

Transfusion-transmissible infections among blood donors in Kathmandu, Nepal

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Abstract

Background: Screening of transfusion-transmissible infections (TTIs) among blood donors can be a cost-effective approach to monitor the prevalence, distribution, and trends of the infections among healthy-looking individuals. The study aimed to determine the seroprevalence of four TTIs, human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV) and syphilis, among blood donors in Kathmandu, Nepal.

Methodology: A total of 21,716 units of blood were tested for the presence of anti-HIV 1/2 IgG/IgM, HBsAg, anti-HCV IgG/IgM, and anti-*Treponema pallidum* IgG/IgM/IgA using commercial ELISA kits following standard protocols. Statistical analysis was performed using WinPepi Ver 3.8.

Results: Seroprevalence of HIV, HBV (HBsAg), HCV and syphilis were observed to be 0.12% (95% CI = 0.08-0.18), 0.47% (95% CI = 0.39-0.57), 0.64% (95% CI = 0.54-0.75) and 0.48% (95% CI = 0.40-0.59) respectively. TTIs were dominant among male blood donors compared to female blood donors. Higher HCV seroprevalence among males compared to females was statistically significant. HIV prevalence was highest among blood donors in the age group 31 to 40 years ($P > 0.5$). HBV, HCV and syphilis prevalence was highest among blood donors 41 to 50 years age group, 21 to 30 years age group, and 51 to 60 years age group respectively ($P < 0.05$). HIV and HBV prevalence was relatively higher among first-time donors, whereas HCV and syphilis was relatively higher among the repeated donors ($P > 0.05$).

Conclusions: It is of utmost importance to continue screening donated blood with highly sensitive and specific tests and to counsel donors who are positive to any of the above infections. It is absolutely necessary to avoid the transmission of infection from repeat donors.

Key words: transfusion, HIV, HBV, HCV, syphilis, seroprevalence

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Introduction

Blood donation saves millions of lives; however, although blood transfusion plays an important role in the supportive care of medical and surgical patients, unsafe transfusion practices also put millions of people at risk of transfusion-transmissible infections (TTIs) [1]. Only continuous improvement and implementation of donor selection, sensitive screening tests, and effective inactivation procedures can ensure the elimination, or at least reduction, of the risk of acquiring TTIs [2]. TTIs can exist as asymptomatic diseases in their hosts, so donors must be screened for high-risk behaviour [3]. Mandatory screening tests are performed for human immunodeficiency virus (HIV) 1 and 2, hepatitis B virus (HBV), hepatitis C virus (HCV) and syphilis by blood transfusion centres in Nepal. HIV seroprevalence among blood donors in different regions of Nepal and Kathmandu Valley has been

reported to range from 0.019% to 0.41% [4-7]. HBV seroprevalence has been reported to range from 0.3% to 4.0% in the general population of Nepal by various studies conducted from 1990 to 2003 [8-13]. HBsAg seroprevalence among Nepalese blood donors has been reported to range from 0.45 to 1.26% [4,14-17]. HCV seroprevalence among Nepalese general population and blood donors has been reported to range from 0.1 to 1.7% [4,10-12,16,18-21]. Very little information is available on the prevalence of syphilis in the general population, although one of the focussed studies has reported it as 0.6% among Nepalese males [8]. So far, no study has been conducted to determine the prevalence of one or two of these infections at a time in Kathmandu, Nepal. This study was conducted to determine the seroprevalence of HIV, HBV, HCV, and syphilis. Prevalence of any infection varies with the time and

Table 1. Seroprevalence of Transfusion Transmissible Infections among blood donors in Kathmandu, Nepal.

Blood Donors	Total no.	No. of HIV	No. of HBV	No. of HCV	No. of Syphilis
Male	18,434	25 (0.13%) CI=0.09-0.20	92 (0.5%) CI=0.40-0.61	128 (0.69%)* CI=0.58-0.82	90 (0.48%) CI=0.40-0.60
Female	3,282	2 (0.06%) CI=0.01-0.20	10 (0.3%) CI=0.15-0.54	11 (0.33%) CI=0.18-0.58	16 (0.48%) CI=0.29-0.77
Total	21,716	27 (0.12%) CI=0.08-0.18	102 (0.46%) CI=0.39-0.57	139 (0.64%) CI=0.54-0.75	106 (0.48%) CI=0.40-0.59

CI refers to 95% Confidence Interval

* Significantly higher prevalence among male blood donors ($P < 0.05$).

place of a study; therefore, it is necessary to monitor the prevalence in a given area in a set course of time to understand the current scenario. The prevalence of 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.

Materials and methods

This cross-sectional study was conducted from March 2008 to September 2008 at the Nepal Red Cross Society (NRCS), Central Blood Transfusion Service (CBTS). The total sample number included the number of blood donors donating blood only once during the study period. Prior to blood collection, the donors were requested to answer a questionnaire to determine whether they were eligible for donation per the criteria set by NRCS, CBTS. Donors were both new first-time donors and repeated donors. Five millilitres of each donor's blood was dispensed in a small clean test tube labelled with a unique sample number for mandatory screening of the TTIs. Serum samples were tested as follows: for anti-HIV IgG and IgM using Enzygnost Anti * HIV ½ Plus, Dade Behring, Germany; for HBsAg using Enzygnost HBsAg 5.0, Dade Behring, Germany; for anti-HCV IgG and IgM using EIAgen HCV Ab kit, Adaltis, Italy; and for anti-*Treponema pallidum* IgG, IgM and IgA using SD Syphilis ELISA 3.0, Standard Diagnostics, Inc., Korea. The tests were performed using automated Behring ELISA Processor III (Dade Behring, Marburg, Germany) and the positive samples were confirmed with respective immunochromatographic test kits (SD Biotline HIV – ½ 3.0, Standard Diagnostics, Inc., Korea for the HIV

test; Virucheck HBsAg, Orchid Biomedical Systems, India for the HBsAg test; and SD Biotline HCV, Standard Diagnostics, Inc., Korea for the HCV test). The anti-*Treponema pallidum* test was confirmed with the same available ELISA test kit. All the test results were recorded in Microsoft Access 2007 suitable for further analysis using available tools. Statistical analysis was done using WinPepi Ver 3.8. Chi Square Test was used wherever applicable.

Results

The seroprevalence of HIV, HBV, HCV and syphilis were determined to be 0.12%, 0.46%, 0.64% and 0.48% respectively. Though the prevalence of infections was higher among the male blood donors, only HCV prevalence among males (0.69%) was statistically significant compared to HCV prevalence among females (0.33%) [Table 1]. HIV prevalence was highest but statistically insignificant among blood donors of the age group 31 to 40 years of age. HBV, HCV and syphilis prevalence was highest and statistically significant among blood donors in the age groups of 41 to 50 years, 21 to 30 years, and 51 to 60 years respectively compared to other age groups taken as a whole [Table 2]. HIV and HBV prevalence was relatively higher among first-time donors, whereas HCV and syphilis was relatively higher among the repeat donors but the differences in prevalence among both types of blood donors were insignificant [Table 3].

Discussion

Determined seroprevalence of HIV, HBV, HCV and syphilis was lower than the infections reported in other countries: Ethiopia (HIV-4.5%, HBV-8.2%,

Table 2. Age-wise seroprevalence of TTIs among blood donors.

Age Groups	Total no.	No. of HIV	No. of HBV	No. of HCV	No. of Syphilis
≤ 20	3,310	2 (0.06%)	7 (0.21%)	7 (0.21%)	10 (0.30%)
21-30	9,818	12 (0.12%)	45 (0.45%)	75 (0.76%)**	19 (0.19%)
31-40	5,763	10 (0.17%)	29 (0.50%)	42 (0.72%)	37 (0.64%)
41-50	2,433	3 (0.12%)	19 (0.78%)*	13 (0.53%)	24 (0.98%)
51-60	392	0 (0.00%)	2 (0.51%)	2 (0.51%)	16 (4.08%***)

* Significantly higher HBV prevalence in the age group ($P < 0.05$).** Significantly higher HCV prevalence in the age group ($P < 0.05$).*** Significantly higher syphilis prevalence in the age group ($P < 0.05$).**Table 3.** TTIs seroprevalence among first-time and repeat blood donors.

Donation Times	Total no.	No. of HIV	No. of HBV	No. of HCV	No. of Syphilis
First Time Donors	9,993	14 (0.14%)	51(0.51%)	58 (0.58%)	42 (0.42%)
Repeat Donors	11,723	13 (0.11%)	51 (0.43%)	81 (0.69%)	64 (0.54%)

None of the above differences among first-time and repeat blood donors were significant ($P > 0.05$).

HCV-5.8%) [1]; Tanzania (HIV-8.7%, HBV-11%, HCV-8%, syphilis-12.7%) [22]; Thailand (HIV-0.69%, HBV-4.61%, HCV-2.90%) [23]; Pakistan (HBV-2.45%, HCV-2.52%) [24]. Lower prevalence of TTIs during this study may be attributed to lower infection rates in Nepal as compared to the other countries/studies under review. Seroprevalence of TTIs was higher among male donors compared to female donors. TTIs considered for the study can be all transmitted by sexual transmission. The findings could indicate some risk behaviours of males, such as outside socialization, multiple sex relationships, etc. and may also be due to fewer females donating blood; hence fewer females are screened compared to males. HIV, HBV, HCV and syphilis seroprevalence was highest in different age groups indicating the different risk behaviours in the age groups. HCV and syphilis seroprevalence was higher among the repeat donors. This is an alarming situation requiring immediate action in appropriate counselling of donors before and after the testing. It further shows the need to communicate the test results to the donors. These precautions not only inform donors of their health status, but also prevent them from donating again with infected blood. Furthermore, unnecessary expenditures from the superfluous testing and proper disposal of the infected blood product are also eliminated, thereby lowering costs for the NRCS, CBTS. Differences in HIV, HBV,

HCV and Syphilis seroprevalence in Nepal compared to studies conducted in Ethiopia [1], Tanzania [22], Thailand [23] and Pakistan [24] must have been due to variations in geographical distribution as well as population differences in terms of lifestyle, awareness, sensitivity and specificity of tests, donor selection criteria, etc. The prevalence of HIV, HCV, and HBV also seems to be decreasing when compared to similar previous studies focussed on any of these infections conducted in Kathmandu, Nepal [5,14-18].

Though the seroprevalence of TTIs in Nepal is lower and decreasing, there is need for immediate action to 1) strengthen donor counselling before donation, and 2) report the results of the tests after donation with follow-up counselling to prevent further transmission of the infection. Mandatory screening of all the TTIs concerned should be continued following standard algorithms developed by the WHO and government. Encouraging younger members of the population who have not had blood transfusions to donate blood may also decrease the chances of transmission of TTIs. Similar studies in other blood transfusion centres of Nepal need to be conducted to monitor the overall sero status of the concerned infections.

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