Research Paper

Prevalence and Risk factors of Hepatitis B and C virus infections in Bangladesh: A nationwide population based study

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Prevalence and Risk factors of Hepatitis B and C virus infections in Bangladesh: A nationwide population based study

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Abstract

Background: Hepatitis B (HBV) and C (HCV) virus infections are global public health concern and known to be responsible for 96% of all hepatitis mortality worldwide. No attempt was made to estimate the population based prevalence of HBV and HCV infections in a representative sample of general population in Bangladesh.

Objective: The aim of this study was to estimate the prevalence and identify the factors associated with HBV and HCV infections in general population of Bangladesh.

Methods: A cross-sectional study was conducted both in urban and rural areas of Bangladesh from December 2015 to January 2017. Data were collected using a pretested structured questionnaire followed by testing of serum specimens for positivity of HBV and HCV infections. Statistical analysis was performed to identify the factors associated with HBV and HCV infections.

Results: A total of 2713 (male=1645) participants were included in the study, with a mean age of 34.3 (±12.7) years. The overall prevalence of HBV infection was 5.1% (95% CI: 4.2, 5.9). So, about 85 lacs peoples were affected with HBV. The prevalence was higher in male than female (6.3% vs. 3.2%, p-value<0.001); among farmers (8.9 %, p-value<0.05) and among those with positive family history of liver diseases (11.8% vs. 4.2%, p-value<0.001). About 57lac male and 28 lac female were carrying HBV.The prevalence of HBV was higher in younger age from 18 to 29 years (6.3%) which gradually decreases with the increases of age (p-value=0.04). Young people of 25 lac and 18 lac female of child bearing aged (18 to 45 years) had HBV.The prevalence of HCV infection for this population was 0.20% (95% CI: 0.02, 0.35). HCV prevalence is higher in > 30 years of age and those with history surgery. Both sexes were equally affected with HCV.

Conclusion: The study results indicate significant burden of HBV and HCV infections in the country; about 10 million populations are affected with these viruses and warrant profound attention in eliminating viral hepatitis as a major public health threat.

Keywords: Hepatitis B; Hepatitis C; Viral hepatitis; Hepatitis mortality; Liver disease; Bangladesh

Introduction

HBV and HCV infections are global public health concern and known to be responsible for major source of all hepatitis mortality worldwide[1, 2]. Hepatitis B virus attacks the liver and can cause both acute and chronic disease[3].Globally, an estimated 257 million people are living with hepatitis B virus infection (defined as hepatitis B surface antigen positive)[4].In 2015, hepatitis B resulted in 887,000 deaths, mostly from complications including cirrhosis and hepatocellular carcinoma[5]. Additionally, HBV infection is considered as an important occupational hazard for health workers worldwide[6]. On the other hand, hepatitis C virus is a blood borne virus that may spread through exposure to small quantities of blood by injection drug use, unsafe injection practices, unsafe health care, and the transfusion of unscreened blood and blood products[7]. [8].A significant number of those who are chronically infected will develop cirrhosis or liver cancer[7].Approximately 399,000 people die each year from hepatitis C, mostly from cirrhosis and hepatocellular carcinoma[9].

HBV and HCV infections are highly prevalent in the Asia Pacific region[1]. Globally, 74% of deaths resulting from hepatic carcinoma occur in Asian countries[10]. The burden is similar in Bangladesh. In Bangladesh, 5.3 deaths per 100,000 populations are due to HBV infections while HCV accounts for 30% cases of cirrhosis and 17% cases of hepatocellular carcinoma in the country. However, data is very limited on prevalence of Hepatitis C virus infections in Bangladesh. Published literatures demonstrated the prevalence between 0.2% to approximately 1% in general population. According to Lancet, HCV prevalence varies considerably, from 0.8% among truck drivers to 24.8% among people who inject drugs[1]. Overall, > 60% cases of the HCV infected people were between 30 to 50 years of age.

Although the burden is substantial, but there is paucity of data regarding the prevalence of HBV and HCV infections in the general population in Bangladesh. Most studies were done in young people having certain risk factors, such as blood donors (voluntary or professional), people who inject drugs, sex workers, or hospital inpatients. But till date no attempt was made to estimate the population based prevalence of HBV and HCV infections in a representative sample of general population in Bangladesh. Moreover, there remains dearth of information pertaining to factors associated with HBV and HCV infections in general population of Bangladesh. Therefore, we aimed to estimate the prevalence and identify the factors associated with HBV and HCV infections in general population of Bangladesh.

Methods

Study design and sample

A cross-sectional study was conducted between December 2015 and January 2017 in Dhaka City, the capital of Bangladesh along with four district towns and four sub-district towns (small administrative unit) in Bangladesh. The locations were selected purposively. Multistage sampling method was followed so that it represents the general population of Bangladesh irrespective of urban and rural areas. Out of 11 city corporations Dhaka city was selected. The district and sub-district towns were selected from the larger four divisions of the country. District towns named Feni, Mymensingh, Bogra, and Patuakhali are located in urban areas and the sub-district areas named Pabnasadarupazilla, Chatkhil, Bheramara and Keraniganj represent the rural areas (Figure- 1). The study population comprises healthy individual who were informed to attend free medical camp by an extensive media campaign and through text messages, leaflet, banner, festoon, poster, and hand-mike announcing. The participants who attended the medical camp and gave informed consent to participate were enrolled in the study.

Figure 1: Global positioning system coordinated map of Bangladesh showing the study sites

Data collection

An informed written consent was obtained from each individual participant and data were collected in a pretested questionnaire through interview followed by physical examination, and screening tests for hepatitis B and hepatitis C. A trained physician collected data and performed physical examination. The questionnaire included demographic characteristics such as age, sex, family history of liver disease, any current medication that may elicit liver disease, medical history, anthropometric measurement and other co-morbid conditions like diabetes (RBS > 11.1 mmol/L or known case of diabetes), hypertension (known case of hypertension and receiving treatment), previous history of surgery, and previous dental procedure.

Physical examination and biochemical tests

Physical examination was performed by physicians to detect whether there were any sign of jaundice, abdominal mass or any other symptoms related to liver diseases. Screening tests for the serum markers of hepatitis B (HBsAg) and hepatitis C (Anti-HCV) virus were carried out by using rapid strip test.

Statistical analysis

All statistical procedures were performed using the StataMP version 13.0. To summarize the data, proportion estimate was used for categorical variables and mean estimate with standard deviation (SD) was used for quantitative variables.Student's t-test or chi-squared testwere performed to compare the variables between the groups. The results were considered statistically significant at p-value of???0.05.

Results

A total of 2713 (male=1645, 60.6%) participants were included in the study, with a mean age of 34.3 (±12.7) years. A total of 2060 (75.9%) were from urban areas, and one-quarter (n=756, 27.9%) of the study participants were unmarried (Table 1). The mean (±SD) BMI, SBP, and DBP for the study participants were 23.9(±4.5)kg/m2, 115.0 (±9.9) mmHg, and 70.6 (±7.4) mmHg, respectively. The majority of the study participants were normotensive (92.2%), non-diabetic (91.5%) (Table 1).

Prevalence of HBV infections

The overall prevalence of HBV infection was 5.1% (95% CI: 4.2, 5.9). The prevalence was higher in male than female (6.3% vs. 3.2%, p-value<0.001), among unmarried than married (6.5% vs. 4.5%, p-value=0.03), in non-diabetic than diabetic participants (5.6% vs. 1.7%, p-value=0.03), and among those with positive family history of liver diseases compared to their counterparts (11.8% vs. 4.2%, p-value<0.001).

Table 1. Characteristics of the subjects with and without Hepatitis-B virus infection in Bangladesh, 2017

	No-Hepatitis-B	Hepatitis-B	Total	p-value*
Age (y), mean (SD)	34.5 (12.8)	31.6 (10.7)	34.3 (12.7)	0.002
Gender, n(%)				<0.0001
Male	1542 (59.9)	103 (75.2)	1645 (60.6)	
Female	1034 (40.1)	34 (24.8)	1068 (39.4)	
Place of residence, n(%)				0.102
Urban	1948 (75.6)	112 (81.8)	2060 (75.9)	
Rural	628 (24.4)	25 (18.2)	653 (24.1)	
Marital status, n(%)				<0.034
Married	1869 (72.5)	88 (64.2)	1957 (72.1)	
Not married	707 (27.5)	49 (35.8)	756 (27.9)	
Hypertension, n (%)				<0.877
Yes	153 (7.8)	9 (8.2)	162 (7.8)	
No	1815 (92.2)	101 (91.8)	1916 (92.2)	
Diabetes, n(%)				<0.025
Yes	174 (8.8)	3 (2.7)	177 (8.5)	
No	1795 (91.2)	107 (97.3)	1902 (91.5)	
Family history of liver disease				<0.001
Yes	269 (10.4)	36 (26.3)	305 (11.2)	
No	2307 (89.6)	101 (73.7)	2408 (88.8)	

* p-values were calculated by the means of Student's t-test or chi-squared test
† Data are presented as mean (standard deviation) or number (proportion) for continuous and categorical variables

The prevalence of HBV was higher in younger age from 18 to 29 years (6.3%) which gradually decreases with the increases of age (p-value=0.04) (Figure2).

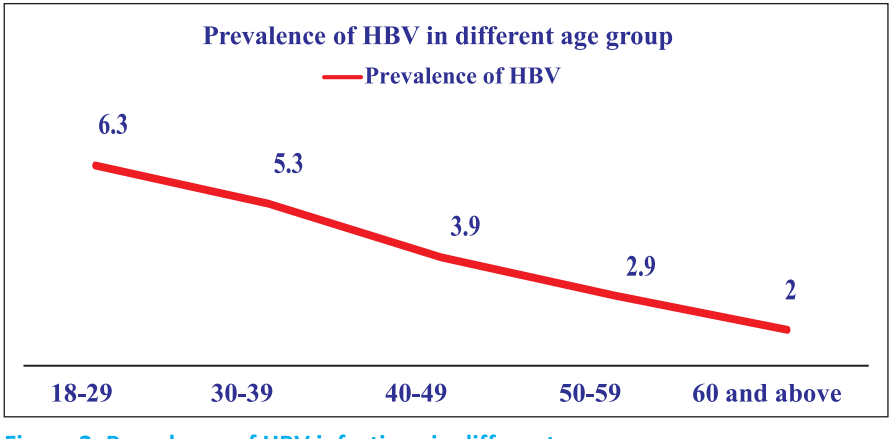

Figure 2: Prevalence of HBV infections in different age groups

The farmers had the higher prevalence (8.9%, p-value=0.01) in terms of occupation. Although statistically insignificant, the proportion of HBV was higher in urban residents compared to rural populations (5.4% vs. 3.8%, p-value=0.10), and in underweight participants compared to normal, overweight, and obese subjects (8.0% vs. 4.8% vs. 4.7% vs. 3.7%, p-value=0.09). Table 2 illustrates the prevalence of HBV infections by characteristics. So total 85 lacs people; 57 lac male and 28 lac female were affected with HBV. Young people of 25 lac and 18 lac female of child bearing aged (18 to 45 years) had HBV.

Table 2. Prevalence of Hepatitis-B among adults in Bangladesh, by characteristics, Bangladesh 2017

Gender	Hepatitis-B prevalence	p-value
Sex		
Male	6.3 (5.2, 7.5)	<0.001
Female	3.2 (2.3, 4.4)	
Age group		0.04
18-29	6.3 (5.0, 7.8)	
30-39	5.3 (3.8, 7.3)	
40-49	3.9 (2.5, 6.1)	
50-59	2.9 (1.5, 5.8)	
60+	2.0 (0.6, 6.1)	
Profession		0.01
Housewife	3.3 (2.3, 4.9)	
Service holder	4.8 (3.6, 6.4)	
Farmers	8.9 (4.3, 17.5)	
Businessmen	7.6 (5.4, 10.6)	
Others	5.1 (3.5, 7.5)	
Place of residence		0.10
Urban	5.4 (4.5, 6.5)	
Rural	3.8 (2.6, 5.6)	
Blood transfusion		0.27
Yes	3.3 (1.4, 7.8)	
No	5.5 (4.5, 6.6)	
History of Surgery		0.94
Yes	5.4 (3.6, 7.8)	
No	5.3 (4.3, 6.5)	
Family history of liver disease		<0.001
Yes	11.8 (8.6, 15.9)	
No	4.2 (3.5, 5.1)	
Dental surgery		0.24
Yes	6.7 (4.4, 10.2)	
No	5.1 (4.1, 6.2)	

Prevalence of HCV infections

The prevalence of HCV infection for this population was 0.20% (95% CI: 0.02, 0.35)(Table 3).

Table 3. Prevalence of Hepatitis C among adults in Bangladesh, by characteristics 2017

Variables	Hepatitis C prevalence, n (%)	p-value
Sex		
Male	2 (40%)	0.35
Female	3 (60%)	
Age group		0.32
18-29	1(20%)	
30-39	3 (60%)	
40-49	0	
50-59	1(20%)	
60+	0	
Place of residence		0.40
Urban	3 (60%)	
Rural	2 (40%)	
Blood transfusion		0.27
Yes	1 (20%)	
No	4 (80%)	
History of Surgery	0.04	
Yes	3 (60%)	
No	2 (40%)	
Family history of liver disease		0.04
Yes	2 (40%)	
No	3 (60%)	
Dental surgery	0.72	
Yes	1(20%)	
No	4 (80%)	

Prevalence was higher in participants with age > 30 years previous history of surgery (0.64% vs. 0.12%, p-value=0.04), positive family history of liver diseases (0.66% vs. 0.12%, p-value=0.04), non-alcoholic fatty liver disease (0.43% vs. 0.06%, p-value=0.03), and hypertension (1.23% vs. 0.16%, p-value=0.007).

Risk factors of HBV and HCV

In bivariate analysis, infection with HBV was associated with male sex,younger age group (18 to 29 years), farmers and positive family history of liver disease.Older age, with history of surgery andpositive family history of liver disease had higher prevalence of HCV infection.

Discussion

Our study finding demonstrated that 5 in every 100 adult populations areHBsAgpositive in Bangladesh. This result indicates about8.5 million adults are suffering from HBV infections in the country. Prevalence of hepatitis B was 8.1% in general population of Bangladesh during 2007 [11]. Recent studies reported HBV prevalence within the range of 2 to 7% in selective at risk population of Dhaka[12, 13]. Study conducted in a densely populated community in Dhaka showed 6.5% HBsAg positivity[12]. Another study conducted in rural Bangladesh showed the prevalence of HBV as 3.2% in children[14]. It could be estimated from here that about 15 lacs child and adolescents are suffering from HBV infection. Our study result is consistent with these reports indicating that the burden remains similar over the last couple of decades.

Previous studies figured the HCV prevalence from 0.2% to 1% among general population of Bangladesh. A study conducted in Dhaka city demonstrated prevalence as 0.2%. Study conducted in a semi-urban area of Bangladesh showed the prevalence as 0.9% and the HCV-positive subjects were >28 years old[15]. We have estimated the prevalence as 0.2% which suggests that 1 in every 500 adult people is HCV infected in Bangladesh. We found, 60% of HCV positive cases were within the age range between 30 to 45 years which is consistent with the previous findings that showed more than 60% of HCV infected people were aged between 30 to 50 years. Study results didn't show any statistical significance of sex and residence of the subjects with the HCV prevalence. We have observed that prevalence of HCV infections were higher among participants with previous history of surgery, positive family history of liver diseases, hypertension and non-alcoholic fatty liver disease (NAFLD). The first one is consistent with previous studies, but the explanations for the remaining three factors are needed to be explored.

In Bangladesh, the 8th most common cause of death is liver diseases and the age-adjusted death rate is 19.26 per 100,000 populations[16]. World Health Organization (WHO) has been documented in May 2014 that 2.82% of total deaths in Bangladesh are due to liver diseases. Of this, 0.39% is due to chronic liver diseases such as liver cancer and cirrhosis of liver. It is well-recognized that chronic infections with hepatitis B virus (HBV) and hepatitis C virus (HCV) are the potential risk factors for cirrhosis and liver cancer. Hence, to find out the factors associated with HBV and HCV are of paramount importance. Previous studies demonstrated the main risk factors of HBV infections are

treatment from quacks, shaving and haircut in barber shops, history of dental procedures, intravenous infusion, body piercing, as well as vaccination from small pox and cholera. Several studies reported that sero-positivity for HBsAg was higher in males than females and we also found the same. HBsAg positivity was 3 times higher among male subjects than that of female subjects.
Previous studies exhibited that Chronic Hepatitis B virus infection affects younger population in Bangladesh. A hospital based study showed that the predominant age group affected by HBV is 25-40 years. Another study depicted that prevalence was highest (8.5%) among the children aged 5 to 9 years old. This study also revealed that younger populations (18 to 29 years) are more affected by HBV infection. Studies confirm that acquisition of HBV infections during young age persist as a predictor of chronic carriage [17]. Therefore, attention is needed to be given to control the infection during early age. However, the rate decreases with increasing age.

Bivariate analysis revealed that being male and farmer is associated with HBV infections. Immune potentials of females are greater than male that could clear the HBV infection. A Study conducted in Poland reported higher prevalence of HBV infections in urban areas than that of rural areas [18]. Probably rural farmer are less aware of screening and vaccination of HBV. We found that positive family history of liver disease is associated with HBV infections. Familial clustering of HBV is well recognized.

History of surgery is significantly associated with HCV infection. This warrants proper sterilization of surgical instrument in all public and private hospitals, specially in casualty and emergency departments.

The study has several limitations. The prevalence of HBsAg alone might not describe the total burden of HBV infections. Therefore, estimation of the prevalence of anti-HBc was recommended, but we didn't do that in this study. Secondly, since it was a cross-sectional study, we could not establish causality.
A longitudinal study on a larger population should be done in future to identify the predictors of both HBV and HCV infections in the general populations of the country.

In conclusion, the findings from present study indicate that Bangladesh is in the intermediate prevalence zone of Hepatitis B virus infections and HCV infections are very limited. Around 8.5 million adults are HBV positive and 1 in every 500 adultsisinfected with HCV in Bangladesh. However, currently available vaccine can prevent the HBV infections. Additionally, policy makers must think and introduce effective policies to eliminate HBV and HCV. Moreover, global hepatitis goals under SDGs should be strongly executed following thenational policy of the country in order to eliminate hepatitis.

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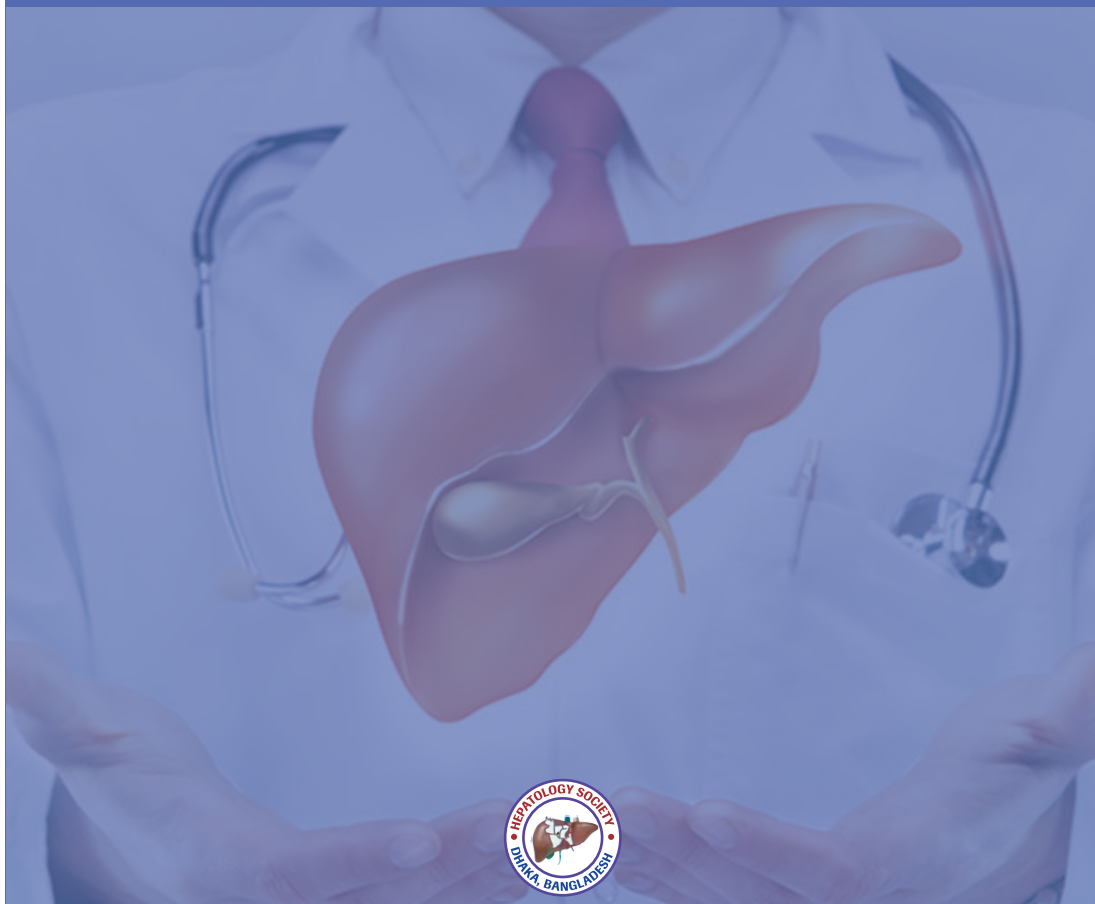
বিশ্ব হেপাটাইটিস দিবস
২৮ জুলাই, ২০১৮

খুঁজে ফিরি তাদের
যারা আছে ঝুঁকির শীর্ষে

নিজেকে পরীক্ষা করুন, হেপাটাইটিস নির্মূলে অংশ নিন



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