

Original Article

SEROPREVALENCE OF HEPATITIS B AMONG BLOOD DONORS IN JHAPA, NEPAL

Khanal H¹, Bhatta DR², Tiwari BR³, Joshi DR²

Central Department of Microbiology, ³Faculty of Science and Technology

¹Sunsari Technical College, Dharan, ³Pokhara University, Kaski, ²Tribhuvan University, Kirtipur

ABSTRACT

Background: Blood donation saves life of millions. However unsafe transfusion is also putting blood receivers in risk of Hepatitis B infections and window period is potential cause of transmission. **Objectives:** The objective of the study was to find out the seroprevalence of hepatitis B among blood donors. **Materials and Methods:** During the study period from July 2008 to April 2009, a total of 2277 donated blood samples from Nepal Red Cross Society Jhapa Branch and Damak Sub-branch were analyzed for present of hepatitis B surface antigen (HBsAg) on serum by using Hepacard, a rapid diagnostic chromatographic test kit. **Results:** On the study HBsAg seroprevalence were 7 out of 1340 (0.52%) and 6 out of 937(0.64%) in Bhadrapur and Damak respectively. The Hepatitis B Virus (HBV) prevalence among male at Bhadrapur was found 7 out of 1172 (0.59%) and 6 at Damak out of 760 (0.79%) were positive. The overall seroprevalence of male blood donors in Jhapa district was 12 out of 1932 (0.62%). Among the 168 female blood donors only one female was seen positive at Bhadrapur with 0.59% of seroprevalence and overall seroprevalence of hepatitis B surface antigen among female in Jhapa district was 1 out of 345 (0.29%). **Conclusion:** Hepatitis B infection is a most important threat associated with unscreened blood donations. It's a great importance to perform and confirm donated blood by sensitive and specific tests. It is essential to prevent the transmission of hepatitis B virus from blood donors.

Key words: HBV, Seroprevalence, HBsAg, Blood donors, Jhapa

Introduction

Hepatitis B virus (HBV) is a DNA virus that infects the liver and can result asymptomatic infections, acute hepatitis or fulminant hepatitis. HBV contain core antigen (HBcAg) surrounded by Hepatitis B surface antigen (HBsAg). This virus is about 100 times more infectious than HIV. ^{1,2}HBV is a member of hepadnavirus group and is an enveloped DNA virus. Once the virus enter in the bloodstream, it travels to the liver and replicate in hepatocytes. ^{3,4}

Globally, it is estimated that two billion people worldwide have serologic evidence of past or present HBV infection, and 360 million are infected chronically and it is responsible for 500,000 to 700,000 deaths annually. ^{1,5}The chronically infected carriers are approximately 5 % to 15%, which may lead to severe liver damage. About 5% of the

Corresponding author:

Mr. Hemanta Khanal, M.Sc.

Lecturer of Microbiology

Sunsari Technical College, Dharan-4, Nepal

E-mail: - hemanta_khanal@yahoo.co.in

population is chronic carriers of HBV and nearly 25% of all carriers develops chronic hepatitis, liver cirrhosis and primary hepatocellular carcinoma (HCC) and approximately one million people per year die due to hepatitis B.^{6,7} About 60 – 80% of patients with HCC present liver cirrhosis.⁸ About 60 – 80% of HCC cases detected worldwide are associated with HBV.⁹

Different investigations show that world prevalence of hepatitis B carriers is from 0.1% till 20% with high percentage in different tropical countries.¹⁰ Blood transfusions is one of the major routes of person to person propagation of Hepatitis B. The chance of hepatitis spread through blood and blood products were known since 1950. WHO recommends that all donated blood should be tested for infection prior to use. Screening should be mandatory for HIV, Hepatitis B, Hepatitis C and syphilis.^{11,12}

The common cause of acute and chronic hepatitis B infection of liver and may be found in blood and other body fluids.^{11,13} Various study from 1990 to 2003 in Nepal the reported seroprevalence ranges from 0.3% to 4.0%.¹⁴⁻²⁰ Among Nepalese blood donors, HBsAg seroprevalence has been reported ranging from 0.88 % to 1.26 %.²¹⁻²³ In the present study we examined the prevalence of HBsAg in the serum of blood donors of Nepal Red Cross Society at Bhadrapur and Damak of Jhapa district in order to access the epidemiology of HBV infections because no data were available for Jhapa.

MATERIALS AND METHODS

This was a retrospective cross-sectional study conducted in two blood transfusion service center of Jhapa. During the period of ten months from July 2008 to June 2009 blood samples from eligible blood donors were taken as the standard operating procedure of Nepal Red Cross Society. A routine mandatory screening for HBsAg was performed by enzyme immunoassay-based technique using immune-chromatographic rapid test kits according to the standard protocol described by Manufacturer Company (Hepacard, J. Mitra and

Co., New Delhi, India). The total population size of 2277 blood donors was included in the study among which; 1340 were from Bhadrapur, 947 were from Damak respectively. As per standard guidelines of Nepal Red Cross Society, blood transfusions service all the blood samples were tested namelessly and confidentially.

STATISTICAL ANALYSIS

Data were entered in Microsoft Excel 2007, frequency and percentage were calculated using Statistical Package of Social Sciences (SPSS) version 11.5 (SPSS Inc., Chicago USA).

RESULTS

During study period, a total of 2277 blood samples at Nepal Red Cross Society of Bhadrapur Branch and Damak Sub-branch were tested for screening of Hepatitis B. In the present study, seroprevalence of HBsAg was 7(0.52%) in Bhadrapur (n=1340) and 6(0.64%) in Damak (n=927) respectively. Overall seroprevalence of HBsAg in the blood donors (n=2277) in Jhapa District were 13 (0.57%). Male blood donors of Bhadrapur (n=1172) had lower seroprevalence 7(0.59%) than the male blood donors of Damak (n=760) with 6(0.79%) seroprevalence and overall seroprevalence of only male blood donors in both blood donation centers (n=1932) was 12 (0.62%) respectively.

Table 1: Gender wise distribution of Blood Donors

Gender/Site	Bhadrapur	Damak	Total
Male	1172	760	1932
Female	168	177	345
Total	1340	937	2277

On the other hand overall female blood donors at Damak (n=177) were not seen positive but at Bhadrapur (n=168) was seen positive with 1(0.59%) of seroprevalence, and overall seroprevalence of HBsAg among female blood donors of Jhapa district (n=345) was 1(0.29%). On

age wise distribution highest HBsAg seroprevalence was 1(14.2%) at Bhadrapur male blood donors of age group 51-60 years (n=7) and no any serum were reactive for HBsAg among female at Bhadrapur (n=0), male at Damak (n=24) and female at Damak (n=0) of same age group. Similarly, male blood

donors of age group 41-50 years at Bhadrapur (n=106) were positive with seroprevalence of 2(1.91%) and HBsAg was not screened on male donors of same age group at Damak (n=180) as well as blood samples of female at Bhadrapur (n=2) and Damak (n=1).

Table 2: Gender and Age wise seroprevalence of Hepatitis B Virus

S.N.	Age group (Years)	Gender	% Prevalence		Overall Seroprevalence
			Bhadrapur	Damak	
1	> 20	M	0/ 92 (0%)	0/37 (0%)	0/129 (0%)
		F	1/30 (3.3%)	0/28 (0%)	1/70 (1.42%)
2	21-30	M	1/395 (0.25%)	3/374 (0.8%)	4/769 (0.52%)
		F	0/ 162 (0%)	0/63 (0%)	0/225 (0%)
3	31-40	M	2/462 (0.43%)	3/198 (1.51%)	5/660 (0.75%)
		F	0/ 84 (0%)	0/32 (0%)	0/116 (0%)
4	41-50	M	2/106 (1.91%)	0/180 (0%)	2/286 (0.7%)
		F	0/2 (0%)	0/1 (0%)	0/3(0%)
5	51-60	M	1/7 (14.2%)	0/24 (0%)	1/31 (3.22%)
		F	0/0 (0%)	0/0(0%)	0/0 (0%)
Total			7/1340 (0.52%)	6/937 (0.64%)	13/2277 (0.57%)

The age group of 31-40 years of male blood donors at Bhadrapur (n=462) had 2(0.43%) seroprevalence, Damak (n=198) had 3(1.51%) and overall male of same age (n=660) had 5(0.75%) seroprevalence respectively. On the other hand female blood donors at Bhadrapur (n=84) and Damak (n=32) were seronegative. Similarly 1(0.25%), 3(0.80%) and 4(0.52%) were the seroprevalence of only male blood donors of age group 21-30 years of Bhadrapur (n=395), Damak (n=374) and overall (n=769) respectively. The age group below 20 years was only a single female blood donor at Bhadrapur (n=30) with seroprevalence of 1(3.3%) but males at Bhadrapur (n=92), males at Damak (37) and females at Damak (n=28) were not observed positive.

DISCUSSION

Comparing this result with similar investigation conducted among blood donors in Jhapa indicate that HBV prevalence seems to be

slightly higher (0.57%) than the findings in the Kathmandu valley by Joshi et. al., (2002) as 1.26%, Ghimire et.al, (2006) as 0.88%.^{18,22} The prevalence was slightly higher (0.45%) and (0.53%) than the reporting of Chander et.al, (2003) in Bhairahawa and Karki et.al, (2008) in Kathmandu respectively.^{24,25} The percent positivity of HBsAg was found to increase steadily from Eastern region (2%) to far western development region (6.2%) as reported by Manandhar et.al, (1997).¹⁶

The HBV seroprevalence in the study at Jhapa (0.57%) was lower than the prevalence reported at different part of Asia by Yedlapati et.al, (2010) in Andra Pradesh (1.41%) Iram et.al, (2009) in Lahore (1.70%).^{26,27} The HBV prevalence among the blood donors of Kosovo is 4.2% that is reported by Hajrullah et.al, in 2009, Luksamijarulkul et.al, in 2002 found that 4.61% prevalence of occurrence of HBV among blood donors in Thailand.^{28,29} This overview of similar investigation shows that the HBV seroprevalence of Jhapa is lower than the other

countries. These variations may be due to variation in geographic distribution, risk behaviors of study population, kits and strategic test, periods of study and donor selection criteria or even aware blood donors too.

Various prevention and intervention techniques are implemented to prevent the hepatitis B, but still new cases are found. Although transfusion associated cases of hepatitis B is reduced due to detection of it by sensitive serological test, the danger of transfusion associated cases is not minimized to zero. This is due to inability of test kits to show the positive results in window period. According to WHO guidelines, this may be greatly overcome by performing Enzyme Linked Immunosorbent Assay (ELISA) for each blood sample and by minimization of participation of risk group and infected people from blood donation.

CONCLUSION

The analysis of trends in HBV seroprevalence among blood donors in Jhapa was observed significantly decreasing trend as compared to both nationwide and Central Blood Transfusion Service data.^{22, 25} The decreasing trends might be due to the cumulative effect of increasing awareness of Hepatitis B and implementation of improved screening system for safe blood collection. Testing of blood samples by ELISA methods detects the window period of Hepatitis B infection from donated blood and the transfusion cases of Hepatitis B would be reduced.

ACKNOWLEDGEMENT

we express a high gratitude to all the faculty members of Central Department of Microbiology for guiding this research work and helping during pullicating. The help rendeved by official personnel of Nepal Red Cross Society, Bhadrapur branch and Damak sub-branch for providing the essential test kits and laboratory support is gracefully acknowledged.

REFERENCES

1. World Health Organization. Hepatitis B. 2012. Fact sheet No: 204.
2. Cao T, Meuleman P, Desombere I, Sallberg M, Leroux-Roels G. In vivo inhibition of anti-hepatitis B virus core antigen (HBcAg) immunoglobulin G production by HBcAg-specific CD4(+) Th1-type T-cell clones in a hu-PBL-NOD/SCID mouse model. *J Virol.* 2001; 75(23):11449–56.
3. Baker LF, Shulman NR, Murray R, Hirschman RJ, Ratner F, Diefenbach WC, et al. Transmission of serum hepatitis. *J Am Med Assoc.* 1996; 276(10):841-4.
4. Beck J, Nassal M. Hepatitis B virus replication. *World J. Gastroenterol.* 2007; 13(1): 48–64.
5. World Health Organization. Hepatitis B vaccines. *Weekly Epidemiol Rec.* 2004; 79:255-63.
6. Hollinger FB, Liand TJ. Hepatitis B virus. In: Knipe DM, et al. editors. *Fields Virology.* 4th ed. Philadelphia, Lippincott Williams and Wikins Publishing. 2001; 2971-3036.
7. Robinson WS. Hepatitis B Viruses. General Features (human). In: Webster RG, Granoff A editors. *Encyclopedia of Virology.* London Academic Press Ltd. 1994; 554-69.
8. Okuda K. Hepatocellular carcinoma. *J of Hepat.* 2000; 32:225–37.
9. Beasley RP, Hwang LY. Overview on the epidemiology of hepatocellular carcinoma. In: Hollinger FB, Lemon SM, Margolis H, ed *Viral Hepatitis and Liver Disease.* Baltimore MD: Williams and Wilkins. 1991; 289–96.
10. Centers for Disease Control. Recommendations for identification and public health management of persons with chronic hepatitis b virus infection. 2008; 57(8): 9-11.
11. Hillyer CD, Hillyer KL, Strobe FJ, Jeffries LC, Siberstein LE. *Handbook of transfusion medicine.* 1ed Academic Press London. 2001; 2(32).

12. Harmening DM. Modern blood banking and transfusion practices. Philadelphia, USA 4ed. 1999, 25(6):1231-43.
13. Mahoney FJ, Kane M, Hepatitis B Vaccine. In Plotkin SA, Orenstein WA, eds. Vaccines, 3ed. Philadelphia, WB Saunders Company. 1999: 158-82.
14. Nakashim K, Kashiwagi S, Noguchi A. Human T-lymphotrophic virus type –I and hepatitis A, B, C viruses in Nepal: A Serological Survey. *J Trop Med Hyg.* 2003; 98:347-50.
15. Shrestha SM. Seroepidemiology of hepatitis B in Nepal. *J Com Dis.* 1990; 22:27-32.
16. Manandhar, K, Shrestha B, Prevalence of HBV infections among the healthy Nepalese males, a serological survey. *J Epi* 2000; 10:410-13.
17. Sawayama Y, Hayashi J, Ariyama I, Furusyo N, Kawasaki T, Kawasaki M, et al. A ten years serological survey of hepatitis A, B and C virus infection in Nepal. *J Epi.* 1999; 9:350-4.
18. Joshi SK, Ghimire GR. Serological prevalence of antibodies to human immunodeficiency virus and hepatitis B virus among healthy Nepalese males: A retrospective study. *Kath Univ Med J.* 2003; 1:251-5.
19. Rai SK, Shibata H, Satoh M. Seroprevalence of hepatitis B and C in eastern region of Nepal. *J Jpn Assoc Infect Dis.* 68:1492-7.
20. Bhatta CP, Thapa B, Rana BB. Seroprevalence of hepatitis B in Kathmandu Medical College Teaching Hospital (KMCTH). *Kath Univ Med J.* 113-6.
21. Joshi M, Manandhar SP, Ghimire P. Seroprevalence of hepatitis B and hepatitis C infection among blood donors of Kathmandu Valley. *J Institute of Science Tech.* 2002; 12:43–50.
22. Ghimire P, Thapa D, Rajkarnikar M, Tiwari BR. HBsAg Seroprevalence in Blood donors of Kathmandu, Nepal *Stupa J of Health Sci.* 2006; 2:24–6.
23. Ghimire P, Dhungyel BB, Tiwari BR. Hepatitis B and malaria among Nepalese blood donors. *J Scientific World.* 2007; 5:81–4.
24. Chander A, Pahwa VK. Status of infectious disease markers among blood donors in a teaching hospital, Bhairahawa, western Nepal. *J Commun Dis.* 2003 Sep. 35(3): 188-97.
25. Karki S, Ghimire P, Tiwari BR, Maharjan A, Rajkarnikar M. Trends in hepatitis B and hepatitis C seroprevalence among Nepalese blood donors. *Jpn J Inf Dis.* 2008; 61:324-6.
26. Yedlapati B, Rao PR, Sudhakar V. Seroprevalence of transfusion transmissible infections among blood donors in a tertiary care hospital of Andhra Pradesh. *Bio and Med.* 2010; 2(4):45-8.
27. Iram M, Noreen H, Seema D, Sana A, Hira F, Zainab R, et al. Seroprevalence of transfusion transmissible infections (TTIs) in blood donors. *Biomedica.* 2009; 25:154–8.
28. Hajrullah F, Skender T. Prevalence of HBV and HCV among blood donors in Kosovo. *Vir J.* 2009; 6:21.
29. Luksamijarulkul P, Thammata N, Tiloklurs M. Seroprevalence of hepatitis B, hepatitis C and human immunodeficiency virus among blood donors, Phitsanulok Regional Blood Center Thailand. *Southeast Asian J Trop Med Pub Health.* 2002; 33(2):272-79.