

Seroprevalence of Blood-borne Viral Infections among Blood Donors in a Tertiary Care Hospital, Kalaburagi District, Karnataka, India

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ABSTRACT

Introduction: Transfusion of blood and its components is a life-saving manoeuvre but has life threatening hazards as well. Blood Transfusion Service (BTS) is covered by “Drug and Cosmetics Act” and has legal implications. Hence, strict criteriae are followed while selecting a donor, particularly emphasising on Transfusion Transmissible Infections (TTI), which may improve safe transfusion practices.

Aim: To study the seroprevalence of Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) among Voluntary Donors (VD) in blood centre, tertiary care hospital, Kalaburagi, Karnataka, India.

Materials and Methods: The present study was retrospective observational study done for four consecutive years from 1st January 2017 to 31st December 2020. Data of all donors screened for HIV, HBV and HCV was retrieved from the records

of Gulbarga Institute Medical Sciences (GIMS) Blood Centre, GIMS Hospital, Kalaburagi, Karnataka, India. The results were tabulated and analysed using descriptive statistics..

Results: Total blood units taken were 15,466 from VDs. There were 96.8% (14,966/15,466) male and 3.2% (500/15,466) female donors. The overall seropositivity of HBV, HCV and HIV was 1.8%, 0.006% and 0.12%, respectively. The highest seroprevalence of TTI was found to be in the age group of 18-30 years (169 donors; 55.6%) followed by 31-40 years age group (103 donors; 33.9%).

Conclusion: This study shows increasing trend for total blood donation. Strict selection and retention of voluntary low-risk blood donors is recommended to improve the blood safety. Use of highly sensitive screening tests like Nucleic Acid Amplification Test (NAAT) technology may be implemented in all blood centres to possibly reduce the incidence of TTI.

Keywords: Hepatitis B, Human immunodeficiency virus, Seropositivity, Transfusion transmitted infections, Voluntary donors

INTRODUCTION

Blood transfusion is an crucial aspect of healthcare. it contributes to saving thousands and thousands of lives each year in both ordinary and emergency conditions, allows increasingly more complicated scientific and surgical interventions and dramatically improves the lifestyles expectancy and standard of living of sufferers with form of acute and chronic situations. Patients who require transfusion as a part of their clinical management have the right to expect that sufficient blood will be available to meet their needs and to receive the safest blood possible [1]. In 2018, 72% of reporting countries, or 123 out of 171, had a national blood policy. Overall, 64% of reporting countries, or 110 out of 171, has specific legislation covering the safety and quality of blood transfusion, including 79% of high-income countries, 63% of middle-income countries and 39% of low-income countries [2].

There are three types of blood donors: voluntary unpaid, family/ replacement and paid donors. An adequate and reliable delivery of secure blood can be assured via a stable base of normal voluntary and paid blood donors. These are also most secure organisation of donors as the prevalence of blood borne infections is lowest among these organisation. The World Health Organisation (WHO) recommends that, each blood donation should be screened for infections prior to use. Screening for HIV, HCV and HBV must be obligatory. Blood screening must be preformed in keeping with high-quality system necessities [2]. In low and middle-income countries translation is used greater often to control pregnancy related trouble and severe childhood anaemia [2]. India being a lower middle income country; the prevalence of transfusion-transmissible infections in blood donations is 0.03-0.77% for HIV,

0.76-5.54% for HBV and 0.3-0.80% for HCV [2]. As the prevalence of these infections among blood donors who are usually considered as healthy members of the society reflects the obvious in addition to hidden load in the population.

Hence, the objective of the present study was to estimate the prevalence of HIV, HBV and HCV among blood donor population.

MATERIALS AND METHODS

This was a retrospective observational study for a period of four years from 1st January 2017 to 31st December 2020. Institutional Ethical Committee clearance was taken (Reference: GIMS/GUL/ PHARMA/IEC/60/2020-21). The records of all the blood donors in GIMS Blood Centre, GIMS, Kalaburagi, Karnataka, India, were reviewed and analysed in three months (i.e January 2021 to March 2021). All the donated blood was screened for HIV, HBV and HCV by Enzyme Linked Immunosorbent Assay (ELISA) method after obtaining a written consent from the donor as per the National AIDS Control Organisation (NACO) guidelines 2017 [3].

The positive control acceptance criterion for ELISA 3rd generation for HBV, HCV and HIV was 1.465, 1.870 and 1.403, respectively as per kit manufacturer's literature. The criteria for blood donor selection and deferral were done as per the National Acquired Immunodeficiency Syndrome (AIDS) Control Organisation (NACO) guidelines 2017 [3].

Inclusion criteria

- Healthy individual aged 18-60 years.
- Non lactating or pregnant woman.
- Weight >45 kg.
- Haemoglobin concentration >12 gm%.

Exclusion criteria

- Age <18 years
- Weight <45 kg
- Haemoglobin concentration <12 gm%.
- Normotensive blood pressure (100/60-160/90 mmHg) and normal pulse rate (60-100 beats per minute and regular).
- Lactating or pregnant woman.
- History of medications.
- Apparently unhealthy or malnourished donors.
- Presence of any illness.
- History of recent vaccination (within six months).
- History of jaundice or asthma.
- High risk behaviour individuals like history of unsafe sexual intercourse or drug abuse.
- History of alcohol, smoking within 24 hours.

The donors were classified based on their epidemiological profile i.e., based on their age, gender and sero-reactivity. The ELISA tests were performed as per manufacturer instructions. The test was repeated for all the reactive samples for confirmation before labeling them seropositive and the seropositive blood was discarded as per the Bio-Medical Waste Management Rules, 2016 [4].

STATISTICAL ANALYSIS

The results were tabulated in Microsoft excel and descriptive statistics were used for the analysis.

RESULTS

During the study period, there were a total of 15,466 VDs who donated blood in GIMS Blood Centre and in various indoor and outdoor blood donation camps. Male donors were the dominant cohort with 96.8% (14,966), while female donors constituted only 3.2% (500 donors) of the study population. [Table/Fig-1] shows year wise and age wise distribution of blood donors. The overall prevalence of blood borne virus during the present study was 1.96%, among which seropositivity of HIV, HBV and HCV were 0.12% (18), 1.84% (285) and 0.006% (01), respectively [Table/Fig-2]. Highest prevalence of TTIs was seen in the age group of 18-30 years (55.6%) followed by 31-40 years (33.9%) as shown in [Table/Fig-3].

Year	Total donors	Male, n (%)	Female, n (%)
2017	3,635	3,512 (96.6%)	123 (3.4%)
2018	4,429	4,297 (97%)	132 (3%)
2019	4,768	4,614 (96.8%)	154 (3.2%)
2020	2,634	2,543 (96.5%)	91 (3.5%)
Total	15,466	14,966 (96.8%)	500 (3.2%)

[Table/Fig-1]: Distribution of donors in the study population.

Year	Total donors	HIV, n (%)	HBV, n (%)	HCV, n (%)	Total, N (%)
2017	3,635	04 (0.11%)	79 (2.17%)	0	83 (2.28%)
2018	4,429	09 (0.2%)	81 (1.8%)	0	90 (2.03%)
2019	4,768	05 (0.1%)	90 (1.9%)	01 (0.02%)	96 (2.01%)
2020	2,634	0	35 (1.33%)	0	35 (1.33%)
Total	15,466 (100%)	18 (0.12%)	285 (1.84%)	01 (0.006%)	304 (1.96%)

[Table/Fig-2]: Prevalence of HIV, HBV and HCV infection among donors.

Variables	≤30 years	31-40 years	41-50 years	>51 years	Total
2017					
HIV	01	03		-	04
HBV	43	32	04	-	79
HCV	-	-	-	-	-

2018					
HIV	05	04	-	-	09
HBV	52	21	08	-	81
HCV	-	-	-	-	-
2019					
HIV	02	03	-	-	05
HBV	48	29	12	01	90
HCV	-	-	01	-	01
2020					
HIV	-	-	-	-	-
HBV	18	11	06	-	35
HCV	-	-	-	-	-
TOTAL	169 (55.6%)	103 (33.9%)	31 (10.2%)	01 (0.3%)	304 (100%)

[Table/Fig-3]: Prevalence of HIV, HBV and HCV infection according to different age groups.

DISCUSSION

The primary responsibility of a Blood Transfusion Service (BTS) is to offer secure, efficient and well-timed delivery of blood and blood component to those in need [3]. In order to satisfy this responsibility, BTS needs to ensure that the act of blood donation is safe and causes no harm to the donor. The collection of blood should be from the lowest risk donors possible and also it should be ensured that every probable TTI reactive blood donors is referred for proper diagnosis and management of the infection and if confirmed remains excluded from the donor pool [3]. The BTS not only screens the blood donor but also gives a clue about the rate of prevalence of TTI in asymptomatic young healthy adults and it may not be considered as representation of general population [5]. Among the VD, male donors were 96.8%, while female constituted only 3.2% and this male dominance was seen in almost all studies. This gender imbalance may be defined with the aid of the higher deference rates seen in females due to the increased chance of them being recognised anaemic and/or underweight and any other attributable reason which may lead to loss of motivation in females to donate blood in the first place. This can easily be remedied by sponsoring more targeted awareness campaigns along gender lines. Various previous studies across India, have also been done that show comparable results similar to the present study [5-10]. Majority of seropositive donors were seen in the age group of 18-30 years (55.6%) which is comparable to Verma A et al., Koshy JM et al., and Yadav BS et al., [9,11,12]. The overall seropositivity of HIV, HBV and HCV of the present study was 1.96% (304 cases); similarity was seen in studies by Mandal R et al., (2.2%), Mittal N et al., (2.1%), Makroo RN et al., (1.86%) and Pallavi P et al., (1.93%), but its more in study by Rawant A et al., (2.67%) [6-8,13,14]. This higher prevalence is probably because of the usage of 4th generation ELISA test utilised by Rawant A et al., [7]. Few studies like Verma A et al., (1.43%), Panchori S et al., (1.4%), Pai S (1.45%); and Bhutia CT and Das D (1.3%), show lesser seroprevalence when compared to the present study [9,10,15,16]. The [Table/Fig-4] shows

Study	Year of study	Place	HIV	HBV	HCV
Mandal R and Mondal K, [6]	2016	Darjeeling	0.42%	1.24%	0.62%
Arya D et al., [5]	2016	Bikaner	0.08%	1.56%	0.13%
Rawant A et al., [7]	2017	Delhi	0.32%	1.61%	0.73%
Mittal N et al., [8]	2019	Faridabad	0.25%	1.3%	0.5%
Verma A et al., [9]	2019	Indore	0.076%	1.29%	0.072%
Panchori S et al., [10]	2020	Jaipur	0.107%	1.22%	0.137%
Pattanashetti M et al., [17]	2020	Madkeri	0.05%	0.58%	0.02%
Mukherjee S [18]	2020	Odisha	0.073%	0.62%	0.044%
Divyashree BN et al., [19]	2020	Kuppam	0.14%	0.82%	0.02%
Present study	2021	Kalaburagi	0.12%	1.8%	0.006%

[Table/Fig-4]: Percentage of seroprevalence of HIV, HBV and HCV among blood donors in other similar studies [5-10,17-19].

the seroprevalence of HIV, HBV and HCV (0.12%, 1.8% and 0.006%, respectively) which is comparable with other studies. [5-10,17-19]. These variations in seroprevalence of comparable research can be because of difference within the observed population, observed duration and observed areas.

Limitation(s)

Unsafe blood nevertheless remains a major risk for the worldwide spread of TTIs. The screening target for HBV, HIV and HCV are routinely included in the donor screening, but fails to detect these TTIs during window period. Viral diagnostic tests like NAAT are very beneficial in this situation which has significantly shortened the window duration. However, the cost of this assay is high which makes it unaffordable for many centres. Therefore, the present studies may have underestimated (presence of a window period) or overestimated (high rate of false positivity HCV) the frequency of TTIs among donors in this population.

CONCLUSION(S)

Blood safety is vital for the prevention and control of TTIs and also to reduce the incidence of TTI's. However, transmission of TTIs during serologically negative window period is still a threat to blood safety. Therefore, use of screening tests with advanced and affordable technologies which are more sensitive and more specific such as NAAT based screening systems for TTIs should be introduced in all blood centres to screen donors.

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