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Original Research Article

Seroprevalence of Human Immunodeficiency Virus, Hepatitis Viruses, and Co-Infections among Blood Donors at Indore, Central India

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Abstract
Background: *Transfusion infectious agents such as human immunodeficiency virus (HIV), hepatitis B virus (HBV) and, hepatitis C virus (HCV) are among the greatest threats to blood safety for recipients. They are also the leading causes of death and chronic and life-threatening abnormalities.*
Methods: *Serological screening was performed on 42582 blood donors at the M.Y. Hospital blood bank, Indore, M.P. India between January 2008 and December 2010. We applied post-stratification weights to control for sampling bias and used logistic regression analyses to examine the association of seropositivity and co-infections with sex, age, provinces of residence, and year of blood donation.*
Result: *Majority of donors are voluntary donors (73.85%) and male donors (97.66%). Seroprevalence of HBV, HIV and HCV are 1.97 %, 0.185 % and 0.032 % respectively. Age group 26-35 year are show higher seroprevalence (1.023 %) for all types of transfusion transmitted disease.*
Conclusion: *A suitably conducted that the time and cost involved screening, notification and counseling of permanently deferred donors will help in reducing these co-infections rates.*
Key Words: *Blood donors, Co-infections, Hepatitis B, HIV infection.*

Introduction

Transmission of infectious diseases through donated blood is of concern to blood safety as transfusion forms an integral part of medical and surgical therapy. Timely transfusion of blood protectslots of lives, but unsafe transfusion practices lead lots of people to risk of transfusion infections.[1] The morbidity and mortality resulting from transfusion of infected blood have sweeping penalties, not only for the recipients themselves, but also for their families, their communities and the wider society. [2,3]

Only continuous improvement and implementation of proper donor selection, sensitive screening tests, and effective inactivation procedures can ensure the elimination, or at least reduction, of the risk of acquiring transfusion infections. [4] Transfusion infections can exist as asymptomatic disease in the hosts, so donors must be screened for high-risk behaviour related diseases. Evaluation of data on the prevalence of transfusion infections namely human immune deficiency virus (HIV), hepatitis B virus (HBV),

and hepatitis C virus (HCV) among blood and blood component donors permits an assessment of the occurrence of infections in the blood donor population and consequently the safety of the collected donations HIV, HBV and HCV co-infection has occurred as a leading cause of morbidity throughout the world.[5,6] Because of the significant burden and clinical impact of HBV in HIV-infected individuals, understanding the epidemiologic characteristics of HBV infection in HIV infected populations is vital. The prevalence of HIV infection among HBV infected persons varies markedly, from 5% -30% in different regions of the world. [7] Knowledge about burden of these diseases among healthy blood donors can provide useful information on the behaviour pattern of the general population. The present study serological screening was performed to know the co-infection rate of HIV, HBV and HCV among blood donors of our blood bank in Indore, M.P. India & the adjoining areas.

Material and Methods

The present study is conducted in the Department of Pathology M.G.M. Medical College Indore and M.Y. Hospital blood bank. This is a retrospective study that was conducted, during the period 2008 - 2010. A total 42582 blood donors are observed in the year 2008-10 in the M.Y. Blood Bank. All voluntary or replacement blood donors who were eligible to donate blood and blood components as per the Drugs & Cosmetics act, 1940[8] and rules, 42582 who donated their blood at our blood bank during the study period were included in the study. Voluntary donations were obtained either at the blood bank or at voluntary blood bank. Replacement donors were either relatives or friends of patients. The data collected from donor register record book, donors form, master record book, HIV, HBV and HCV positive bag number records included the demographic characteristics of donors such as age, gender, residence.

Sample Collection and Laboratory Testing

The screening for HIV was done by ELISA using kits. HBS Ag was detected by ELISA. Anti-HCV test was done by ELISA. ABO and Rhesus (Rh) blood groups were determined using blood grouping antisera: anti-A, anti-B, anti-AB, and anti-D. Selection of cases for the study included the donors of MYH Blood Bank. For HBV, the marker used for routine screening was hepatitis B surface antigen (HBsAg). The test was performed using solid phase enzyme linked immunosorbent assay (ELISA) based on Direct Sandwich principle and the ELISA kit. For HCV, anti HCV (IgG) ELISA was performed using third generation ELISA test. The ELISA tests were performed as per the manufacturer's instructions along with validity check and incorporation of internal controls in each run. Samples positive for HBsAg antigen &/or anti HCV antibody by first test were retested by rapid test for HbsAg and HCV IgG antibodies using chromatographic immunoassay All borderline samples were tested in duplicate and if both duplicate retest sample absorbance value was less than the cut off value, the specimen was considered non-reactive. If any one of the duplicate retest absorbance value was found to be equal to or greater than the cut off, the specimen was considered to be reactive for HBsAg/HCV Ig G antibodies.

Statistical Analysis

Data were analyzed using Chi-square test for trend to compare infection rates in consecutive 5 years. Statistical analysis was carried out using SPSS version 20 (SPSS Inc,Chicago, USA) and p-value less than 0.05 was considered statistically significant.

Result

In the present study, 42582 blood donors are observed in the year 2008-10 in the M.Y. Blood Bank. The data collected from donor register record book, donors form, master record book, HIV, HBV and HCV positive bag number records. In observations studies, majority of donors are voluntary donors 73.85 % as compared to replacement/relative donors 26.15 %. Out of total 42582 blood donations, majority of donors are male donors 97.66 % as compared to female

donors 2.34 %. Seroprevalence of HBV, HIV and HCV are 1.97 %, 0.185 % and 0.032 % respectively. Age groups 26-35 year are showed higher seroprevalence (1.023 %) for all types of transfusion transmitted disease. for HBV-0.904 %, HIV-0.105 % (Table 1). Seroprevalence of transfusion transmitted disease is higher in voluntary donors 62 % as compared to replacement/relative 38 % donors (Table 2).Table 3 showed the seroprevalence of co-infection is 0.04 % and it is higher for HBV with HIV infection.

Table 1: Overall age distribution of seroprevalence of HBV, HCV and HIV in 2008-10

Infections	Age group (in years)				Total
	18-25	26-35	36-45	46-60	
HIV	22 (0.051%)	45 (0.105%)	10 (0.023%)	02 (0.004%)	79 (0.185%)
HBV	332 (0.779%)	385 (0.904%)	109 (0.255%)	17 (0.040%)	843 (1.97%)
HCV	05 (0.011%)	06 (0.014%)	03 (0.007%)	00 (00%)	14 (0.032%)
Total	359 (0.843%)	436 (1.023%)	122 (0.286%)	19 (0.044%)	936 (2.19%)

Table 2: Seropositivity of transfusion transmitted diseases in total blood units collected during the year 2008-10

Year	Units Collected	Seropositive In total units	Voluntary donor	Seropositive (voluntary donor)	Replacement donor	Seropositive (replacement donor)
2008	13052	281 (0.021%)	9238 (70.78%)	66 (0.505%)	3814 (29.22%)	215 (1.64%)
2009	14226	330 (2.13%)	10557 (74.20%)	257 (1.80%)	3669 (25.80%)	73 (0.513%)
2010	15304	306 (2.00%)	11651 (76.14%)	242 (1.58%)	3653 (23.86%)	64 (0.418%)
Total	42582	917 (2.15%)	31446 (73.84%)	565 (1.32%)	11136 (26.15%)	352 (0.826%)

Table 3: Seroprevalence of co infection with HBV, HCV and HIV

Year	HBV+HCV Seropositive	HBV+HIV Seropositive	HBV+HCV+HIV Seropositive	Total
2008	01	02	02	05
2009	00	09	00	09
2010	00	03	00	03
Total	01	14	02	17 (0.040%)

Discussion

The aim of this study was to determine the serological screening to know the co-infection rate of HIV, HBV and HCV among blood donors of our blood bank in Indore, M.P. India & the adjoining areas. By donor type, age, and sex and to determine association if any, in occurrence of the pathogen as well as potential risk of HBV HCV and co-infection associated with HIV seronegative blood transfusion. Majority of donors are voluntary donors 73.85 % as compared to replacement/relative donors 26.15 %. Out of total 42582 blood donations, majority of donors are male donors 97.66 % as compared to female donors 2.34 %.which is consistent with observations in several other studies in Africa [9-11]. This study showed that 15.9%, (~one out six), of the donated blood was seropositive for at least one of the screened pathogens, which is very high prevalence that calls for strict screening of donated blood and stringent donor selection criteria[12]. These three pathogens are the

commonest in this donor population and should be always screened for as a matter of priority.

The overall Seroprevalence of HBV, HIV and HCV are 1.97 %, 0.185 % and 0.032 % respectively. These figures compared well with those reported in other parts of Africa [12-16]. Results this study when compared with those of a study conducted in 1999 at the same hospital, which found the prevalence of HIV, HBV, HCV and syphilis to be 8.7%, 11.0%, 8% and12.7% respectively [17], represent a reduction in all the screened pathogens, especially HCV and syphilis. The reduction in HIV seem to fit a pattern reported by NACP showing a decrease of HIV infections among blood donors from 33% in 1999 to 10% in 2003 [18]. This could be due to increased self-selection of individuals donating blood, which has been associated with a reduction of number of donors per month, both replacement and voluntary donors, from 744 in 1999 to 495 in 2005 (unpublished observation), which may also explain the reduction in the seroprevalence of HBV and syphilis. It is possible that behavioural change, in particular in the youth Tanzania population, may have contributed to the observed decline in the prevalence of HIV and other STIs as suggested by others [19, 20]. The high prevalence of HCV reported in 1999 was possibly due to the latex technique used for diagnosis, which has since been found to be unreliable due cross-reactivity giving rise to false positive reactivities [17]. The current prevalence of HCV found in the present study is in keeping with findings in other parts of Africa, showing a range of between 0.2% and 3.0% [12,21,22].

The prevalence of Age groups 26-35 year is showed higher seroprevalence (1.023 %) for all types of transfusion transmitted disease. for HBV-0.904 %, HIV-0.105 %. Seroprevalence of transfusion transmitted disease is higher in voluntary donors 62 % as compared to replacement/relative 38 % donors. Seroprevalence showed co-infection is 0.04 % and it is higher for HBV with HIV infection. These results, which are in keeping with those of other studies [8, 9, 10], strongly indicate that replacement donors are less suitable and that major emphasis should be made to encourage voluntary donors. It is extremely important to note the high prevalence of HBsAg (8.7), HCV (1.6%) and syphilis (4.6%) and among HIV seronegative blood, which is normally deemed, fit for transfusion. These figures, which can be utilized to estimate the risk of transfusion associated transmission HBV, HCV and co-infections, should serve as a remainder to health personnel to take the necessary precautions, including reducing the number of unnecessary transfusions [23,24].

HBV and HIV are the most prevalent transfusion-transmissible diseases among blood donors in Indore. Screening and better selection of donors are necessary to improve blood safety in the regional blood transfusion center of M. Y. Hospital. Therefore, it is conducted that the time and cost involved screening, notification and counseling of permanently deferred donors will help in reducing these co-infections rates.

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