Original Article

Pattern of hepatitis B and C infections among patients attending a tertiary care hospital in Kathmandu, Nepal

Pokharel N[1], Bhandari D[1, 2], Jha B[3]
[1]Department of Microbiology, Trichandra Multiple Campus, Ghantaghar, Kathmandu, Nepal.
[2]Public Health Research Laboratory,Tribhuvan University Teaching Hospital, Maharajgaunj, Kathmandu, Nepal.
[3]Department of Biochemistry, Tribhuvan University Teaching Hospital, Maharajgaunj, Kathmandu, Nepal.
Corresponding Author: NiteeshPokharel.
Email: niteesh.pokharel@gmail.com

Abstract

Introduction: Hepatitis A, B, C, D and E virus infections are major global health problems. These viral infections affect a million of people worldwide, causing acute and chronic diseases. Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections lead to chronic diseases and are the most common causes of liver cirrhosis and cancer.

Methods: A cross sectional observation study was conducted from March 2013 to August 2013 among clinically suspected out patients and the patients undergoing surgery at Om Hospital and Research Centre with the aim to assess the burden of Hepatitis B and C viral infections. A total of 307 patient sera were tested serologically using Enhanced Chemiluminescence Immunoassay automated system (Vitros ECI) to detect HBsAg and anti-HCV antibodies**.**

Results: Out of 307 serum samples, the overall seropositivity rate for HBs-Ag and anti-HCV antibodies were 2.1% and 0.33% respectively. Positivity rate for both types of infection was found to be higher among male patients, although the P value > 0.05 indicated that there is no significant relationship. Furthermore, the positivity rate of Hepatitis B infection was higher among the patients of age group 46-55 years, and that for Hepatitis C was higher among the age group 36-45 years, with P > 0.05 suggesting no significant relationship between the age group and infection.

Conclusion: The study demonstrated Hepatitis B and C viruses to be endemic necessitating implementation of the preventive measures and screening of population at risk to identify the burden of the disease in the society.

Key words: Hepatitis B, Hepatitis C, Infection, Nepal

Introduction

Hepatitis is an inflammation of the liver, which can be caused by viral and other infections, toxic substance, and autoimmune diseases.[1]Symptoms of hepatitis include fever,diarrhea,jaundice, weight loss etc. The most common causes of viral hepatitis are five hepatitis viruses, referred to as types A, B, C, D and E.Other viruses like cytomegalovirus,Epstein-Barr virus,yellow fever virus, Ebola virus can also cause hepatitis.[2]In particular, types B and C lead to chronic disease in hundreds of millions of people and, together, are the most common cause of liver cirrhosis and cancer.[3]

Hepatitis B virus (HBV) is an enveloped, hepadna virus with partially double stranded DNA.[4] Hepatitis B is a potentially life-threatening liver infection and is a major global health problem. It can cause chronic liver disease and puts people at high risk of death from cirrhosis of the liver and liver cancer.[5] Worldwide, an estimated two billion people have been infected with the hepatitis B virus and more than 240 million have chronic (long-term) liver infections. Virtually 600, 000

people die every year due to the acute or chronic consequences of hepatitis B. Unlike HIV, the hepatitis B virus can survive outside the body for at least seven days. In developing countries like Nepal, common modes of transmission include perinatal, unsafe injection practices, unsafe blood transfusions,and unprotected sexual contact.[6]

Hepatitis C virus (HCV) is RNA, single stranded, enveloped flavivirus that causes liver disease.[7]The disease can range in severity from a mild illness lasting a few weeks to a serious, lifelong condition that can lead to cirrhosis of the liver or liver cancer.About 170million people are infected worldwide.[8] The hepatitis C virus is most commonly transmitted through exposure to infectious blood and it may be transmitted through sex with an infected person or sharing of personal items contaminated with infectious blood, but these are less common.[9]

A definitive diagnosis of viral hepatitis can be done by using several immunoassay techniques like radioimmunoassay (RIA), enzyme immunoassay etc. Enhanced chemiluminescence immunoassay (ECIA) is a highly sensitive serological method used for the diagnosis of viral hepatitis.[10]The technique is used for the detection of viral antigen or the antibody produced against the specific virus.It can also detect the concentration of the analytes.So, this technique helps in diagnosis and prognosis of the disease.

In Nepal very few studies have been conducted to generate information on the burden of viral hepatitis, which is not enough for making plan and policies to fight against the grave problem that this disease poses. Hence, this study was undertaken to assess the burden of hepatitis B and C virus infection among the patients visiting one of the biggest tertiary care hospitals of the country, the data generated through which, in turn, will supplement and add to the pool of existing information on status of viral hepatitis in Nepal.

Methods

A Cross Sectional Observational Study was conducted spanning six months (from March 2013 to August 2013) among patients attending Om Hospital for Surgical Procedures and out-patients suspected of viral hepatitis infections.Patients diagnosed with Jaundice, liver failure and clinically suspected of having any form of viral hepatitis were enrolled in the study, and those who had been tested positive for any form of viral hepatitis in past presentations were excluded from the study.

Following detailed clinical examination, patients with suspected hepatitis infections were investigated serologically to determine the type of viral infection.A total of 307 patient sera were analyzed in the hospital laboratory during the study period using Vitros Enhanced Chemiluminescence Immunoassay automated system.

Data Collection: Written informed consent was obtained from all patients and the Clinical conditions and history of the patients were obtained by interactions with doctors and nurses after the routine tests of the patients. The history of the suspected patients including age, gender and other symptoms were recorded in the data collection form. Thus collected data were interpreted using statistical tools.

Sample Collection, Transportation and Processing: Patient Samples were collected by medical professionals (Laboratory Technicians and Nurses) using aseptic techniques and transported to the laboratory as soon as possible. The prepared serum sample was used to detect HBsAg, and anti-HCV antibodies by using Vitros Enhanced Chemiluminescence Immunoassay automated system.

Statistical Analysis: The data obtained were analyzed by using Statistical Program for Social Science (SPSS) version 19 statistical software. The significance was tested by Pearson's Chi-square test and $P<0.05$ was considered to be statistically significant.

Results

In the study,out of the total 307 serum samples tested for Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections, the seropositivity rate of 2.61% and 0.33% were found for respective hepatitis viruses.

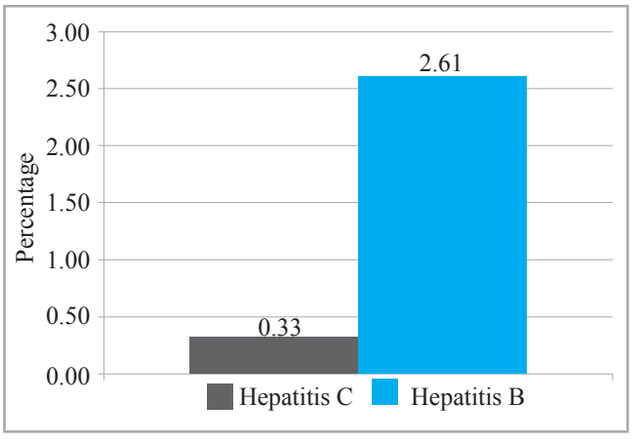

Figure1. Positivity Rate of Hepatitis B and C Viruses

Hepatitis B Virus

Out of the total 307 patients tested for hepatitis B, 204(66.45%) were female and 103(33.55%) patients were male. Serological study of the serum samples showed that 8(2.61%) were positive for hepatitis B infection. Among 204 female patients, 3(1.47%) were positive and out of 103 male patients, 5(4.85%) were positive. No significant association was found between infection and gender (p>0.05)[Table 1].

Table1 : Sex Wise Distribution of Hepatitis B Virus (HBV) Infection

Sex	Total	Positive (%)	P-value
Female	**204**	**3(1.47%)**	**>0.05**
Male	**103**	**5(4.85%)**	
Total	**307**	**8(2.61%)**	

Among 307 patients, the patients of all age groups except children (14 years and below) were found positive for hepatitis B infection.The highest positive rate(6.25%) was found in patients of age group 55 years above (Table 2). But the p>0.05 showed no significant association. Female patients of age group 15-35 and 55 years above were found positive for HBV infection (Table 3).The highest positive rate (5%) was found in females of age group 55 years above (p>0.05). Male patients of age from 36years and above were found positive. The highest positive rate (14.29%) was found in males of age group 46-55 years (p>0.05)[Table 4].

Table2 :Age Wise Distribution of HBV Infection

Age group	Total	Positive (%)	P-value
14 years and below	3	0(0%)	**>0.05**
15-25 years	74	1(1.35%)	
26-35 years	111	1(0.90%)	
36-45 years	60	3(5%)	
46-55 years	27	1(3.70%)	
Above 55years	32	2(6.25%)	
Total	**307**	**8(2.61%)**	

Table3 :Age Wise Distribution of HBV in Female

Age group	Total	Positive (%)	P-value
14 years and below	2	0(0%)	**>0.05**
15-25 years	57	1(1.75%)	
26-35 years	67	1(1.49%)	
36-45 years	38	0(0%)	
46-55 years	20	0(0%)	
Above 55 years	20	1(5%)	
Total	**204**	**3(1.47%)**	

Table 4: Age Wise Distribution of HBV in Male

Age group	Total	Positive (%)	P-value
14 years and below	1	0(0%)	**>0.05**
15-25 years	17	0(0%)	
26-35 years	44	0(0%)	
36-45 years	22	3(13.64%)	
46-55 years	7	1(14.29%)	
Above 55 years	12	1(8.33%)	
Total	**103**	**5(4.85%)**	

Hepatitis C-Virus(HCV)

Out of 307 patients tested for hepatitis C, 204(66.45%) were female and 103(33.55%) patients were male. Serological study of the 307 serum samples showed that only one (0.33%)was positive for hepatitis C infection. None of the female patient was foundpositive and out of 103 male patients, only one (0.97%) was found positive (p>0.05)[Table 5].

Table 5 :Sex Wise Distribution of Hepatitis C Virus (HCV) Infection

Sex	Total	Positive (%)	P-value
Female	**204**	**0(0%)**	**>0.05**
Male	**103**	**1(0.97%)**	
Total	**307**	**1(0.33%)**	

Among 307 patients, the patients of age group 36-45 were found positive for hepatitis C infection (p>0.05).

All the females were found negative and male patients of age group 36-45 years were found positive (p>0.05) [Table 6].

Table 6 :Age Wise Distribution of HCV Infection

Age group	Total	Positive (%)	P-value
14 years and below	3	0(0%)	>0.05
15-25 years	74	0(0%)	
26-35 years	111	0(0%)	
36-45 years	60	1(1.67%)	
46-55 years	27	0(0%)	
Above 55years	32	0(0%)	
Total	**307**	**1(0.33%)**	

Discussion

The group of viruses (Hepatitis A, B, C, D and E) that cause acute and/or chronic infection and inflammation of the liver gives rise to a major public health problem globally. [11] Hepatitis B and C viruses are major causes of severe illness and death. The burden of acute hepatitis B and C, and liver cirrhosis and cancer due to these hepatitis B and C viruses is high worldwide (about 2.7% of all deaths) and is forecast to become a higher ranked cause of death over the next two decades. It is estimated that 57% of cases of liver cirrhosis and 78% of cases of primary liver cancer are resulted from hepatitis B or C virus infection.[12]

Out of 307 tested patients of hepatitis B infection in this study, 2.61% were found positive for HBs-Ag. Males were found to be more affected than female, but there was no significant association regarding the gender. The p-value was greater than 0.05. This gender wise difference in the seropositivity of Hepatitis B might be due to the difference in the risk factors and predominant modes of transmission among male and female.The HBV was found in all age groups accept in children. The highest positive rate was found in the patients of age group 55 years above. This may be due to the lack of vaccination in the older population, as the people at this age do not make any concern about the vaccination. Older population is also not aware of these sorts of viral infections.The infection rate found in this study is higher than 0.9% found in a study conducted in Nepal.[13]This might be attributed to the absence of vaccination program in new population. Small sample size, used in this study, might be another reason. In a prevalence study conducted among the people of Mymensingh in Bangladesh, the infection rate was found to be 6.25%.[14]This is higher than the infection rate found in this study. A prevalence of 13.8% was found in a study amongVietnamese Americans in California.[15] It is very high in comparison to the infection rate found in this study. In another epidemiological study among adults in Germany, 5.1% population was exposed to the virus.[16]The prevalence of 7.9% was found in a study among Equatorial Guinea living in Spain.[17] This rate is also quite higher, which indicates the need of infection prevention. In A study conducted among Chinese residents in Sheffield UK, HBs-Ag was positive in 8.7%.[18]In the seroepidemilogical study conducted in a semi-urban and rural area of Crete island in Greece ,hepatitis B surface-antigen (HBsAg) was found positive in 3.3%.[19] This is close to our study.

Hepatitis B vaccine is globally available and is highly effective. Individual and population immunity has to be achieved through vaccination. Poor management of vaccine stocks, poor record keeping, lack of staff training, and use of multidose vials might be the main reasons for low coverage of the hepatitis B vaccine.The higher infection rates are due to the lack of disease knowledge, vaccination and awareness. Timely diagnosis and/or referral are required to prevent serious health consequences through early institution of treatment.The low or absence of infection in children indicates that there is no significant vertical transmission. The degree of spread by horizontal transmission among the adolescent age group by sexual intercourse or intravenous drug use also determines the infection rate of the HBV. Increasing age, male gender, illiteracy and history of multiple sexual partners are normally associated with hepatitis B virus (HBV) infection.Higher positivity rate of the infection in older population is also due to the weaker immune system at the old age; as a result, the HBV infection cannot be easily cleared and may progress to liver cirrhosis and hepatocellular carcinoma. It might be worth considering a pilot screening program for chronic HBV patients to detect hepatocellular carcinoma.

Out of 307 patient sera tested, only one (0.33%) was found to be positive. In a study carried out among blood donors in Nepal, theseroprevalence was found to be 0.26% in Morang, 0.16% in Kaski and 0.11% in Banke.[20] These rates are less than 0.33% found in this study. A study conducted among blood donors at a tertiary care hospital in India found prevalence of HCV

infection as 0.57%.[21] In the study carried out among residents of Linxian, a rural community in Henan Province, 9.6% were found HCV positive.[22] This is very high in comparison to our study. In another study performed among homeless adults in Los Angeles, the prevalence rate was found to be 26.7%.[23]The prevalence of anti-HCV was found 16.6% in the study conducted among healthcare workers in Egypt.[24]These data indicate the extreme burden of the HCV infection and require immediate health plans and strategies.

Higher rates of HCV infection are among intravenous drug users (IDU), as the most common mode of transmission of hepatitis C is injection drug use. Infection rates are also high because many people are not aware of the infection for long time unless tested for any other reason. It does not manifest any symptoms in large number of populations. Screening is the only way to identify people with hepatitis C before the onset of symptomatic liver disease. The HCV infection in children is due to the perinatal transmission of the disease. There is no vaccine available against hepatitis C infection, which may be another reason behind the high infection rate of the disease.

In the countries with poor health facilities, hepatitis C is still transmitted via blood transfusion. The HCV infection progresses to chronic stage potentially leading to severe consequences of liver cirrhosis and cancer. While chronic infection can be cured with effective drug use.The patients with asymptomatic acute HCV respond well to early monotherapy with pegylated interferon alfa-2b, and spontaneous clearance of symptomatic hepatitis C occurs in at least 21% of patients.Urgent interventions are needed to screen, counsel, and treat where infections rates are found higher.

This study is carried out in a limited population and only involves the patients attending Om Hospital and Research Centre,Chabahil,Kathmandu.So, the results obtained from this study might not be enough to indicate actual burden of the disease in the large population. Still, the study finds the existence of endemic viral hepatitis among the people and need of health policies to reduce the burden of viral hepatitis in the society. Efforts to halt the transmission of HCV and other blood borne viruses should be a top public health priority.

Conclusion

Out of 307 patients tested for hepatitis B and C infections,attending Om Hospital and Research Centre, Kathmandu, 2.61% and 0.33% seropositivity rates were found for respective. So, disease management and prevention is necessary. Since HBV and HCV infections have high mortality, population at risk should be screened to know the burden of hepatitis virus infections nationwide to make the plans and policies for disease prevention. Hepatitis viruses should be strictly tested during blood transfusions.

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Conflict of interest: None declared

References

1. Worman HJ. The Liver Disorders and Hepatitis Sourcebook: McGraw-Hill; 2006.
2. Cheesbrough M. District Laboratory Practice in Tropical Countries: Cambridge University Press; 2006.
3. Kose S, Kuzucu L, Gozaydin A, Yilmazer T. Prevalence of Hepatitis B and C Viruses Among Asylum Seekers in Izmir. Journal of immigrant and minority health / Center for Minority Public Health. 2013.
4. Brooks G, Carroll KC, Butel J, Morse S. Jawetz Melnick&Adelbergs Medical Microbiology 26/E: Mcgraw-hill; 2012.
5. Jindal A, Kumar M, Sarin SK. Management of acute hepatitis B and reactivation of hepatitis B. Liver international : official journal of the International Association for the Study of the Liver. 2013; 33 Suppl 1:164-75.
6. WHO. Hepatitis 2013 [Available from: www.who.int/topics/hepatitis/factsheets/en/.
7. Younossi ZM, Stepanova M, Mishra A, Venkatesan C, Henry L, Hunt S. The impact of chronic hepatitis C on resource utilisation and in-patient mortality for Medicare beneficiaries between 2005 and 2010. Alimentary pharmacology & therapeutics. 2013; 38(9): 1065-75.
8. Mullis CE, Laeyendecker O, Reynolds SJ, Ocama P, Quinn J, Boaz I, et al. High frequency of false positive HCV ELISA in Rakai, Uganda. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America. 2013.
9. Rudra S, Chakrabarty P, Hossain MA, Akhter H, Bhuiyan MR. Seroprevalence of Hepatitis B, Hepatitis C, HIV

Infections in Blood Donors of Khulna, Bangladesh. Mymensingh medical journal : MMJ. 2010; 19(4): 515-9.

10. Wild DG. The Immunoassay Handbook: Theory and applications of ligand binding, ELISA and related techniques: Elsevier Science; 2013.
11. Gaze R, de Carvalho DM, Santoro-Lopes G, Tura LF. From hepatic diseases and jaundice to viral hepatitis: the configuration of a kaleidoscope. Revista de saude publica. 2013; 47(1):116-22.
12. WHO. Immunization, Vaccines and Biologicals 2013 [Available from:
13. Shrestha SM, Shrestha S. Chronic hepatitis B in Nepal: an Asian country with low prevalence of HBV infection. Tropical gastroenterology : official journal of the Digestive Diseases Foundation. 2012; 33(2):95-101.
14. Rudra S, Chakrabarty P, Poddar B. Prevalence of hepatitis B and hepatitis C virus infection in human of Mymensingh, Bangladesh. Mymensingh medical journal : MMJ. 2011;20(2):183-6.
15. Ha NB, Trinh HN, Nguyen TT, Leduc TS, Bui C, Ha NB, et al. Prevalence, risk factors, and disease knowledge of chronic hepatitis B infection in Vietnamese Americans in California. Journal of cancer education : the official journal of the American Association for Cancer Education. 2013; 28(2):319-24.
16. Poethko-Muller C, Zimmermann R, Hamouda O, Faber M, Stark K, Ross RS, et al. [Epidemiology of hepatitis A, B, and C among adults in Germany: results of the German Health Interview and Examination Survey for Adults (DEGS1)]. Bundesgesundheitsblatt, Gesundheitsforschung, Gesundheitsschutz. 2013; 56(5-6):707-15.
17. Rivas P, Herrero MD, Poveda E, Madejón A, Treviño A, Gutiérrez M, et al. Hepatitis B, C, and D and HIV Infections among Immigrants from Equatorial Guinea Living in Spain. The American Journal of Tropical Medicine and Hygiene. 2013; 88(4):789-94.
18. Vedio AB, Ellam H, Rayner F, Stone B, Kudesia G, McKendrick MW, et al. Hepatitis B: Report of prevalence and access to healthcare among Chinese residents in Sheffield UK. Journal of infection and public health. 2013.
19. Drositis I, Bertsias A, Lionis C, Kouroumalis E. Epidemiology and molecular analysis of hepatitis A, B and C in a semi-urban and rural area of Crete. European journal of internal medicine. 2013.
20. Tiwari BR, Ghimire P, Kandel SR, Rajkarnikar M. Seroprevalence of HBV and HCV in blood donors: A study from regional blood transfusion services of Nepal. Asian journal of transfusion science. 2010; 4(2):91-3.
21. Meena M, Jindal T, Hazarika A. Prevalence of hepatitis B virus and hepatitis C virus among blood donors at a tertiary care hospital in India: a five-year study. Transfusion. 2011; 51(1):198-202.
22. Zhang M, Sun XD, Mark SD, Chen W, Wong L, Dawsey SM, et al. Hepatitis C virus infection, Linxian, China. Emerging infectious diseases. 2005; 11(1):17-21.
23. Gelberg L, Robertson MJ, Arangua L, Leake BD, Sumner G, Moe A, et al. Prevalence, distribution, and correlates of hepatitis C virus infection among homeless adults in Los Angeles. Public health reports. 2012; 127(4):407-21.
24. Abdelwahab S, Rewisha E, Hashem M, Sobhy M, Galal I, Allam WR, et al. Risk factors for hepatitis C virus infection among Egyptian healthcare workers in a national liver diseases referral centre. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2012; 106(2):98-103.