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SEROPREVALENCE OF TRANSFUSION-TRANSMISSIBLE INFECTIONS AMONG BLOOD DONORS AT A TERITARY CARE HOSPITAL, IN SOUTHERN INDIA.

Immune Haematology

Dr. Sindhuja Kondareddy

AssistantProfessor, Department of Transfusion Medicine, Anam Chenna Subba Reddy (ACSR) Government Medical College,Nellore.Andhra Pradesh

ABSTRACT

Background: To study the seroprevalence of transfusion-transmissible Infections(TTI's) among Blood Donors in Southern India.

Methods: The present retrospective study was carried out at blood bank in Anam Chenna Subba Reddy (ACSR) Government General Hospital ,Nellore,Andhra Pradesh.Data regarding age,sex,residence of donors and screening test results were collected from the records of blood bank over a period of 5 years(January 2013 to December 2017.

Results: A total of 11,234 blood donors were screened during the study period, of which 10,949 (97.5%) were males and 285 (2.5%) were females. The overall seroprevalence of TTI were 2.5% among these HIV, HBV and HCV were 0.3%, 1.8% and 0.1% respectively; for syphilis, the seroprevalence was estimated to be 0.1%.

Conclusion: Prevention of TTI's can be achieved by stringent screening of donors and donated bloods

KEYWORDS

Seroprevalence,TTIs, HIV, HBV, HCV, Syphilis.

INTRODUCTION:

Blood transfusion is an integral and life saving procedure of modern medicine,but simultaneously it carries the risk of transmitting the life threatening transmissible infections. A number of viruses, bacteria and parasites can be transmitted through blood or blood products. Amongst these, hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV) and syphilis are the most serious infections transmitted during blood transfusion (1,2). Discovery of these hazards brought a dramatic change in attitude of physicians and patients about transfusion of blood (3).It is mandatory to test each donor blood for syphilis by a Veneral Disease Reference Laboratory(VDRL) ,and for HBsAg and ,anti- HCV and anti –HIV.

India has a population of more than 1.2 billion with 5.7 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, HCV, and HBV (0.5%, 0.4%, and 1.4% respectively) among the blood donors (4).Estimating the prevalence of TTIs, namely HBV, HCV, HIV and syphilis, among blood donors can reveal the problem of unnoticeable infections in healthy-looking members of the general population and also provide data that is important in formulating the strategies for improving the management of a safe blood supply. In addition it can give us a guide to the magnitude of some sexually transmitted infections in the community.

Hence, this study was undertaken to analyze the seroreactivity for TTI of apparently healthy blood donors and the possible risk of these transmission through blood and blood components.

MATERIALS AND METHODS:

This is a retrospective study carried out at the blood bank attached to ACSR Government General Hospital,Nellore. Data over a period of 5 years (Jan 2013- December 2017) was collected from the records of blood bank. Blood donors, fulfilling the criteria for donor selection as per the selection criteria laid down by Drugs and Cosmetics Act, 1940 and Rules, 1945 were considered for the present study (5). A total of 11,234 blood donors were screened during the study period. As 100% voluntary blood donation is encouraged,majority of the donors are voluntary and very few are replacement blood donors. Data retrieved includes the demographic characteristics of donors such as age, sex, residence and the results of HIV, HBV, HCV, and Syphilis serologies.

Sample Collection and Laboratory Testing: 5 ml of whole blood samples were collected from the subjects into plain sterile tubes and were centrifuged . The sera were separated and analyzed for different TTI; HIV, HBV, HCV, Syphilis as per the standard operating procedures followed in the blood bank. Samples were analyzed for antibodies to HIV1 and HIV 2 (Microlisa HIV , J.Mitra & Co. Pvt. Ltd, New Delhi, India), HBsAg (HEPALISA, J.Mitra & Co. Pvt. Ltd, New Delhi, India), and HCV (Microlisa, J.Mitra & Co. Pvt. Ltd, New Delhi, India), by ELISA. Any serum found reactive by the first assay was retested using a second assay based on different antigen preparations and/or different test principle using the anti-HIV test (HIV TRI-DOT, Diagnostic Enterprises, Parwanoo, India), HBsAg (Alere Trueline, Alere Medical Pvt .Ltd,Haryana,India) and HCV by the anti- HCV test (HCV TRI-DOT, Diagnostic Enterprises, Parwanoo, India) which are immunochromatographic sandwich assays. Test for syphilis was done by RPR (BEACON DIAGNOSTICS PVT.LTD, NAVSARI, India). The validity of the test was assured as per the given criterion and the results were computed.

STATISTICAL ANALYSIS: Data were collected in excel data sheet and analyzed with SPSS version 16. The associations between categorical variables were tested using Chi-square ($\chi 2$) test. $P < 0.05$ was considered to be significant.

RESULTS: A total of 11,234 donors were screened over a period of 5 years from January 2013 to December 2017, of which 10,949 (97.5 %) were males and 285 (2.5%) were females. The most common age group of donors was found to be 21 -30 years followed by age group of 18 -20 years while the least age group was 51 – 60 years and 6,788 (60.4%) belongs to rural area and 4,446(39.6%) are from urban residence.(Table/ fig 1).

TABLE 1 :Socio-demographic characteristics of blood donors at ACSR Government General Hospital,Nellore from January 2013 to December 2017 (n = 11,234)

Age group	Number of donors	Percentage
18- 20	3532	31.5
21 -30	5141	45.7
31-40	1719	15.3
41-50	678	6
51-60	164	1.5
Total	11234	100
Sex		
Male	10949	97.5
Female	285	2.5
Total	11234	100
Residence		
Rural	6788	60.4
Urban	4446	39.6
Total	11234	100

TABLE/FIG 2: Age wise sero prevalence of TTIs among blood donors

Age groups	HIV(%)	HBV(%)	HCV(%)	Syphilis (%)	Total(%)
18-20	9 (13.9)	50 (76.9)	6 (9.2)	0	65 (23.3)
21-30	20 (14)	100 (69.9)	14 (9.8)	9 (6.3)	143 (51.3)
31-40	7 (14)	39 (78)	2 (4)	2 (4)	50 (18)
41-50	2 (10)	17 (85)	0	1 (5)	20 (7.1)
51-60	0	1 (100)	0	0	1 (0.3)
Total	38 (0.3)	207 (1.8)	22 (0.1)	12 (0.1)	279 (100)

HIV-Human Immunodeficiency virus , HBV-Hepatitis B virus, HCV- Hepatitis C virus

TABLE / FIG 3: sero prevalence of TTIs among blood donors (Gender –wise)

Blood donors	Total no	HIV	HBV	HCV	SYPHILIS	Total(%)
Male	10949	37	203	20	12	272 (2.5)
Female	285	1	4	2	0	7 (2.4)
Total	11234	38	207	22	12	279 (2.5)

HIV-Human Immunodeficiency virus , HBV-Hepatitis B virus, HCV- Hepatitis C virus

TABLE / FIG 4: Residential wise sero prevalence of TTIs among blood donors

Residence	Total no	HIV	HBV	HCV	SYPHILIS	Total(%)
Rural	6788	22	134	16	8	180 (2.6)
Urban	4446	16	73	6	4	99 (1.6)
Total	11234	38	207	22	12	279 (2.5)

HIV-Human Immunodeficiency virus , HBV-Hepatitis B virus, HCV- Hepatitis C virus

Highest prevalence of transfusion transmitted infection was with in the age group of 21–30 years (51.3%) followed and the least affected age group were 51-60 years (0.3 %)(Table/ fig 2) .There was no statistically significant difference of TTIs between the age groups (P value = 0.30) .Out of 10,949 male donors 2.5 % were reactive for different TTI and of 285 female donors, 2.4 % were reactive for TTI (Table/ fig 3) .There was no significant difference between these two groups (p=0.91).Out of 6,788 urban residence donors, 180(2.6 %) reactive for different TTI and of 4446 rural donors , 99 (1.6%) were reactive for TTI (Table/ fig 4). There was a statistical significant difference between rural and urban residence donors (p=0.0004).

TABLE/FIG-5: Prevalence and trends of TTI among blood donors during 2013-2017.

YEAR	No.of donors	HIV(%)	HBV(%)	HCV(%)	Syphilis (%)	Total
2013	2602	6(0.2)	42(1.6)	7(0.2)	7(0.2)	62 (2.3)
2014	2307	7(0.3)	45(1.9)	6(0.2)	3 (0.1)	61 (2.6)
2015	1653	7(0.4)	40(2.4)	1(0.06)	2 (0.1)	50 (3.0)
2016	2523	13(0.5)	48(1.9)	7(0.2)	0	68 (2.7)
2017	2149	5(0.2)	32(1.4)	1(0.04)	0	38 (1.7)
Total	11234	38(0.3)	207(1.8)	22(0.1)	12(0.1)	279 (2.5)

HIV- Human immunodeficiency virus, HBV- Hepatitis B virus, HCV- Hepatitis C virus, Syphilis.

Out of all 279 reactive blood donors, HBV infections prevalence observed was 1.8% followed by HIV 0.3%.The prevalence of HCV and syphilis is 0.1%.[Table/Fig-5].In the present study, there was gradual increase of all the markers (2.3% to 3%)from 2013 to 2015 and it was declined from 3% to 1.7% from year 2015-2017. [Table/Fig-5]

DISCUSSION: TTIs threaten the safety of recipients and community as a whole and are a subject of real concern worldwide (6). Despite the pre-donation counseling and medical fitness test, the presence of TTIs is inevitable in blood donation since a person can transmit infection during its asymptomatic phase (window period), transfusion can contribute to an ever widening pool of infection in the population (7). In the present study TTI prevalence was observed to be 2.5 % which was similar to the study done by Agrawal VK et al., (2.5%) (8). But it was low compared to other studies by Suresh B et al., (9) (3.5%) and Disha A et al., (4.03%) (10).

With respect to the age, TTIs were more prevalent in the age group of 21-30 years. Analyzing the individuals TTIs, it was observed that the prevalence of HBV was high in the 51-60 years (100%) age group, HCV in the 21- 30 years (9.8%) age group, syphilis in the 21 -30 years (6.3%) age group and HIV in the 21-30 years (14%) and 31-40 years(14%) age groups [Table/Fig-2]. The difference of the prevalence of transfusion transmitted diseases among different age groups was statistically not significant (p=0.3). This is in contrast to the study done in Maharashtra (11). They observed the prevalence of HBV in <20 years (100%), HCV in 31- 40 years age group (43.90%), syphilis in 41 - 50 years age group (16.66%) and HIV in 21-30 years age group (6.34%).

Majority of the donor population in this study were males constituting 97.5% [Table/Fig-1] and this finding is similar to other studies conducted in India by Karmakar PR et al., (12) and Agrawal P et al., (13). TTI seroreactivity rate was more in 272 male donors (2.5%) than in 7 females (2.4%) [Table/Fig-3]. But it was not statistically significant (p=0.91). Similar findings were recorded in the study by Agrawal P et al., [13]. This might be attributed to more exposure of males to risk factors for TTI than females.

Majority of the donor population in this study were from rural area(60.4%) [Table/Fig-1] and this finding is in contrast to the study conducted in Pakisthan by Arshad A et al., [14] .They observed the majority of the blood donors belongs to urban residence. TTI seroreactivity rate was more in 180 rural donors (2.6%) than in 99 urban donors (1.6%) [Table/Fig4].There was a statistical significant difference between these groups. (p=0.0004).

HIV prevalence in the blood donors of our study was 0.3% which was higher than reported by Giri et al.(11) from rural Maharashtra (0.07%), Chandra et al.(15) (0.23%) and lower than the study conducted Singh et al.(16) (0.54%) from Delhi.

The present study revealed seroprevalence of HBV at 1.8% among the donors which is similar to the findings by Arshad et al.,(14).Variable results o f 0.9%(17),1.09%(11),1.4%(12),2.5%(10) have also been reported in other studies.Seroprevalence of HBV among blood donors differs.The major route of HBV transmission is parenteral and it is most infective among blood –borne viruses and chronic carrier state is associated with chronic liver disease,cirrhosis and hepatocellular carcinoma.

HCV is an evolving public health problem globally .For hepatitis C,the estimated prevalence in this study was 0.1%, which was similar to the study conducted by Shah N et al.,(17) where as a few studies reported higher prevalence (0.3%) (18),1.09% (19),4% (10).

Transmission of HCV is primarily through blood exposure and majority of the infected persons progress to chronic infection and chance of cirrhosis and hepato cellular carcinoma is more as compared to HBV.Blood is one of the main sources of transmission of Hepatitis C; hence donor selection is of paramount importance.

Sexually transmitted infections are wide spread in developing countries and constitute a major public health problem. The estimated sero prevalence for syphilis in the present study was found to be 0.1% which was lower than reported by Agrawal P et al; (13) from Rajasthan(1.29%) ,Arshad et al;(14) (2.1%) from Pakisthan. The variation in the prevalence rates of syphilis reported from different studies may be due to differences in risk behaviour patterns.

CONCLUSION: TTIs continue to be a threat to safe transfusion practices.Prevention of TTIs should be the main goal right now.This can be achieved by vigorous screening of donors and donated bloods. Effective control strategies including a stringent screening of all blood donors ,public awareness programs and institution of adequate public health measures are urgently needed.It may be possible through proper donor selection and education,uniform implementation of laboratory screening tests, and adequate supply of blood through voluntary blood donations along with restriction of donation by professional donors.

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