

Original Research Article

Seroprevalence of transfusion transmitted infections in voluntary and replacement blood donors in a tertiary care hospital blood bank of Anantapur, Andhra Pradesh, India: 5 years retrospective study

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Received: 19 December 2019

Accepted: 24 December 2019

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ABSTRACT

Background: Critical part of transfusion is effective screening of TTI, to reduce the risk of transmission is as safe as possible. The present study has undertaken to focus on seroprevalence of TTIs among both voluntary and replacement donors and also to project epidemiological data of TTIs in this community.

Methods: This is a retrospective study conducted from January 2014 to December 2018. All blood samples collected from donors were screened for HIV, HBV, HCV, Syphilis and malaria according to blood bank policy. Before drawing blood, donors were asked to fill pre structured Blood bank questionnaire and consent form.

Results: In this present 5-year study, total number of blood donor population was 54937, among them voluntary donors were 33891 and replacement donors were 21046. Out of 33891 voluntary donors, 33486(98.8%) were males and remaining 405(1.19%) were females. All replacement donors (21046) were males. The seroprevalence of HBV was highest, 1.82% (1003/54937) followed by HCV 0.31% (175/54937) in all the donors. The seropositivity for HIV is 0.23% (129/54937), for syphilis 0.04% (24/54937) and for malaria 0.01% (6/54937).

Conclusions: National blood transfusion policy should be strengthening the standards and quality of screening across the country. For blood screening, resources and appropriate screening assays must be available at all health centres.

Keywords: Blood bank, Blood donors, Screening, Transfusion transmitted infections

INTRODUCTION

Transfusion Transmitted Infections (TTIs) are infections resulting from the introduction of pathogens including bacteria, viruses, prions and parasites into a recipient through blood transfusion.

For provision of safe blood supply, the screening of following four infections is mandatory in India: HIV, HBV, HCV, Treponema pallidum (Syphilis) in India. In some countries, screening of infections such as malaria, chagas disease, human T cell lymphotropic viruses I/II (HTLV) are recommended.

The adoption of effective blood screening programmes is needed in all countries. In few countries TTIs has been reduced dramatically over the last 20 years.^{1,2}

In India, 43 million people are chronically infected with HBV, 15 million people are HCV positive and 2.5 million HIV positive persons approximately. Among blood donors screening of these TTIs are compulsory due to high seroprevalence of HIV (0.5%), anti HCV (0.4%) and HBsAg (1.4%).³ The prevalence of TTIs in voluntary remunerated blood donors is generally much lower than among family/replacement and paid donors.^{4,7} Critical

part of transfusion is effective screening of TTI, to reduce the risk of transmission is as safe as possible.

The present study has undertaken to focus on seroprevalence of TTIs among both voluntary and replacement donors and also to project epidemiological data of TTIs in this community.

METHODS

A retrospective study over a period of 5 years from January 2014 to December 2018 was conducted at Department of Pathology by collecting data from blood bank registers. Blood donors were selected only if they fulfilled all the criteria to be eligible for donation as per blood bank policy. At Blood bank, routinely blood was collected from apparently healthy persons aged between 18-60 years, weight >45 kg and hemoglobin of >12.5 gm/dl.

All blood samples collected from donors were screened for HIV, HBV, HCV, Syphilis and malaria according to blood bank policy. Before drawing blood, donors were asked to fill pre structured Blood bank questionnaire and consent form.

Inclusion criteria

- Persons of both sexes of age group between 18-60 years, with a body weight of above 45 kg and hemoglobin concentration of >12.5 gm/dl.

Exclusion criteria

- Persons with significant medical and surgical history.
- High risk patients including chronic diseases, professional blood donors, drug abusers, dialysis patients, pregnant women, patients treated in thalassemia clinics, sexually transmitted disease clinics, and sex workers.

Blood collection procedure

Under aseptic precautions, venous blood was collected in plain vacutainer tubes, allowed to clot at room temperature and the tube was centrifuged at 2500 rpm for 5 minutes to extract serum for serological testing. Along with plain vacutainer, EDTA blood was also collected for testing hemoglobin and malaria. Quality controls were carried out routinely for all investigations according to manufacturer's instructions. Patient details were maintained confidentially.

HIV Testing

Microlisa HIV (J. Mitra and Co., Pvt., Ltd.) kits were used for detection of antibodies to HIV-1 (including subgroups O and C) and HIV-2 according to NACO guidelines. The Microlisa test is an enzyme immunoassay based on indirect ELISA. All three HIV tests of different

principles were selected and processed for indeterminate results according to NACO guidelines.

HBV testing

Microscreen HBsAg ELISA test kits (Span Diagnostic Ltd.) were used for detection of HBsAg. The test is based on solid phase microplate direct ELISA (Sandwich ELISA) technique. Indeterminate results were confirmed by rapid kits (J.Mitra and co.).

HCV testing

SD HCV ELISA 3.0 (SD Bio-standard diagnostic Pvt., Ltd.) kits were used which is indirect sandwich ELISA for the qualitative detection of antibodies against HCV. Indeterminate results were confirmed by rapid kits (J.Mitra and co.).

Syphilis testing

Syphilis was diagnosed using Accucare™ rapid plasma reagin (RPR) syphilis screening test (Lab-care Diagnostic Pvt., Ltd.). The RPR syphilis screening test is macroscopic nontreponemal flocculation card test for detection and to quantify reagin, an antibody-like substrate present in serum or plasma and spinal fluid from syphilitic persons.

Malaria testing

- Malarial parasites were tested by MP Kit.
- All the data entered into spread excel sheet and the positive samples were calculated for seroprevalence.

RESULTS

In this present 5-year study, total number of blood donor population was 54937, among them voluntary donors were 33891 and replacement donors were 21046. Out of 33891 voluntary donors, 33486(98.8%) were males and remaining 405(1.19%) were females.

All replacement donors (21046) were males (Figure 1). On assessment of both voluntary and replacement blood donor year wise, the number of blood donors has increased every year among voluntary donors whereas, the number of replacement donors remains almost same (Table 1).

In 5 years of study, 1337 were Transfusion transmitted infections out of 54937 blood bank screenings. Out of 1337 TTIs, majority were Hepatitis B virus positive cases. The seroprevalence of HBV was highest, 1.82 % (1003/54937) followed by HCV 0.31% (175/54937) in all the donors. The seropositivity for HIV is 0.23% (129/54937), for syphilis 0.04% (24/54937) and for malaria 0.01% (6/54937).

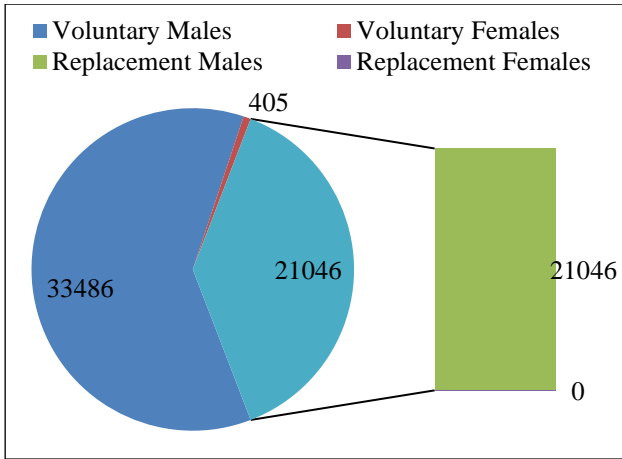


Figure 1: Sex distribution among blood donors.

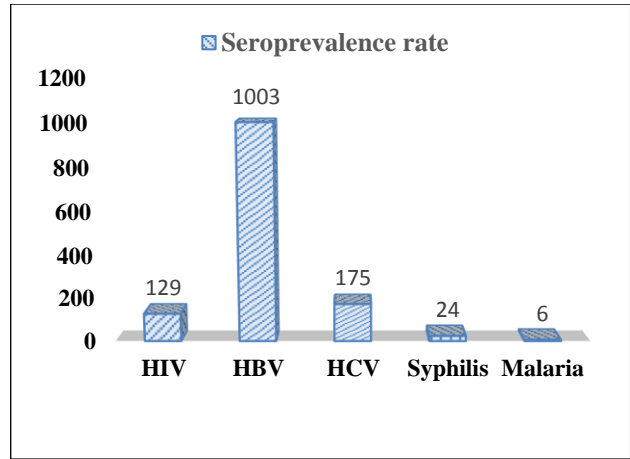


Figure 2: Seroprevalence rate of various TTIs.

Table 1: Year wise distribution of voluntary and replacement donors.

Year	Voluntary	Replacement	Male	Female	Total
2014	2724	4219	6840	103	6943
2015	3938	5598	9522	14	9536
2016	5156	5166	10290	32	10322
2017	10165	2664	12738	91	12829
2018	11908	3399	15142	165	15307
Total	33891	21046	54532	405	54937

Among 1337 TTIs, 1003(75.01%) were Hepatitis B virus, 175(13.08%) were Hepatitis C virus, 129(9.6%) were Human immunodeficiency virus, 24(1.7%) were syphilis and 6(0.4%) were malaria positive cases.

All TTIs were predominantly observed in the age group of 18-30 years (70.2%), followed by 31-40 years (24.5%) (Figure 2 and Table 2).

Table 2: Seroprevalence of TTIs distribution in relation to age.

Tests	Age group in years				Total
	18-30	31-40	41-50	51-60	
HIV	99	25	5	0	129
HBV	689	259	47	8	1003
HCV	131	35	8	1	175
Syphilis	14	9	1	0	24
Malaria	6	0	0	0	6
Total	939	328	61	9	1337

DISCUSSION

Transfusion Transmitted Infections (TTIs) can cause a serious health consequences and economic burden to country. By timely transfusion of blood can save millions

of lives, but unsafe transfusion practices can put millions of people at risk of Transfusion transmitted infections.⁸

Various viruses, bacteria, parasites can transmit through blood. Screening of these infections varies from country to country depending on magnitude of infection. Mandatory screening of blood and blood products before transmission is due to these infections can cause chronic disease with possible serious consequences and present the greatest infection risk to recipients.

In this present 5-year study, total number of blood donor population was 54937, among them voluntary donors were 33891 and replacement donors were 21046. Out of 33891 voluntary donors, 33486(98.8%) were males and remaining 405(1.19%) were females. All replacement donors (21046) were males in the present study.

In similar to this study Patel PA showed 95.56% voluntary donors and 4.44% replacement donors.⁹ Gupta PK et al, found higher number of voluntary donors, with 61.9%, and 38.1% replacement donors.¹⁰ In contrast to this study, Arora I et al, noted majority were replacement donors i.e., 67.62%, remaining donors were voluntary i.e., 32.37%, Kakkar et al, Singh et al, and Sri Krishna et al, also showed replacement donor predominance of 94.7%, 84.5%, 98.5% respectively.¹¹⁻¹⁴

Arora I et al, documented that male donors comprised 97.2% of total donors and female donors were 2.79% of total donors.¹¹ Ahmed et al, and Pallavi et al, showed 91.8% and 97.84% male donors, respectively.^{15,16} In many of the studies, female donors number is less, this may be due to unfit for blood donation including anemic women, underweight, malnourishment and social ignorance. As per this study, the number of blood donors has increased every year among voluntary donors however; the number of replacement donors remains

almost same. A study by Chandekar A et al, also showed that the number of blood donors progressively increased in 3 year study period, which coincides with the present study.¹⁷ As per the study, seroprevalence of HBV is highest, 1.82 % (1003/54937) followed by HCV 0.31% (175/54937) in all the donors. The seropositivity for HIV is 0.23% (129/54937), for syphilis 0.04% (24/54937) and for malaria 0.01% (6/54937). The seroprevalence of various other studies is also same as this study (Table 3).

Table 3: Seroprevalence percentage of TTIs.

Study	Year	Region	HBV	HCV	HIV	Syphilis
Sulhyan Kalpana et al, ²⁰	2013-2017	Maharashtra, India	1.15	0.11	0.24	0.00
NACO ²¹	2015	Maharashtra, India	1.09	0.28	0.19	0.04
Patil AS et al, ²²	2008-2014	Maharashtra, India	1.14	0.37	0.40	0.11
Jaseen Hassan M et al, ²³	2012-2015	New Delhi, India	1.7	0.74	0.33	0.16
Makroo et al, ²⁴	2005-2013	New Delhi, India	1.18	9.87	0.24	0.43
Sastry JM et al, ²⁵	2008-2013	Maharashtra, India	1.23	0.41	0.28	0.008
Ahmed Z et al, ¹⁵	2008-2011	Karnataka, India	0.5	0.008	0.1	0.007
Karmakar PR et al, ²⁶	2008-2011	West Bengal, India.	1.4	0.59	0.6	0.23
Ramole Archana et al, ¹⁸	2007-2016	Madhya Pradesh, India	2.17	0.22	0.11	0.02
Gupta R et al, ²⁷	2003-2008	New Delhi, India	1.66	0.65	0.35	2.8
Das DK et al, ²⁸	2009-2010	Kolkata, India	1.55	0.35	0.32	-
Bhawani Y et al, ²⁹	2010	Andhra Pradesh, India	1.41	0.84	0.39	0.08
Present study	2014-2018	Andhra Pradesh, India	1.82	0.31	0.23	0.04

A Study by Ramole Archana et al, and by Patel PJ et al, stated that no Malaria cases were observed as Transfusion transmitted infections in their studies.^{18,19}

Arora I et al, observed that TTI prevalence was higher (0.26%) among replacement donors in comparison with voluntary donors (0.07%), this may be because majority of donors were replacement donors.¹¹ They also documented that none of the female donors showed seropositivity to TTIs.

Jaseem Hassan M et al, observed TTIs correlation with blood groups, stated that blood group B showed higher positivity rate of 45.07% (32/71 TTIs) followed by blood group of 29.57% (21/71 TTIs), blood group A of 18.3% (13/71 TTIs) and blood group AB of 7.04% (5/71 TTIs).²³

CONCLUSION

In this study, the seroprevalence of HBV is highest, followed by HCV, HIV, Syphilis, Malaria in all the donors, which is similar to many other studies in India. Majority of the donors were males, this may be due to females are unfit for blood donation because of some reasons including anemic women, underweight, malnourishment and social ignorance. Laboratory screening of HIV, HBV, HCV and syphilis should

perform before transfusion and make this policy mandatory throughout the country. National blood transfusion policy should be strengthening the standards and quality of screening across the country. For blood screening, resources and appropriate screening assays must be available at all health centers.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Naik VSS, Neeraja M, Sujeeva Swapna R, Bhavani C, Sravani P, Kumar STCS. Seroprevalence of transfusion transmitted infections in voluntary and replacement blood donors in a tertiary care hospital blood bank of Anantapur, Andhra Pradesh, India: 5 years retrospective study. *Int J Res Med Sci* 2020;8:455-9.