

Seroprevalence of Hepatitis B and Hepatitis C Virus, and Risk Perception among Healthy Adults in Western Region, Nepal

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Abstract: ***Background:** Seroprevalence of Hepatitis B and C viruses among the healthy adults is important helps to know about the disease burden. **Objective:** This study was conducted to find out the seroprevalence of hepatitis B and hepatitis C infection, and risk perception among healthy young adult population in the this Region. **Methods:** Blood samples were analyzed for the presence of HBsAg and HCV antibodies by ELISA at Western Regional Blood Transfusion Service. Perceived risk of HBV and HCV was measured by Likert-type scale: 'no risk', 'little', 'moderate', 'high' and 'very high' risk, ranging from 1 to 5. Proportions, chi-square test and independent samples t-test were used. **Results:** Seroprevalence of HBV, HCV and co-infection of HBV and HCV among 2032 healthy participants were found 0.7%, 0.4% and 0%, respectively. Seroprevalence of HBV was slightly higher among females, the respondents aged 30 years and below, married, having had multiple sexual partners. Seroprevalence of HCV was higher among males, respondents aged 18-29 years, married, participants having made tattoo. However, there was not statistically significant association of HCV seropositivity except with age group. About two-fifth of the respondent perceived moderate to very high risk of contracting HBV and HCV in their life time. Mean risk perception was 2.74 and 2.68 of HBV and HCV, respectively. There was statistically significant association of risk perception of HBV and HCV with sex, age group and marital status. **Conclusion:** seroprevalence of HBV is more than of HCV, and risk perception of both is moderate among healthy looking general population.*

Keywords: HBV, HCV, Seroprevalence, Risk Perception, Healthy Adult, Western Nepal

1. Background

Viral hepatitis is a major public health challenge worldwide that requires an urgent response [1, 2]. The Global hepatitis report 2017 shows that hepatitis B and C are responsible for 96% of all hepatitis mortality. In addition, a large number of people, about 325 million worldwide were reported as carriers of hepatitis B or C virus infections, which can remain asymptomatic for decades [2, 3]. These people are at risk of a slow progression to severe liver disease and death [2].

Infection with HBV and HCV are major public health problems worldwide, particularly in developing countries [2, 4]. HBV and HCV infections can cause both acute and chronic liver disease, including cirrhosis and hepatocellular carcinoma (HCC) [2, 3, 5]. Studies showed that 80% of HCC was caused by active replication of chronic HBV and HCV infections [6]. In 2015, the global prevalence of HBV infection in the general population was found 3.5%; and the global prevalence of HCV infection was 1.0% [2]. Patients with dual HBV and HCV infection have more severe liver disease, and are at increased risk of progression to HCC. Chronic infection develops in the majority of people infected with HBV early in life while the majority of people infected with HBV as adults will recover completely [7].

In the WHO South-East Asia Region, an estimated 2.0% of the general population is infected with HBV, respectively. Globally, about 887,000 people died due to complications of HBV infection in 2015 [5]. The widespread use of hepatitis

B vaccine in infants has considerably reduced the incidence of new chronic HBV infections. Between the pre vaccine era and 2015, the proportion of children under 5 years of age who became chronically infected fell from 4.7% to 1.3% [2]. Suppression of HBV replication by HCV in acutely or chronically infected patients is well-described phenomenon. In vivo study, in chimpanzees, showed that acute HCV super infection in chronic HBV infection resulted in marked reduction in the titer of serum HBsAg [8].

It is widely acknowledged that the prevalence of Hepatitis B and hepatitis C infections is continuously increasing in Nepal as well as in various part of the world. Hepatitis B and hepatitis C co-infection among healthy adults has not been given the necessary attention and awareness by the health sector and or the government. Spreading of such infection should be monitored routinely and carefully to prevent from its devastating consequences on public health. This study therefore examined seroprevalence of Hepatitis B and C among healthy adults in Western Region in order to get evidence on the prevalence and find out the people risk perception on them. The objective of the study was to assess the seroprevalence of hepatitis B and hepatitis C infection, their coinfection and risk perception among healthy young adult population in Western Region, Nepal.

2. Methods

2.1 Study Design and Study Population

A descriptive cross-sectional study was conducted in Western Region, Nepal among healthy adults. The samples were collected from July, 2016 to June, 2017. A total of 2032 healthy adults aged 18-58 years were enrolled in the study. The adult who did not mention the history of jaundice in last one year and did not have any other diseases that contradict for blood donation were not included in the study. The entire samples were collected at the blood donation site organized by Nepal Red Cross Regional Blood Transfusion Center, Pokhara, Kaski. All the individuals selected were requested to fill a questionnaire, and consent for HBV and HCV testing; and each donor was given a donor number for the investigations, the donor number was used as identification. The individuals who met the inclusion criteria for blood donation were included in the study.

2.2 Materials and Equipment

The materials and equipment used for the study were as Centrifuge, ELISA processor, Refrigerator, Incubator, Micropipettes, Test tubes, Disposable Gloves, Distilled water, Micropipette tips.

2.3 Collection of Information and Blood Sample

Blood samples were collected by technical professionals using aseptic technique. Before collection of the sample, each donor was requested to fill the questionnaire form. With the help of sterile syringe, about 5 ml of blood was drawn and dispensed in a test tube having labeled with corresponding sample number. Socio-demographic variables and risk perception was measured by questionnaire method. A structured questionnaire was prepared and provided to the respondents to fill out. Perceived risk of HBV and HCV was measured by Likert-type scale: 'no risk', 'little', 'moderate', 'high' and 'very high' risk, ranging from 1 to 5, 1 indicating no risk and 5 very risk.

2.4 Sample Transportation

The blood bags were transported from blood donation campaign site to blood bank in Igloo box containing ice bars to maintain the temperature near 4°C. From the blood donated by blood donors, few drops of whole blood was used for blood grouping and 5ml of blood was allowed to clot or centrifuged at 3000rpm for 2 minutes in a dry screw-capped test tube to separate serum samples to perform the test for HBsAg and anti HCV.

2.5 Sample Processing

All serum samples were tested for presence of HBV and HCV using ELISA. The method used for the detection of HBV (HBsAg; Biokit, Werfen Group) and HCV (anti HCV; Biokit, Werfen Group) was followed as directed by the manufacturer's protocol.

2.6 Disposal

All the infectious blood were firstly autoclaved at 121°C for 30 minutes, then discarded.

2.7 Data Analysis

All the study data was entered into a computer database using standard format, checked for errors and verified. Data were entered and organized in MS Excel. Analysis was performed using SPSS version 24.0. Level of significant was maintained at 5%. Proportion, mean, chi-square test and independent sample t test were computed.

2.8 Ethical/ Safety issues

The study team started the field activities only after the approval of the proposal by University Grand Commission (UGC), Nepal. Ethical approval was obtained from the Ethical Review of Board of Pokhara University. Permission was also obtained from Western Regional Blood Transfusion Center for the conduction of this research. All the participants were introduced to the study and were invited to participate. The nature and purpose of the study, potential risks and benefits, and measures to ensure confidentiality were explained to the participants. Respondents had the right and ability to refuse to participate. Only those participants giving verbal informed consent voluntarily were included in the study.

3. Results

A total of 2032 participants were included in the study. Of the total, 87.2% were males and the mean age of the participants was 30 years. Majority of the participants i.e. 62.1% were married. Of the total respondents, 94.9% mentioned they did not have multiple sexual partners. Nearly 10% of the respondents had made tattoo in their body. Of the total, 1.6% participants received blood transfusion services in their lifetimes. Seroprevalence of HBV and HCV among healthy population were found to be 0.7% and 0.4%, respectively. Co-prevalence of HBV and HCV among the study participants was not found.

Table 1: Characteristics of the Study Population and Seroprevalence of Hepatitis B and Hepatitis C Infection (N=2032)

Variables	Categories	Number	Percent
Sex	Male	1772	87.2
	Female	260	12.8
Mean age (in years)	Total	2032	30.6 (±8.7)
	Male	1772	30.6 (±8.7)
	Female	260	30.4 (±8.8)
Marital status	Married	1262	62.1
	Unmarried	770	37.9
Multiple sexual partner	Yes	104	5.1
	No	1928	94.9
Tattoo piercing	Yes	193	9.5
	No	1839	90.5
Blood transfusion	Yes	32	1.6
	No	2000	98.4
Hepatitis B Virus	Yes	15	0.7
Hepatitis C Virus	Yes	8	0.4
Co-infection	Yes	0	0.0

Seroprevalence of HBV and HCV

The Seroprevalence of HBV was slightly higher among females than among males, 0.8% and 0.7%, respectively. However, the difference was not significant ($p>0.05$). HBV seropositivity was found higher among the respondents aged 30 years and above than the respondents below 30 years i.e. 0.7% and 0.8%. Although there was difference in the proportion, the association between age groups and seropositivity of HBV was not significant among the study participants. Married respondents had more prevalence (1.0% vs. 0.4%) as compared to the unmarried respondents. However; there was also not statistically significant association between marital status and seroprevalence of HBV. The seroprevalence among the respondents who reported having had multiple sexual partners was 1.0% and among those who did not have multiple sexual partners was 0.7%. However, no statistically significant association was observed between seroprevalence of HBV and having multiple sexual partners. None of the participants who received blood donation were found with seropositive for HBV in the study. We also found no statistically significant association between having tattoo pierced in their body and seropositivity of HBV ($p>0.05$) (table 2).

No case of HCV was found among female participants; and seroprevalence among males was 0.5%. The seroprevalence among respondents aged 18-29 years and 30-58 years were 0.1 and 0.7%, respectively. Statistically, there was a significant association between age group and seropositivity of HCV. It meant there was significant difference in the prevalence of HCV across age groups. Seroprevalence of HCV among married and unmarried participants was found to be 0.7% and 0.1%, respectively. However, there was no significant difference in the seroprevalence of HCV regarding marital status of the study participants. No cases of HCV seropositive were found among the respondents who reported having multiple sexual partners in their life time. The seroprevalence of HCV among the participants who had made tattoo was 1.0%, and among those who did make it was 0.3%. This shows proportion of cases were higher among tattoo piercing group. However, there was no significant association between having made tattoo in their

body and showing seropositivity of HCV among the study participants. None of the seropositive cases were reported among the respondents who reported having taken blood transfusion in their life time (table 2).

Table 2: Seroprevalence of HBV and HCV across Socio-Demographic and Behavioral Factors

Variables	Hepatitis B Virus		P value	Hepatitis C Virus		P value
	Yes	No		Yes	No	
Sex						
Female	2 (0.8)	258 (99.2)	0.950	0	260 (100)	0.278
Male	13 (0.7)	1759 (99.3)		8 (0.5)	1764 (99.5)	
Age group (in years)						
18-29	7 (0.7)	1022 (99.3)	0.757	1 (0.1)	1028 (99.9)	0.031
30-58	8 (0.8)	995 (99.2)		7 (0.7)	996 (99.3)	
Marital status						
Unmarried	3(0.4)	767 (99.6)	0.152	1 (0.1)	769 (99.9)	0.138
Married	12 (1.0)	1250 (99.0)		7 (0.7)	1255 (99.3)	
Multiple sex partners						
No	14 (0.7)	1914 (99.3)	0.785	8 (0.4)	1920 (99.6)	0.510
Yes	1 (1.0)	103 (99.0)		0 (0)	104 (100)	
Tattoo piercing						
No	14 (0.8)	1825 (99.2)	0.707	6 (0.3)	1833 (99.7)	0.134
Yes	1(0.5)	192 (99.5)		2 (1.0)	191 (99.0)	
Blood transfusion						
No	15 (0.8)	1985 (99.3)	0.623	8 (0.4)	1992 (99.6)	0.720
Yes	0 (0.0)	32 (100.0)		0 (0.0)	32 (100.0)	

Risk Perception of HBV and HCV

Of the total study population, about 12.2% and 42.9% perceived no risk and low risk of HBV, respectively. Low proportion, only 13.5% and 14.4% mentioned that they perceived themselves being at high risk and very high risk of contracting HBV, respectively. Less than half, 44.9% population perceived moderate to very high risk of contracting HBV in their life time. Similar 43.4% population perceived moderate to very high risk of contracting HCV in their life time (table 3).

Table 3: Risk Perception of HBV and HCV by the Study Participants

Risk perception	HBV		HCV	
	Number	Percent	Number	Percent
No risk	248	12.2	282	13.9
Low risk	871	42.9	868	42.7
Moderate	346	17.0	350	17.2
High risk	292	14.4	287	14.1
Very high risk	275	13.5	245	12.1

Mean risk perception of HBV was 2.74, including 2.93 among females and 2.71 among males. There was significant difference in the mean risk perception by gender. The mean risk perception was significantly higher among females as compared to the males ($p<0.05$). Similarly, the mean risk perception was found to be significantly higher among the participants of 18 to 29 years as compared to the participants of 30 to 58 years ($p<0.05$). In the same way, the mean risk perception was found to be significantly higher among unmarried participants as compared to the married. The participants who did not receive blood transfusion also perceived significantly higher risk than those who received blood transfusion ($p<0.05$). However, risk perception of HBV was not significantly different among the respondents

who mentioned having multiple sexual partners as compared to those who did not report having multiple sexual partners ($p>0.05$). Similarly, risk perception of HBV was also not significantly different among the respondents practicing tattoo piercing as compared to those who did not do it. Thus, there was significant difference in the mean risk perception across sex, age group, marital status, blood transfusion status (table 4).

Table 4: Mean Risk Perception of HBV and HCV across Socio-demographic and Behavioral Factors

Variables		HBV			HCV		
		Mean	t value	P value	Mean	t value	P value
	Total	2.74			2.68		
Sex	Female	2.93	2.58	0.010	2.83	2.21	0.027
	Male	2.71			2.65		
Age group (in years)	18-29	2.80	2.07	0.038	2.75	2.67	0.008
	30-58	2.68			2.60		
Marital status	Unmarried	2.82	2.14	0.038	2.77	2.54	0.011
	Married	2.70			2.62		
Multiple sex partners	No	2.73	-1.57	0.119	2.67	-1.028	0.304
	Yes	2.94			2.80		
Tattoo piercing	No	2.74	0.008	0.993	2.68	0.481	0.637
	Yes	2.74			2.64		
Blood transfusion	No	2.75	2.23	0.032	2.69	2.90	.007
	Yes	2.31			2.16		

More than 50% of the respondents perceived no risk or little risk of the HCV. Only, 14% and 12% mentioned that they felt they were at high risk and very high risk of HCV, respectively. Less than half, 43.4% population perceived moderate to very high risk of contracting HCV in their life time. Mean risk perception of HCV was 2.68, including 2.83 in females and 2.65 in males. Mean risk perception of HCV was found significantly higher among female respondents ($P<0.05$). Similarly, mean perceived risk of HCV was significantly higher among respondents aged 18 to 29 years as compared to respondents of 30 to 58 years ($p<0.05$). Regarding marital status, mean risk perception HCV was significantly higher among unmarried respondents ($P<0.05$). However, there was no significant difference in the risk perception on the basis of number of sex partners and Tattoo piercing practices. Mean risk perception was found significantly higher among the respondents who did not receive blood transfusion services as compared to those who received it ($P<0.05$).

Risk Perception and Seroprevalence of HBV and HCV

Seroprevalence of HBV was 0.4% in no risk, 0.7% in low risk, 0.9% in moderate risk, 0.3% in high risk and 1.5% in very high risk perception. The Seroprevalence was more than 3 fold higher in very high risk perception group as compared to no risk perception group. The analysis shows that seroprevalence of HCV was 0.4% in no risk, 0.3% in low risk, 0.9% in moderate risk, 0.3% in high risk and 0% in very high risk perception group. However, there was no statistically significant association between seropositivity of HBV and its risk perception level of the respondents ($p>0.05$).

Table 5: Seroprevalence of HBV and HCV across Risk Perception Level

Risk perception	Seroprevalence of HBV		Seroprevalence of HCV	
	Yes	No	Yes	No
No risk	1 (0.4)	247 (99.6)	1 (0.4)	281 (99.6)
Low risk	6 (0.7)	865 (99.3)	3 (0.3)	865 (99.7)
Moderate	3 (0.9)	343 (99.1)	3 (0.9)	347 (99.1)
High risk	1(0.3)	291(99.7)	1(0.3)	286 (99.7)
Very high risk	4 (1.5)	271 (98.5)	0 (0.0)	245 (100.0)

4. Discussion

The study determined seroprevalence of HBV and HCV among healthy adult aged 18 to 58 years in Western Region of Nepal. This study helped to understand the distribution pattern of HBV and HCV among the population in accordance to socio demographic status, behavior pattern and risk perception level.

The study revealed that seroprevalence of HBV and HCV, and co-prevalence among healthy looking adults in Western Region of Nepal was found to be less than one percent. Similar to the study, HBV was found in 1.1% and HCV in 0.3% in a study conducted in Manipal Medical College in Pokhara [9]. Similarly, a study conducted among mother, and children of positive mother was found very high in upper Dolpa[10]. This difference might be due to the differences in the study population. Low prevalence in the study might be due to the selection of healthy nature of population to exclude all susceptible individuals for HBV and HCV. A study conducted using the retrospective data collected during 2006 to 2007 revealed that the seroprevalence rate of HBV was only 0.35% in Kaski among healthy blood This statistics shows that seropositivity was double in one decade[11]. However, if we see trend of seropositivity of HBV and HCV among blood donors, there was fluctuation in each year. Seroprevalence of HBV was 0.86% in 2002, 1.23% in 2003 and 0.37% in 2007; whereas seroprevalence of HCV was 0.52% in 2002, 0.56% in 2003 and 0.35% in 2006. Overall seroprevalence rate of HBV and HCV in a nationwide analysis was found to be 0.82% and 0.47%, respectively for the sample collected during 2001 to 2006 among blood donors. In addition, the study also showed that there was an overall significant decreasing trend in the seroprevalence of both HBV and HCV in the nationwide data in spite of fluctuation in the seroprevalence of HBV and HCV during the study years [12]. The seroprevalence of hepatitis B surface antigen (HBsAg) among healthy general population in the Western Region was found within the range of the finding of the previous studies, which lies between 0.4–1.2% among general population and blood donors [11,13,14].

Regarding the international scenario, the global prevalence of HBV infection in the general population was found 3.5% [2]. A study conducted in Cameroon found that the overall pooled seroprevalence was 11.2% [15]. The community seroprevalence of HBV was 3.1% in Ethiopia where the prevalence of HIV was also high (3.3%) [16]. The current study revealed far lower seropositivity among the study population. One of the reasons behind this might be the selection of apparently healthy population for HBV and

HCV. A study by Shrestha and shrestha (2012) stated that Nepal has the lowest prevalence of hepatitis B virus (HBV) infection in Asia, with an HBsAg carrier rate of 0.9%. This study concluded that the low prevalence of this infection in Nepal was due to an absence of significant vertical transmission and its predominant spread by horizontal transmission [17].

The study found that seroprevalence of HCV among healthy population was 0.4%. Similarly, nationwide seroprevalence of HCV was 0.35% in 2006 among blood donors [12]. However, a study conducted in 2010 showed seroprevalence of HCV was only 0.16% among blood donor in Kaski district [11]. Thus, this data shows that there might have increased seroprevalence in this region. The study revealed higher prevalence of HBV than HCV. Similar findings were also observed in other previous studies conducted among blood donors [11,12]. Regarding the burden of HBV as well as HCV was found to be higher in male participants as there were also mentioned in other previous studies conducted among blood donors [11, 12].

Most of the study about risk perception of HBV and HCV are found conducted among health workers and students[18, 19]. In the study, of the total study population, less than half, 45% and 43% perceived risk of HBV and HCV. Mean risk perception of HBV was 2.74, including 2.93 among females and 2.71 among males. There was significant difference in the mean risk perception across sex, age group, marital status, blood transfusion status. Mean risk perception of HCV was 2.68, including 2.83 in females and 2.65 in males. Mean risk perception of HCV was found significantly higher among female respondents; respondents aged 18 to 29 years, unmarried respondents. This shows about two-fifth of the general perceived risk of HBV and HCV. Although burden of seropositivity seemed to be higher in male population, risk perception was significantly higher among females

5. Limitation

The study did not include the adults who reported the history of jaundice in last one year and having any other diseases that contradict for blood donation. Thus, this study may not represent general public rather healthy looking population. There might higher prevalence among the general public. This is one of limitation of the study. Second, as less number of females was included in the study, this may induce a sampling bias regarding the prevalence.

6. Conclusions

The study revealed that the seroprevalence of the HBV and HCV was 0.7% and 0.4% among the healthy adults in the western Region of Nepal. The proportion of HBV was higher among females, older participants, and married. The proportion of HCV was higher among males, older participants, and married and those participants who had made tattoo in their body. Of the total, 45% and 43% study participants perceived moderate to very high intensity risk of HBV and HCV, respectively. Mean risk perception of HBV and HCV was 2.74 and 2.68, respectively. There was significant difference in the mean risk perception across sex, age group, marital status, blood transfusion of HBV and

HCV. There is need of awareness programs about HBV and HCV among general population. The prevalence of seropositivity among general population might be more than reported in the study as this study included only healthy looking person screened for blood donation.

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8. Conflict of Interest

None

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