ In the study by Arshad A et al the maximum number of donations came from the 18-30 years age group.¹⁰

Among 23303 donations a total 268 (1.15%) samples were tested reactive, which is in concordance with the studies done by Agarwal et al, Patel et al, Leena and Shafee, Mandal S et al and Siraj N et al whose overall positive rates were 0.87%, 1.35%, 1.41%, 1.92% and 2% respectively.^{12,20,21,19,13} The lower TTI reactivity rate might be because of increased VNRBDs and most of the replacement donors were spouses of antenatal mothers, who were already screened for Blood borne infections. Our present study shows seroprevalence of HIV, HBsAg, HCV, Syphilis and Coinfection 0.06%, 0.92%, 0.10% 0.05% and 0.008% respectively. Arshad A et al study shows the seroprevalence of HIV, HBV, HCV, Syphilis and Malaria as 0.04, 1.7, 1.8, 2.1 and 0.07 respectively.¹⁰ In a Nigerian study 7% were deferred due to positive screening tests for TTIs: HBV 3.9%, HCV 2.1%, HIV 0.6% and Syphilis 0.4% and 0.03% due to HIV& HBV coinfection.⁸ In our study the HIV seroprevalence rate is 0.06% the studies done by Dhivya N S et al, Amit V et al the seroprevalence of HIV was 0.062% and 0.06% respectively which is concordant with our results.^{7,22} In the present study 0.92% was HBV seroprevalence rate, In other studies the seroprevalence is in range of 0.91% to 1.61%.

In our study 0.10% was seroprevalence of HCV, similarly in the study by Adhikary M et al the seropositivity of HCV is 0.12%.¹⁶ In the present study shows 0.05% RPR reactive rate, In our study no malarial parasites were detected which is on par with the studies done by Adhikary M et al and Mandal S et al.^{16,19} our study has 2 donors who were found reactive to co infection (1 HIV&HBV, 1HIV&HCV) 2/23303 (0.008%) which is concordant with the study done by Ugwu et al, Adhikari et al and Chandrasekar SA et al.^{8,16,23} in the present study the most prevalent TTI infection is HBV 0.92% then HCV (0.10%) which is similar to the studies done by Amit V et al and Adhikary M et al the most common seroprevalence is HBV followed by HCV 1.29% and 0.076%, 0.28 and 0.12 respectively.^{22,8}

The seroprevalence among the VNRBDs is 3/14448 (0.02%) for HIV, 85/14448 (0.6%) for HBV, 7/14448 (0.04%) for HCV, and 5/14448 (0.03%) for Syphilis. Similarly the reactivity rate among the replacement donors is 11/8855 (0.12%) for HIV, 130/8855 (1.5%) for HBV, 16/8855 (0.18%) for HCV, and 8/8855 (0.09%) for Syphilis which is similar to the above studies.

Among the 268 reactive donors 188 (70%) donors responded to call and the remaining 80(30%) are non-responders phone number is switched off, not picking up the call or the given phone number is wrong. Among the 188 responders 158 (59%) have come to blood centre for counseling and were referred to appropriate departments. The total 110 (41%) non-responders, 80(30%) are non-responders phone number is switched off, not picking up the call or the given phone number is wrong, remaining 30 (11%) turned out to be non-responders after 1st phone call. In the study done by Mandal S Kumar et al 89% of the reactive donors responded to phone calls, 52.11% of the reactive donors were attended counseling at the blood centre.¹⁹ Similarly in the study done by Agarwal N showed the response rate as 59.8% and the response rate is high among the HBV reactive donors.¹² on the contrary the study by Dhivya N S et al the reactive donor response rate was 85.71% and non-responders was 14.28%.¹⁴

The reactive donors follow up rate is 16/16 (100%) for HIV & HIV with other TTIs, for HBV 128/215 (60%), for HCV 9/23 (40%) and for Syphilis 5/13 (35%). All HIV reactive were referred to concerned ICTC, registered and are on regular follow up. However the response rate for HBV & HCV is 58% and 45%. The number of donors not turned up after 1st call was 30 (16%). Similarly in the study done by Agarwal N showed the response rate as 59.8% and the response rate is high among the HBV reactive donors.¹² on the contrary the study by Dhivya N S et al the reactive donor response rate was 85.71% and non-responders was 14.28%.¹⁴

CONCLUSION

In Conclusion our study shows that the overall seroprevalence among the blood donors is 1.15% with seroprevalence of HIV, HBsAg, HCV, Syphilis and Coinfection 0.06%, 0.92%, 0.10% 0.05% and 0.008% respectively.. The seroprevalence is increased among the replacement donors than voluntary non remunerated blood donors. This may be due to lack of awareness among the positive people regarding the disease, peer pressure and family pressure which makes them to donate blood knowingly or unknowingly. On the contrary VNRBDs donate blood in altruistic nature; hence the seroprevalence is low among them. Further there is a increased seropositivity of HBV & HCV among the blood donors which shows the need of health programmes towards hepatitis seroreactive blood donors. In view of response rate of reactive donors, it necessitates the need of a qualified, well trained full time counselor at every blood centre. In addition, for non responders it is mandatory to formulate proper guidelines. It mandate us to the usage of existing nationwide computerized blood donor registry along with TTIs screening results which enables us to identify the seroreactive donors across the country, to follow up the reactive donors and to create a support group for them. Further, highly sensitive screening techniques along with implementation of NAT, appropriate donor counseling and education, proper implementation vaccination will help to enhance the quality of blood and blood products.

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