Prevalence and Risk Factors of Asymptomatic Hepatitis C Virus Infection in Bangladesh

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ABSTRACT

Objectives: There are paucity of information about prevalence and risk factor of hepatitis C virus (HCV) in Bangladesh.
Methods: Blood was collected from 1018 randomly selected subjects from a semi-urban area of Bangladesh. Anti-HCVs were checked in the blood twice using a third-generation commercial kit. The data of the questionnaires were analyzed to find possible risk factors.
Results: Nine of the 1018 subjects (88%) were tested positive for anti-HCV. The HCV-positive subjects were >28 years old. Major risk factors for HCV infection were treatment by unqualified and traditional practitioners, history of mass-vaccination against smallpox, hair cutting and shaving by barbers, and body piercing. However, known risk factors such as blood transfusion, surgery, invasive therapy, and intravenous drug use were not detected in any HCV-infected subjects.
Conclusion: Control of HCV infection in Bangladesh may be difficult because the risk factors are related to normal tradition and culture of Bangladeshi people.

INTRODUCTION

Hepatitis C virus (HCV) is notorious for causing chronic infection, and about 170 million people of the world are infected with this virus. HCV-infected persons mostly develop chronic hepatitis and complications like liver cirrhosis and HCC.[1,2] In the absence of valid population-based and nation-wide surveys, it is assumed that the prevalence of HCV is low in developing countries of Asia and Africa. However, recent studies have shown that developing countries like Pakistan and Egypt harbor high percentages of HCV-infected subjects.[3,4]

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Abbreviations: HBV: hepatitis B virus; HCC: hepatocellular carcinoma; HCV: hepatitis C virus; HIV: human immunodeficiency virus
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Bangladesh is a developing country of Southeast Asia, with a population of 140 million. There is no population-based data on HCV prevalence in Bangladesh. In 1993, Khan et al[5] have reported zero prevalence of HCV among blood donors in Bangladesh. However, this was contradicted when Akbar et al[6] reported that about 5% apparently healthy subjects of Bangladesh were harboring HCV RNA. Recently, a study conducted in rural Bangladesh has shown that 0.5% apparently healthy subjects were infected with HCV.[7] On the other hand, another study from Bangladesh has shown that HCV is highly prevalent among injectable (24.8%) as well as in noninjectable drug users (5.8%).[8] These figures indicate that more studies should be conducted in different regions of Bangladesh to develop insights about considerable variations in HCV prevalence in the country. Also, risk factors related to HCV infection should be explored, since this is yet to be done in Bangladesh.

The study presented here was performed to assess the prevalence of HCV in a semi-urban area of Bangladesh. It was carefully conducted after considerable mass campaigns among study population to ensure active participation of the local people. A questionnaire was developed to identify risk factors associated with HCV transmission in Bangladesh.

METHODS

Study Design

The study was conducted in the outskirts of Dhaka city. The area has a large industrial base. Nature and purpose of the study was informed to the people of the community by undertaking mass campaigning for 1 month to get their support and active participation. Prior to the study, meetings were held with people's representatives of the area to request their cooperation. Especially, the nature and purpose of the study were discussed with Imams (religious leaders), local leaders, and social representatives. Extensive broadcasting was done about the study, and posters and banners were erected in key locations of the locality. The study was carried out in August 2010.

Twenty graduate physicians were given training for the collection of epidemiological data and blood samples.

Printed questionnaire were supplied to collect relevant data from the study subjects. Demographic data such as age, sex, religion, and education levels of each participant were registered. In addition, information about possible risk factors of HCV infection such as history of blood transfusion, dental procedure, jaundice, surgery, abscess drainage, urinary catheterization, blood donation, gastrointestinal endoscopy, immunization, tattooing, intravenous drug use, multiple sexual partners, acupuncture, vaccination for cholera and small pox, treatment by nonqualified village doctors, shaving and hair cut in barber shop, circumcision, and ear piercing were also included in the questionnaire. The study area was divided into 10 blocks, and the subjects were selected randomly. A total of 1018 blood samples were collected. Patients suffering from acute or chronic liver disease and those who were already aware of their HCV status from previous investigations were excluded from the study. Five milliliter of blood was collected and transported to our Dhaka laboratory by using a cold-chain system. Sera were stored at −20°C, and a commercial third-generation anti-HCV enzyme-immunoassay method (Abbott Laboratories, Abbott park, IL, USA) was employed to assess the presence of anti-HCV in the sera. All subjects or their guardians gave informed consent to the study. The samples that tested positive for anti-HCV were further tested for HCV RNA (COBAS AmpliPrep/TaqMan; kit Roche HCM for COBAS AmpliPrep, USA; lower limit of detection 15 IU/mL), and HCV genotyping (real-time PCR with TaqMan-MGB probes, USA) was also done. Ethical approval was taken from Viral Hepatitis Foundation Bangladesh to conduct this study. The study was performed according to the principle of the "Declaration of Helsinki of 1975."

RESULTS

Sera were collected from 1018 apparently healthy persons of Savar area of Bangladesh. The area is situated 20 Km from Dhaka metropolitan area and is a typical semi-urban area. People with different professions such as farmers, industrial labors, businessmen, and small and mid-level manufacturers live here. The subjects were aged between 1 and 60 years. Questionnaire was filled in by the attending physicians. In case of adults, the responses were given by the subjects, and in case of minors, the legal guardians helped to fill the questionnaire. None of the subjects were suffering from acute or chronic liver disease. Those who were already aware of their HCV status from previous investigations were excluded from the study.

Demographic data of the patients such as age, sex, religion, and educational status of the subjects have been shown in Table 1.

Nine (0.88%) of the 1018 subjects tested positive for anti-HCV in the sera. Analyses of the data of the questionnaire revealed that the HCV-infected subjects were 28–60 years old.

Table 1 Demographic characteristics of study population.

	Numbers	Percentage
Age distribution (years)		
0–16	411	40.37
17–50	574	56.39
50+	33	3.24
Sex distribution		
Male	584	57.37
Female	434	42.63
Religion		
Muslim	950	93.32
Hindu	61	5.99
Christian	7	0.69
Education level		
None	113	11.10
Primary	322	31.63
High School	432	42.44
College	114	11.20
University	37	3.63

Two-thirds of them (N=6) were males and the rest 3 were females. All of them had either primary or secondary education. On further analysis of the anti-HCV-positive serum samples, 7 had detectable HCV RNA. Of them, 5 had genotype 3, 1 had HCV genotype 2, and the rest 1 had HCV genotype 1.

One of the main objectives of this study was to develop insight into the risk factors related to HCV infection in this area, and a questionnaire was developed to materialize this. Co-infection with hepatitis B virus (HBV) was not detected in any subject. Of the 9 HCV-infected subjects, history of jaundice in family members was reported by 3. All 3 female HCV-infected subjects had history of pregnancy, and one of them had previous experience of abortion.

The prevalence of HCV-related possible risk factors is shown in Table 2. None of the patients had previous history of blood transfusion, dental procedures, or any other invasive procedure that might predispose to HCV infection. None of the HCV-infected subjects were injection-drug user, and none had multiple sexual partners.

Possible risk factors for HCV transmission in this cohort included: (1) previous vaccination for small pox and cholera, (2) circumcision, (3) treatment by nonqualified village doctors, and (4) body piercing for cosmetic purpose (Table 2).

The prevalence of risk factor in 1009 HCV noninfected subjects was also evaluated to develop insights about HCV infection in this area. The prevalence of risk factors (Table 2) was higher in non–HCV-infected subjects compared with the HCV-infected subjects (Tables 1 and 2), because none of these factors were detected in any HCV-infected subjects in this study.

DISCUSSION

This study, conducted in a semi-urban area of Bangladesh supports what Khan et al[7] reported about HCV prevalence

Table 2 Risk factors in 1018 subjects at Savar area of Bangladesh.*

S. no.	Risk factor	Hepatitis C virus-infected subjects (n = 9)	Hepatitis C virus-noninfected subjects (n = 1009)
1	Blood transfusion	0	122
2	Dental procedure	0	153
3	History of jaundice	0	374
4	History of surgery	0	102
5	Intravenous infusion	0	226
6	Abscess drainage	0	24
7	Urinary catheterization	0	29
8	Blood donation	0	31
9	Gastro-intestinal endoscopy	0	23
10	Tattooing	0	30
11	Intravenous drug use	0	4
12	Multiple sexual partners	0	33
13	Acupuncture	0	0
14	Vaccination for cholera and small pox	6	350
15	Treatment by nonqualified village doctors	6	723
16	Shaving and hair cut in barber shop	3	504
17	Circumcision	3	607
18	Ear piercing	3	130

*Nine of the 1018 subjects were positive for anti-HCV in their sera.

in rural Bangladesh; 0.88% apparently healthy subjects were infected with HCV. It seems that these studies have apparently contradicted the data about high HCV prevalence in urban Bangladesh reported by Akbar et al[6] (about 5% HCV positivity among general population of Dhaka) and by Shirin et al[8] (5.8% HCV positivity among nonintravenous drug users of Dhaka). These discrepancies about HCV prevalence among rural, semi-urban, and urban areas of Bangladesh deserve careful analyses. The study by Akbar et al[6] showed that the prevalence of HCV among Dhaka's population was 5%. However, only 2.3–2.6% of the service holders and businessmen were infected with HCV, respectively. On the other hand, 9.5% of the day laborers were harboring the HCV RNA in their blood. Shirin et al[8] also documented high prevalence of HCV (5.8%) among nonintravenous drug users (5.8%) in Bangladesh. Thus, HCV prevalence may vary from 0.5% to 2–3% among general population. It remains to be evaluated why 9.2% of the day laborers were HCV infected, as mentioned by Akbar et al.[6] Accordingly, a population-based study would be required to develop proper insight into the prevalence of HCV and to design control strategy against HCV in Bangladesh.

One of the major contributions of the present study is the analysis of various risk factors related to HCV infection.[9,10] The common risk factors (Table 2), which are usually related to HCV transmission, were not detected in any of the 9 HCV-infected subjects in this cohort. On the other hand, factors related to normal lifestyle of Bangladesh people may be related to HCV infection in these subjects (Table 2). Treatment by nonqualified village doctors, shaving at barber shops, circumcision by traditional practitioners popularly known as "hajams," and ear and nose piercing by females are part of common tradition and culture of our people. These practices would continue for decades in Bangladesh. In fact, role of ethnic and cultural characteristics as risk factors of HCV transmission has previously been reported.[11]

The wide diversity in the prevalence of HCV in Bangladesh deserves special attention. Observation of 0.5% prevalence of HCV in apparently healthy subjects in the rural area by Khan et al[7] represents "relatively low prevalence" of HCV in Bangladesh. Considering the pathological process and virology of HCV, even 0.5% or 1% HCV prevalence constitutes a major public health problem. Most of the HCV-infected subjects develop chronic liver disease and its complications. Treatment of HCV infection is also extremely costly and endowed with serious side-effects. Also, contrary to hepatitis B virus, no prophylactic vaccine is available against HCV.

In this context, the study by Siddiqui et al is important. They observed HCV positivity at a hospital of India for 7 years from 2001 to 2007 on a yearly basis.[12] They found a progressive increase in HCV positivity among voluntary blood donors in their university hospital. No HCV-infected cases were recorded in 2001, and only 1 HCV-infected person was identified in 2002; whereas, HCV prevalence among volunteer blood donors increased by 18-folds from 2002 to 2007.[12]

Taken together, HCV prevalence of 1% or less should not be regarded as low HCV prevalence in Bangladesh. Rather, this should be regarded as a serious public health problem. We should learn important lessons from the epidemiological studies and government declarations about HIV infection from developing countries in the 1980s and 1990s. At that time, it was considered that HIV was not a dominant problem for the developing world.[13–15] Even zero prevalence of HIV was declared among 15,700 prostitutes in Thailand.[13] However, now, large numbers of HIV-infected individuals have been detected in these countries. Understanding the risk factors allows control of infection,[4] which has now occurred in Egypt and Bangladesh, and we can follow this example for containment of HCV.

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