

Original research article

A seroprevalence study: On major blood transfusion transmissible infections among the blood donor in a Kalaburagi region

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Abstract

Introduction: Acquisition of transfusion transmissible infections in the process of therapeutic blood transfusion is a major global health challenge in transfusion medicine. This study aimed to determine the prevalence and trends of major transfusion transmissible infections among blood donors.

Materials and Methods: A retrospective study, analysis of consecutive blood donors' records covering the period between May 2018 and November 2019 was conducted to analyze for seroprevalence of HIV, HBV, HCV, VDRL and Malaria among blood donors and year trends were analyzed. Sterile venous anti-coagulated blood was collected from the donors and analyzed using highly sensitive and specific kits.

Result: Out of the 5124 (4965 males and 159 females) individuals tested for HIV, HBV, HCV, VDRL and Malaria. Significantly declining trends of HIV, HBV, HCV, VDRL and Malaria ($p < 0.001$) seroprevalence were observed over the two years study period. The seroprevalence of HIV was 0.13% in 2018 and showed no prevalence for next year afterwards. The seroprevalence of HBV decreased from 0.52 % in 2018 to 0.50% in 2019. No HCV prevalence in 2018 but 0.01% in 2019. Similarly, the prevalence of VDRL decreased progressively from 0.03% in 2018 to 0.01% in 2019.

Conclusion: The low prevalence of HIV, HBV, HCV, VDRL and Malaria observed in present study may be due to awareness of donors, strict donor selection criteria and affective screening of the donors.

Keywords: Blood donors, Infectious pathogens, HIV, HBsAg, HCV, VDRL.

Introduction

The presence of blood borne infections in blood cells or plasma of asymptomatic donors is the major risk factors for transmitting infectious agents through blood transfusion. Although blood transfusion service is mandatory to save the life of many patients who suffer from the loss of blood, it is an ideal vehicle for transmission of any infectious organism that may present in the blood. ^[1] Common infectious agents include hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV) and Venereal Disease Research Laboratory test (VDRL). ^[2]Unsafe blood transfusion is very costly from both human and economic points of view. Transfusion transmissible infectious diseases carry long term consequences for the recipients, families and the communities since the infected person represents a pool for the infection and can transmit the disease during its asymptomatic period. Therefore, transfusions can contribute to an ever-widening pool of infection in the population^[3]. In developing countries, blood safety continues to be a major problem due to the high prevalence of infectious markers among blood donors. ^[4] In developing countries,

factors contributing to transfusion-related transmissions include a high prevalence of HIV and other transfusion transmitted infections in the general and blood donor populations; inadequate screening facilities; and lack of infrastructure and capacity to ensure sustainable operations.^[5] Sexually transmitted infections are also widespread in developing countries and constitute a major public health problem.^[6] VDRL has acquired a new potential for morbidity and mortality through association with increased risk of HIV infection, thus making more difficult to get safe blood.^[7] India, being part of developing countries, has a high prevalence of HIV, HBV and other infectious diseases^[8]. The prevalence of transfusion transmissible infections (TTIs) 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. Although there are available data on the prevalence of these diseases in a general population and its high-risk population has been addressed.^[9] There are limited epidemiological data on TTIs on blood donors in India.^[10] especially in the Karnataka region of India. Therefore, this study was conducted to determine the prevalence and trends of major TTIs among blood donors at ESIC medical college & Hospital, Kalaburagi.

Materials and Methods

Study Area: This study was carried out in Department of Pathology, ESIC Medical College & Hospital, Kalaburagi, on consecutive blood donors' records covering the period between May 2018 and November 2019. This blood bank is the center where an effective blood banking system is catering for all the blood needs of patients in the hospitals of this region.

Study Population: Since the study was retrospective, health data for 5124 blood donors who attended the blood donor's bank of the region between May 2018 and November 2019 were collected.

Collection and Processing of Samples: Blood samples were collected aseptically by venipuncture from the donors. The samples were analyzed for blood group, HIV-1 & 2, HBV, HCV, VDRL and Malaria following standard procedures.

Laboratory Diagnosis for HIV-1 and 2: Each donor's serum sample was screened for HIV-1 and HIV-2. The detection of HIV-1 and HIV-2 in the blood was done following the manufacturer's instructions.

Laboratory Diagnosis for HBsAg and HCV Antibodies: Sera were checked for the presence of hepatitis B surface antigen (HBsAg) using ELISA. This is a fairly reliable test having more than 99.9% sensitivity and specificity. Similarly, IgG antibodies to HCV were detected using an ELISA technique according to the manufacturer's instructions.

Laboratory Diagnosis for VDRL: Serum for all donors was tested for the presence of antibodies using rapid plasma regain test (RPR).

Laboratory Diagnosis for malaria: Whole blood sample tested for malaria antigen using rapid visual card method.

Results:

Out of the 5124 (4965 males and 159 females) individuals tested for HIV, HBV, HCV, VDRL and Malaria (Table 1).

Table 1: Gender related prevalence of HIV, HBV, HCV, VDRL and Malaria among blood donors at blood bank.

Year	Male	Female	Total male and female
2018	2526 (49.2)	90 (1.7)	2616 (51.0)
2019	2439 (47.5)	69 (1.3)	2508 (48.9)
Total No of blood donors	4965 (96.8)	159 (3.1)	5124 (100)

Table 2: Trends of seroprevalence of HIV, HBV, HCV, VDRL and Malaria among blood donors at blood bank.

Year	Total screened N	HIV positive N (%)	HBV positive N (%)	HCV positive N (%)	VDRL positive N (%)	Malaria Parasite
2018	2616 (51.0)	7 (0.13)	26 (0.50)	0 (0.0)	2 (0.03)	0 (0.00)
2019	2508 (48.9)	0 (0.00)	27 (0.52)	1 (0.01)	1 (0.01)	0 (0.00)
Total	5124 (100)	7 (0.13)	53 (1.0)	1 (0.01)	3 (0.05)	0 (0.00)
p-value of LR for trend	-	0.000	0.000	0.000	0.000	

N=Number, LR=Linear Regression

Significantly declining trends of HIV, HBV, HCV, VDRL and Malaria ($p < 0.001$) seroprevalence were observed over the two years study period. The seroprevalence of HIV was 0.13% in 2018 and showed no prevalence for next year afterwards. The seroprevalence of HBV increased from 0.50% in 2018 to 0.52% in 2019. No HCV prevalence in 2018 but 0.01% in 2019. Similarly, the prevalence of VDRL decreased progressively from 0.03% in 2018 to 0.01% in 2019 in table 2.

Discussion

It is a well-known fact that HIV, HBV and HCV are global infectious pathogens contributing to mortality and morbidity in all ages.^[11] In this study, a total of the 5124, 7 (0.13) subjects screened were seropositive for HIV, 53 (1.0%) were positive for HBV, while 1 (0.01%) and 3 (0.05%) were positive for HCV and VDRL respectively. The diseases studied are fairly age-specific and behavior-dependent. People of ages 20-40 years have been found to be more sexually and economically the most active group and HIV is at high prevalence in those groups.^[12] In our study, HIV prevalence has been found highest in the age group of 26-35 compared to the age group of 35-46 which contradicts earlier reports.^[13] This variation in prevalence between two groups may be attributed to the variation in duration and opportunity for risk exposure, the continuous sharing of sharps and use of unsterilized materials such as barbing clippers. The fact that these subjects are proposing donors does not exclude them from being potential sources or carriers of transfusion transmissible infections (TTI's), especially HIV. In this study, the prevalence of HIV was 0.13% which is in line with the earlier reports.^[14] However, it is less than the report according to Lavanya V 7.54%.^[15] This variation may be due to the small sample size they used. The seroprevalence of HBV 53 (1.0%) in our study is lower than the previous reports of 10.4% by Nada HA.^[14] and 6.2% by Lavanya V^[15]; but it is higher than the earlier report in Singh R with 9.7%.^[16] Our finding is in agreement with the report of 5.2% by Quadri SA.^[17] Most countries in Africa, including Ethiopia, have high endemicity for hepatitis B. This clearly explains the reason behind the

high seroprevalence obtained in our study. The prevalence of hepatitis C (0.01%) identified in this study is less than the reports by Saghir SA et al. [18] with the age group 20-29 more infected and the reports of 5.71% by Nada HA et al. [14] However, according to Lavanya V it is slightly similar with the prevalence of antibody to HCV in healthy adult Indian blood donors of 3.4%. [15] Nevertheless, the prevalence of HIV, HBV and HCV could be higher in commercial sex workers, their clients and intravenous drug users, since they are involved in high risk behaviors.

Table 3: Comparison of HIV, HBV, HCV and VDRL.

Author	HIV	HBV	HCV	VDRL
Nada HA ¹⁴	12.6%	10.4%	5.71%	12.8%
Lavanya V ¹⁵	7.54%	6.2%	3.4%	7.9%
Sabharwal ER ²⁰	16.7%	12.8%	7.8%	14.4%
In our study	0.13%	1.0%	0.01	0.05%

However, the prevalence of VDRL (0.05%) in this study is less than that of the above reports; but in agreement with the earlier reports by Bhawani YR. [19] Prevalence of active VDRL infection according to Nada HA was 12.8% [14] According to Lavanya V et al 7.9%. [15] A study conducted to assess the prevalence of infection with HIV, VDRL and HBV among Indian blood donors in 1998 showed that the seroprevalences of HIV-1, HBV, HCV and VDRL were 16.7%, 12.8%, 7.8% and 14.4%, respectively. [20] A major limitation of our study is the fact that our sample size was small. A study done on 6827 subjects alone cannot provide overall prevalence of HIV, HBsAg, HCV and VDRL status in the country as a whole. In this study, significantly declining trends of HIV, HBV, HCV and VDRL seroprevalences were observed among blood donors over the study period. This finding is consistent with the observed declining trends of HIV, HCV and VDRL in the report by Kaur P. and with the observed declining trends of HIV seroprevalence in the general population of India, as well as the declining trends of HIV and VDRL infection among pregnant women in India. [21] The subsequent declining in HIV seroprevalence may be due to the effect of the prevention programs that have been instituted in recent years [22]. Also, because this study was a retrospective analysis, we could not gather information about the socio-economic status and behavioral patterns which are major indices in measuring the prevalence of these infections. The seroprevalence data, behavioral patterns and socio-economic status of our community indicates that there is a high potential for the spread of HBsAg, and HIV in city of Karnataka State. If adequate preventive measures are not put in place, these infections can lead to the death of the most productive ages of the general population thereby resulting in a vicious cycle of poverty and vulnerability.

Conclusion

The low prevalence of HIV, HBV, HCV, VDRL and Malaria observed in present study may be due to awareness of donors, strict donor selection criteria and affective screening of the donors.

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