



Original Article

HIV and Hepatitis B seroprevalence among the nepalese blood donors

Kandel SR¹, Ghimire P¹, Tiwari BR², Rajkarnikar M²

¹Central Department of Microbiology, Tribhuvan University, Kirtipur, Nepal

²Central Blood Transfusion Service, Nepal Red Cross Society, Kathmandu, Nepal

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ABSTRACT

Background: HIV and Hepatitis B infections are public health problems in Nepal. This study was conducted based at NRCS/CBTS, with the objective of determining the HIV and HBsAg sero-prevalence in non-remunerated volunteer blood donors.

Materials and Methods: A total of 66,904 units of blood collected, following donor recruitment criteria during March 2009-Sept. 2010 was included for analysis. All donated blood samples were subjected to screening for Transfusion transmitted infections including HIV and Hepatitis B surface antigen using standard ELISA test kits (Dade Behring, Germany). Initial reactive sera were re-tested for reconfirmation with same test kits plus another test kit (Detect-HIV, Adaltis Inc, and Qualisa).

Results: Out of 66,904 units of blood collected, 56,973 units were from male and 9,931 were from female donors. Among the total screened samples, 73 (0.10%) were found to be positive for HIV, {0.11% (64/56973) in male and 0.09% (9/9931) in female}; the difference between male and female donors ($\chi^2 < 3.841$) was statistically significant. The seroprevalence of HIV was highest in age group of 30-39 both in male and female ($p < 0.001$). Similarly, for HBsAg, overall seroprevalence was found to be 0.47% (316/66904) {0.42% (242/56973) in male and 0.74% (74/9931) in female}. The difference was statistically significant ($\chi^2 < 3.841$). The highest HBsAg sero-prevalence (0.65%) was also observed in same age group i.e. 30-39 ($p < 0.001$) in male but highest seroprevalence (2.63%) was observed in age group of ≥ 50 in female.

Conclusion: Both HIV and HBV sero-prevalence is high in adult voluntary blood donors.

INTRODUCTION

HIV had spread unrecognized in the human population as sexually transmitted disease and was finally identified by its disease AIDS in 1983. Even after the isolation of the causative agent in 1983, the burden and death rate of AIDS

accelerated worldwide especially in young people despite the co-infection of new drugs capable to inhibit virus replication since 1997.¹

HIV is a very small retrovirus and its high mutation rate leads to extremely variable viral populations, both within and between individuals. It is coated with glycoprotein 120(gp120), which it uses to bind and infect a range of CD4 leukocytes, depending on the co-receptor specificity.²

Correspondence:

Mr. Suresh Raj Kandel

Department of Microbiology, Tilganga Eye Centre, Kathmandu, Nepal

E-mail: srajkandel@gmail.com

Table 1: Distribution of HIV/HBsAg Sero-prevalence among blood donors

Anti-HIV antibody								
SN	Test Results	Male		Female		Total		X2-Value
		No.	%	No.	%	No.	%	
1.	Positive	64	0.11	9	0.09	73	0.10	
2.	Negative	56909	99.89	9922	99.91	66831	99.89	<3.841
Total tested		56973		9931		66904		
Hepatitis B Surface antigen (HBsAg)								
1.	Positive	242	0.42	74	0.74	316	0.47	
2.	Negative	56731	99.58	9857	99.26	66588	99.53	<3.841
Total tested		56973		9931		66904		

Table 2: Distribution of HIV Sero-prevalence in age groups

Age group	No. of Samples tested	Male		Female		Total no. of sero-positive Cases(%)	P-value
		No. of samples tested	No. of samples positive	No. of samples tested	No. of samples positive		
≤19 Years	10281	9048	1 (0.01%)	1233	0 (0%)	1 (0.009%)	
20-29 Years	29808	24443	19 (0.07%)	5365	3 (0.05%)	22 (0.073%)	
30-39 Years	17649	15002	34 (0.22%)	2647	5 (0.18%)	39 (0.22%)	p< 0.001
40-49 Years	7632	7022	8 (0.11%)	610	1 (0.16%)	9 (0.11%)	
≥50 Years	1534	1458	2 (0.13%)	76	0 (0%)	2 (0.13%)	
Total	66904	56973	64 (0.11%)	9931	9 (0.09%)	73 (0.10%)	

Table 3: Distribution of HBsAg Sero-prevalence in different age groups

Age group	No. of Samples tested	Male		Female		Total no. of sero-positive Cases(%)	P-value
		No. of samples tested	No. of samples positive	No. of samples tested	No. of samples positive		
≤19 Years	10281	9048	11 (0.12%)	1233	1 (0.08%)	12 (0.11%)	
20-29 Years	29808	24443	89(0.36%)	5365	23 (0.42%)	112 (0.37%)	
30-39 Years	17649	15002	98 (0.65%)	2647	39 (1.47%)	137 (0.77%)	p< 0.001
40-49 Years	7632	7022	39 (0.55%)	610	9 (1.47%)	48 (0.62%)	
≥50 Years	1534	1458	5 (0.34%)	76	2 (2.63%)	7 (0.45%)	
Total sample	66904	56973	242 (0.42%)	9931	74 (0.74%)	316 (0.47%)	

HIV is characterized a concentrated epidemic in Nepal with HIV prevalence of 0.30% among adult aged 15-49 years in 2011. There are approximately 50,200 people estimated to be living with HIV.³

HBV is an enveloped DNA virus and a member of the hepadnavirus family.⁴ It has a double stranded DNA genome of approximately 3200 base pairs organized into four partially overlapping frames, which encodes the envelope, core (precore/core), polymerase and X proteins. The envelope proteins are surface glycoproteins collectively designated as hepatitis B surface antigen (HBsAg). In virus infected liver cells, HBsAg is produced in excess and secreted in blood, where it serves as marker for active infection and infectivity. The presence of detectable HBeAg in serum or

plasma is associated with high levels of HBV replication.⁵ HBsAg is the prototype serologic marker of HBV infection and characteristically appears 1 to 10 weeks after an acute exposure to HBV, before the onset of symptoms or elevation of serum alanine aminotransferase (ALT).⁶ The seroprevalence rate of HBV reported among blood donors was 0.82% nationwide and 0.92% in Kathmandu, over a period of 6 years.⁷ In Nepal, screening of blood for HBsAg was started from 1979 in Kathmandu and now became mandatory in all blood transfusion centers. Nevertheless, the risk of transfusion cannot be overcome fully due to its window period.

The major objective of this study was to determine the seroprevalence of HIV/HBsAg among the volunteer non-

remunerated blood donors in Nepal.

MATERIALS AND METHODS

This is a cross sectional study conducted in Nepal Red Cross Society (NRCS), Central Blood Transfusion Service (CBTS), Exhibition Road, Kathmandu, over a period of 15 months (March 2009 to September 2010). Donors who donated their blood in central blood transfusion services or in mobile camps organized in Kathmandu valley were included in this study. A total of 66,904 units of donated blood were evaluated in present study. Blood were collected from non-remunerated volunteers fulfilling the specific criteria set and in practice by NRCS since years. All donated samples were screened for HIV antibody using Enzygnost Anti-HIV antibody ELISA test and for Hepatitis B surface antigen detection Enzygnost HBsAg 5.0 ELISA test, both are manufactured by Dade Behring, Germany. Initial reactive sera were reconfirmed with repeated test using another ELISA test having similar sensitivity and specificity (Detect-HIV TM (V.2) Adaltis Inc, Canada and Qualisa/HBsAg, Microwell enzyme Immunoassay, India), however with difference in test principles. The collected data on volunteer details, screening test results were recorded in Microsoft excel spreadsheet and analyzed using data analysis software winpepi Ver 3.8. Chi-square test was also used for testing the association. The analyzed data were interpreted following standard interpretation methods for diagnostic tests.

RESULTS

Out of 66,904 blood samples, 56,973 were collected from male donors and 9931 were collected from female donors. Among the total screened samples, 73 were found to be seropositive for HIV antibody after the repeated array of test. The overall seroprevalence of HIV was found to be 0.10% (73/66,904), of which seroprevalence in male was 0.11% (64/56,973) and 0.09% (9/9,931) in female as shown in table 1. Statistically significant difference was found between male and female donors ($\chi^2 < 3.841$). Table 2 shows that the overall seroprevalence of HIV was highest in age group of 30-39 ($p < 0.001$). Similarly, among the total screened samples, 316 were found to be seropositive for HBsAg. The reactivity was confirmed after the repeated array of test. The overall seroprevalence for HBsAg was found to be 0.47% (316/66,904) of which seroprevalence in male was 0.42% (242/56,973) and in female was 0.74% (74/9,931) (Table 1). Statistically significant difference was found between male and female donors in seroprevalence of HBsAg ($\chi^2 < 3.841$). Here, the overall seroprevalence was highest in age group of 30-39 in male but highest seroprevalence was observed in age group ≥ 50 in female ($p < 0.001$) (Table 3).

DISCUSSION

In the present study, the overall sero-prevalence was found to be 0.10% (73/66904) for HIV and 0.47% (316/66904) for HBsAg. Highest sero-prevalence of HIV was observed in age group 30-39. However, in case of HBsAg, the highest sero-prevalence was observed in age group 30-39 in male but in females, highest sero-prevalence (2.63%) was observed in age group ≥ 52 . The low seroprevalence in age group ≥ 19 and ≥ 50 might be due to lower sample size. But high seroprevalence was observed in age group ≥ 50 for HBsAg.

The lower HIV seroprevalence (0.10%) was observed than HBV seroprevalence (0.47%). It might be due to the high infectivity rate of HBV and increased awareness about HIV among the people. The findings of the present study were similar to the study conducted by Shrestha et al., 2009 (HIV-0.12%, HBsAg-0.46%).⁸ However, the seroprevalence of HIV was 4.5% and HBV-8.2% in Ethiopia during 2008.⁹ In addition, the HIV and HBsAg seroprevalence was found to be 0.69% and 4.61% respectively in Thailand, 2002.¹⁰ These differences might be due to difference in study population. The high seroprevalence of HBV infection indicates a need for rapid interventions like mass vaccination. Moreover, this study only reflects the scenario of seroprevalence of HIV and HBsAg among blood donors. So, the seroprevalence survey of whole country is essential to plan appropriate interventions in reducing HIV and HBV infections.

In addition, the findings of this study showed somehow discordance with the study conducted by Karki et al., 2008 seroprevalence of HBsAg- 0.92%. This might be due to difference in the samples (sample size, representativeness of the samples in different years). The high seroprevalence is seen in active age group and reason yet to be explored.

CONCLUSION

The sero-prevalence of HBsAg is an alarming in adult voluntary blood donors; different prevalence in different settings, years & population groups, indicating the need for nationwide representative survey to plan and implement appropriate containment/ control/ prevention strategies.

HIV sero-prevalence is still high in adult voluntary blood donors, indicating the need for expansion of counseling services and quality of testing in BTS for stopping onwards transmission from the blood donors.

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