

Seroprevalence of HBV Infection in a Tertiary Care Hospital in Bangladesh

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Abstract

An estimated 1 million people die each year from HBV infection. This investigation aimed to determine the frequency, distribution, and risk factors for HBV infection in a healthy Bangladeshi community. A cross-sectional study among the general population was conducted in Dhaka Medical College Hospital. A series of 100 patients with the chronic liver disease between 18 to 49 years. Diagnosed based on clinical and biochemical parameters were collected. All medicine units of Dhaka Medical College Hospital have been analyzed regarding the seroprevalence of HBsAg and its correlation with the demographic pattern. Among 100 cases of liver disease, the number of CLD patients was 85, of which 56 (65.88%) were HBsAg positive 29 (34.11%) were HBsAg negative. The number of patients with acute viral hepatitis was 15, of which 4(26.66%) were HBsAg positive, 11(73.33%) were HBsAg negative, and the overall seroprevalence was 60%. The age incidence was more below 40 years (83%) less above the age of 40(17%). Males had higher seropositivity (70.31%) than females (41.66%). People of all ages are susceptible, particularly the farmers (21.66%) and manual laborers (13.33%). Most of the patients belong to the poor (62.79%) and middle class (62.22%). Urban people were more (60.93%) susceptible than rural people (58.33%). Married persons were more (70.27%) prone than unmarried (30.76%). Seroprevalence of HBsAg was more in those people who had a history of blood and blood product transfusion (84.61%). Illiterate persons were more (75%) susceptible than literate (59.37%). Seroprevalence of HBsAg was more in those who had a history of instrumental tooth extraction (68.42%) than those who had not (58.02%). People who cut their beards and mustache in the barbershop were more susceptible (73.91%) than those who got it by themselves (68.29%). Among female persons, those who underwent instrumental delivery were more susceptible than those who delivered their baby by normal vaginal delivery.

Keywords: Seroprevalence, HBV Infection.

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INTRODUCTION

Hepatitis B it's a major health issue in both developed and developing countries. In developed countries, where most of the major communicable diseases have been successfully controlled, hepatitis B continues to cause considerable morbidity and mortality and therefore has become one of the priority public health problems in these countries [1]. In developing countries, the prevalence is much higher, and its health impact is even greater [2]. About 50-80% of persons with hepatitis B virus (HBV) infections are asymptomatic or present with mild flu-like symptoms.

The majority of patients with HBV infection can expect a full recovery. The hepatitis B surface antigen (HBsAg) is present during the acute phase and normally disappears during convalescence. In some patients, however, the antigen persists. The persistence of HBsAg in the serum for more than six months indicates the chronic carrier state. The carrier state in hepatitis B is established in about 5-10% of infected adults [2]. The carrier state is closely associated with subsequent development of chronic illness, such as chronic hepatitis, cirrhosis, and sometimes primary liver cancer (e.g., 15 in 1,000 chronic infections).

Carriers appear to be the most dangerous source of infection. There is a large pool of chronic carriers globally, the prevalence varying from 0.1% in developed countries (Europe, America, Australia) to 15% of the population in developing countries [3]. In the developed countries, HBsAg is most often found in the 20-40 years age group; in the developing countries, in children of the 4-8 years age group. Carrier state among the young is more infectious than among adults. The hepatitis B e antigen (HBsAg) is detected in a relatively small proportion of HBsAg-positive sera. Possession of the e antigen appears to be associated with a worse prognosis with regard to liver disease. It is a reliable indicator of infectivity and the presence of HBsAg is in fact the main determinate of HBV transmission. HBsAg is found more often in young than in adult carriers.

Acute viral hepatitis is caused by HAV, HEV, HBV, HCV, and other viruses like CMV, and chronic liver disease is caused by HBV, HCV, and HDV, and HBV. So, HBV is common in causing chronic liver disease and acute liver disease. The investigator has observed that there is no satisfactory study for measuring the Seroprevalence of Hepatitis B infection in a tertiary care hospital in Bangladesh. The public health importance of viral hepatitis in Bangladesh has been recognized. However, viral hepatitis has not yet been made a legally notifiable disease by the Ministry of Health and Family Welfare. Effective control measures have been promoted through different programs. The effective HBV Control includes surveillance, hepatitis B immunization, the introduction of disposable needles and syringes in health care institutions, universal precautions, public education, and routine screening of voluntary blood donors for HBsAg carriers [4].

The key component in the HBV Control Programme is that the Hepatitis B Immunization was first introduced in the late 1980s with the voluntary immunization of high-risk groups such as health care Workers. A mass immunization program against hepatitis B for babies has been incorporated recently into the National Expanded Program of Immunization. In addition, older children and adults are also encouraged to be immunized. Therefore, there is a need to strengthen the hepatitis B immunization programme to reach out to those with no immunity, especially young adults. Furthermore, to complement the immunization program, a mass media education program also needs to be launched to educate the public on the risks of hepatitis B Infection and encourage members of the public who have not been immunized to be screened and immunized against HBV infection [5].

GENERAL DESCRIPTION

The liver is the largest gland in the body which occupies almost the whole of the right hypochondrium. The greater part of the epigastrium & part of the left

hypochondrium as far as the left lateral line. The normal adult liver is 1.4Kg to 1.0 Kg in weight which is 2.5% of the total body weight. The liver is somewhat coneiform in shape, Reddish-brown in color & firm inconsistency. The liver has five surfaces-superior, anterior, inferior, posterior & right lateral surfaces. The superior, anterior & right surfaces of the liver are continuous at the rounded border, but a sharp inferior border separates the right & anterior surfaces from the inferior surface. This border is rounded between the right & inferior surfaces but becomes thin & angular at the lower limit of the anterior surfaces and is notched along this edge by the ligamentum teres. The right of the middle. Conventionally liver is divided into a larger right lobe (5/6th), and smaller left lobe (1/6th) by the attachment teres inferiorly and posteriorly by the fissure for ligamentum venosum [6]. The right lobe also has two smaller lobes, the caudate & quadrate lobes; the caudate lobe lies between the groove for the inferior vena cava & the portahepatis. The quadrate lobe lies between the fissure for the ligamentum teres hepatitis and the fossa for the gallbladder. Advances in hepatic surgery. However, have indicated a more useful division into right and left hemilivers based on the hepatic blood supply. The right and left hemilivers are further divided into a total of eight segments in accordance with subdivisions of the hepatic and portal veins [7].

The liver is almost completely covered by peritoneum except for 'the bare area of liver'- a triangular area on its posterior surface, groove for inferior vena cava. Gall bladder fossa & along the line of attachment of the folds include the falciform ligament, right and left triangular, coronary ligaments & the lesser omentum. The inferior surface of the liver is important for its relation to the adjacent abdominal viscera and the porta hepatic, which is situated between the quadrate lobe in front & the caudate process behind. the porta hepatis the portal vein, hepatic artery, and hepatic plexus of nerve enter and the right and left hepatic ducts and some lymphatic vessels emerge [8].

FUNCTION OF LIVER

Liver have various functions. Some important are listed below [9].

1. Metabolic function-Liver is the sole organ for the metabolism of Protein, Fat, carbohydrates, etc.
2. Storage Function- Carbohydrate, Iron, Vitamin A, D, B12 are stored in the liver
3. Synthetic Function- Liver manufactures plasma proteins albumin-albumin, coagulation factors and inhibitors (except Von Willebrand factor), complement factors, transferrin, haptoglobin, caeruloplasmin, protease inhibitors, alpha-fetoprotein, an acute-phase protein, etc.
4. Secretory Function- Liver produces and secretes bile. The daily secretion of bile is 600-800ml.
5. Hemopoietic Function- In intrauterine life liver is the main organ of hemopoiesis.
6. Formation of urea

7. Inactivation of some polypeptide hormones.
8. Reduction and conjugation of adrenocortical and gonadal steroid hormones.
9. Detoxification of many drugs and toxins
10. Synthesis of 25-hydroxycholecalciferol.
11. Phagocytosis of particulate matter in the splanchnic circulation by Kupffer cells.

Aetiology

a) Viral hepatitis

HBV: About 20-25 percent of cases of post necrotic cirrhosis evolves from chronic active hepatitis B infection (10). About 10% of patients suffering from acute HBV infection fail to clear HBsAg from the blood in 12 weeks and become chronic carriers. Incidence of chronic liver disease associated with HBV is found to be higher in geographical areas where carrier incidence is frequent, e.g., Southeast Asia and other developing countries of the world.

HCV: HCV is a major cause of parenteral non-A non-B hepatitis and is associated with chronic liver disease and also primary liver cancer in some regions (11).

HDV: HDV requires a helper function provided by HBV. It is an important cause of acute and severe chronic liver damage in many regions of the world.

- b) **Alcoholism:** Men who drink over 80 gm alcohol/day and women who drink 40 gm alcohol/day over 10 years have a significant risk of developing cirrhosis. Approximately 10 to 20 percent of chronic alcoholics develop cirrhosis. Alcohol can produce a variety of changes, alcoholic fatty liver. Alcoholic hepatitis and cirrhosis [12].
- c) **Hemochromatosis:** Two types: i) Primary due to a genetic defect and ii) secondary due to some primary condition. It is an uncommon cause of cirrhosis.
- d) **Wilson's disease:** Rarely cause cirrhosis. Autosomal recessive disorder of copper metabolism causing failure of biliary copper excretion.
- e) **Alpha-1 antitrypsin deficiency:** It is also a rare cause.
- f) **Primary biliary cirrhosis:** Here, chronic granulomatous inflammation of unknown etiology destroys the interlobular bile ducts, eventually developing cirrhosis.
- g) **Secondary biliary cirrhosis:** Following large duct biliary obstruction.
- h) **Venous outflow obstruction:** Budd-Chiari syndrome is an uncommon condition.

i) **Toxins and therapeutic drugs:** Drugs should be suspected as a possible aetiological agent in all cases of cirrhosis.

j) **Intestinal bypass surgery for obesity.**

k) **Doubtful etiological factors:**

Autoimmunity: Its role is unproven in the production of cirrhosis. But it may produce chronic active hepatitis, which may evolve to macronodular cirrhosis rapidly.

Mycotoxin: Their exact role in human cirrhosis is still uncertain.

Schistosomiasis: Fibrosis may occur, but its role in the production of cirrhosis is still unproven.

Malnutrition: It is uncertain if malnutrition by itself is ever a cause of cirrhosis in man.

B) **Cirrhosis of unknown etiology**

- i) Indian childhood cirrhosis
- ii) Cryptogenic cirrhosis

C) **Functional Classification**

1. based on activity

- a) Such features estimate liver failure as jaundice, ascites, encephalopathy, low serum albumin, raised transaminase level. And a prothrombin deficiency not corrected by Vitamin K.
 - b) Splenomegaly esophageal varices show portal hypertension, newer methods of measuring portal pressure.
2. based on evolution.
- a) Progressing
 - b) Regressing
 - c) Stationary

OBJECTIVES

General Objective

To estimate the seroprevalence of Hepatitis B Virus (HBV) infection among individuals aged 18 to 49 years admitted in a tertiary care hospital (DMCH) with liver disease (acute and chronic)

Specific Objectives

- a. To estimate the seroprevalence of HBsAg among the individuals aged 18 to 49 years with Liver disease among Rural and urban residents in hospitalized states.
- b. To assess the sociodemographic characteristics of the patients.

MATERIALS AND METHODS

A cross-sectional study among 100 cases of patients with acute and chronic liver disease was selected from all Dhaka Medical College Hospital medicine units from 1st September 2009 to 28th February 2010. This study has enrolled clinicians and biochemically diagnosed acute and CLD patients.

Sampling technique

The sample will be selected from every adult patient presented with acute or chronic liver disease (clinical or biochemical) in the study site until the desired sample size of 100 is reached. One study subject fulfilling the inclusion criteria will be selected to detect HBsAg by ELISA.

Inclusion criteria

1. Patients presenting with clinically or biochemically defined acute and chronic liver disease
2. Provides informed consent
3. Age: 18 to 49 years

Exclusion criteria

1. The patient was diagnosed with hemolytic or obstructive jaundice.

Data collection and Laboratory Methods

Persons fulfilling the inclusion criteria were included in the study. They were briefed about the study's objectives, risks, benefits, freedom to participate, and confidentiality. Informed consent was obtained accordingly. A pretested questionnaire was used to gather socio-demographical and relevant epidemiological data. Confidentiality was maintained in all steps. A sample 5 ml of whole blood without anti-coagulant was drawn, taking all aseptic measures from each respondent. The blood samples were transported immediately to pathological Laboratory, DMCH, to detect HBsAg by ELISA.

Work Schedule (Describe sequence of tasks within the time frame).

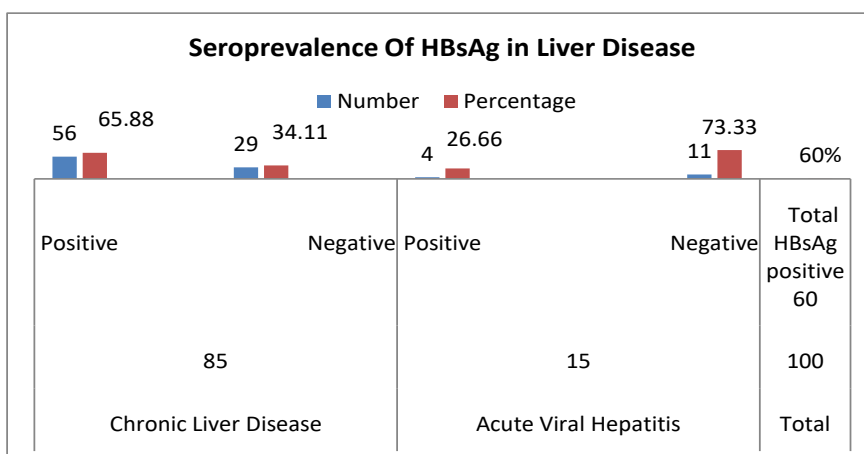
	Sep 09	Oct 09	Nov 09	Dec 09	Jan 2010	Feb 2010
Investigator meeting with supervisor and selection	█					
Data Collection	█	█	█	█	█	█
Data Entry	█	█	█	█	█	█
Data Analysis						█
Report writing						█

Data processing and analysis

All data were checked up and edited after collection. Later the data were put into the computer and were analyzed with the help of software programmer SPSS 23.0.vs for windows and Microsoft

excel worksheet. Some measurements were done with the help of the calculator. The data were presented in the form of tables graphs.

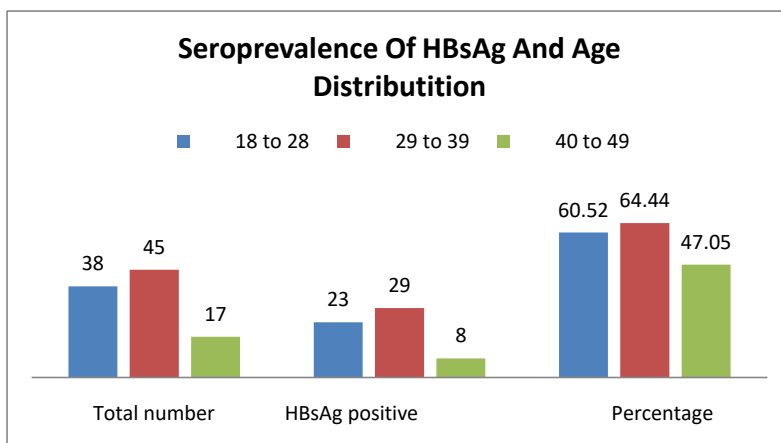
RESULT



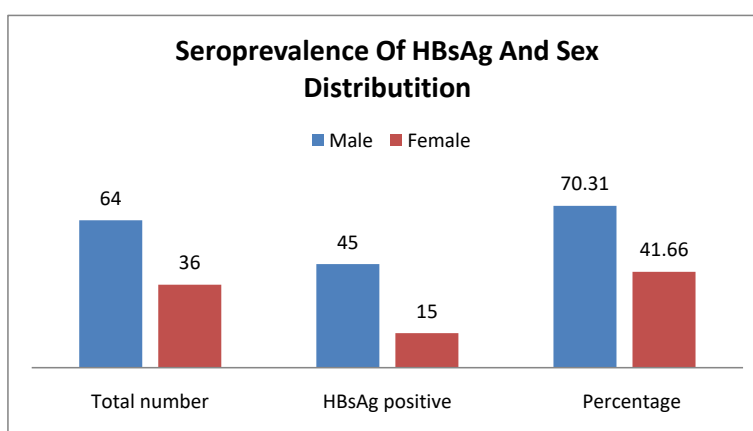
Graph-1: Seroprevalence of HBsAg in Liver Disease

Among 100 cases of liver disease, the number of CLD patients was 85, of which 56 (65.88%) were HBsAg positive and 29 (34.11%) were HBsAg negative. The number of patients with Acute viral

hepatitis was 15, of which 4(26.66%) were HBsAg positive and 11(73.33%) were HBsAg negative, and the overall seroprevalence was 60%.

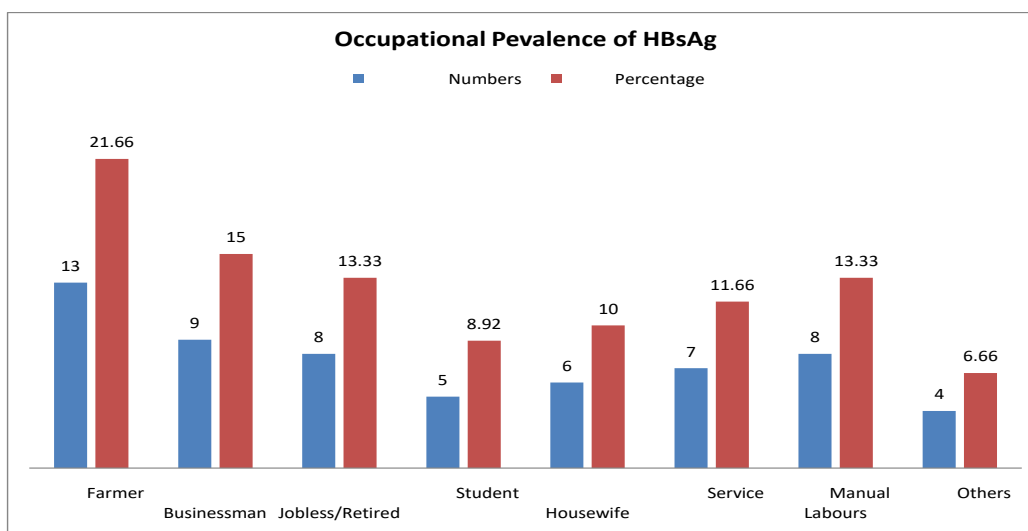


A higher percentage of HBsAg patients were below the age of 40 years.



Graph-3: Seroprevalence of HBsAg and Sex Distribution (n=100)

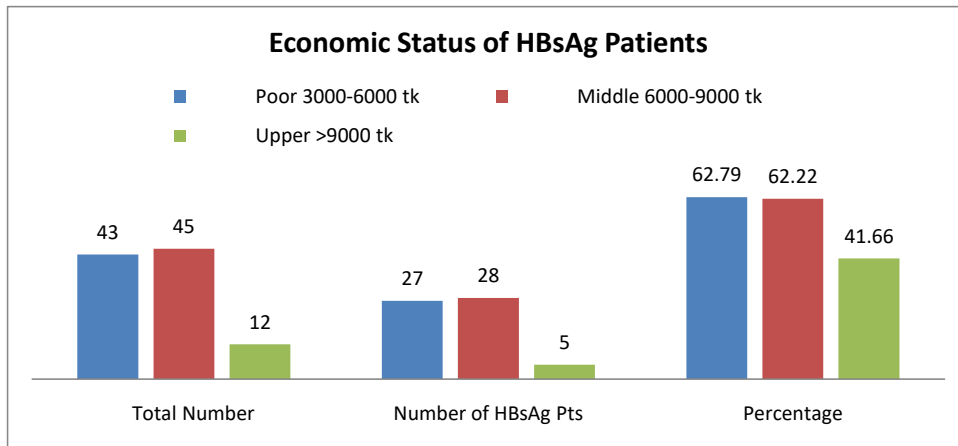
The higher percentage of HBsAg patients was male.



Graph-4: Occupational Prevalence of HBsAg (n=60).

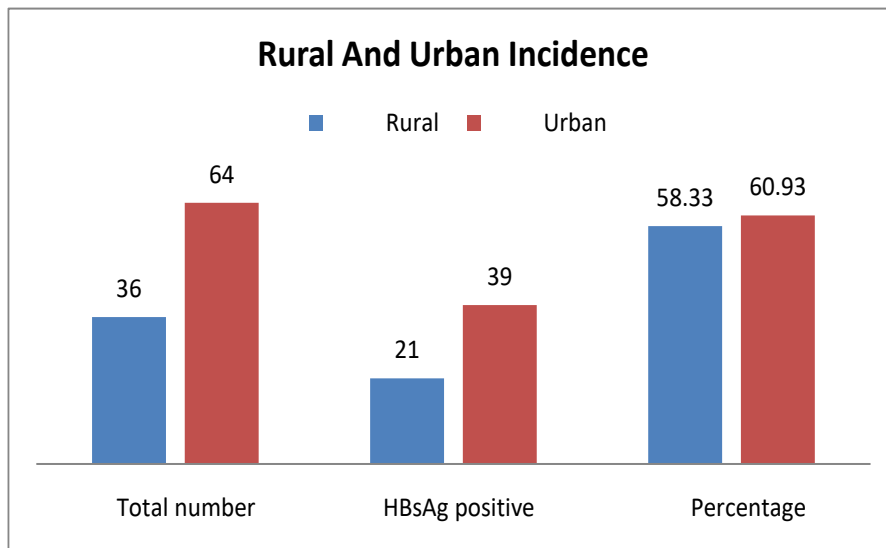
People in all occupations were susceptible to being HBsAg positive and developing liver disease,

particularly the farmers and manual laborers who were more prone.



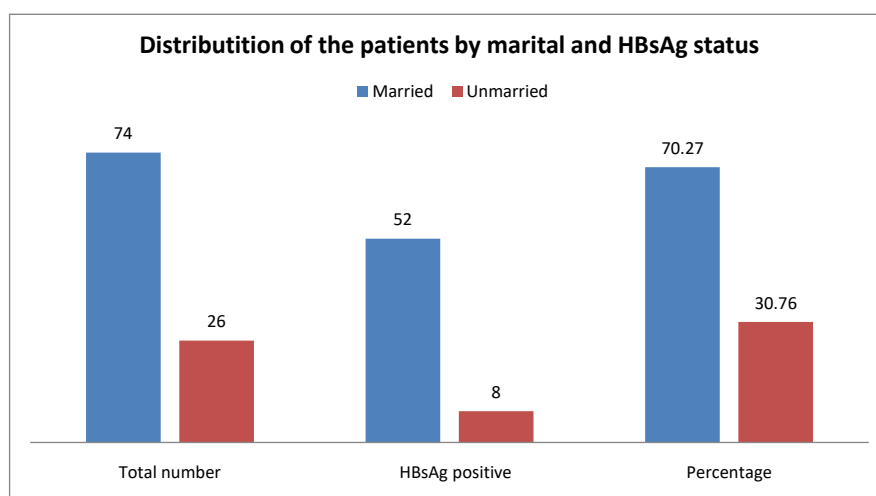
Graph-5: Economic Status of HBsAg Positive patients (n=100)

The seroprevalence of HBsAg increased with declining economic status.



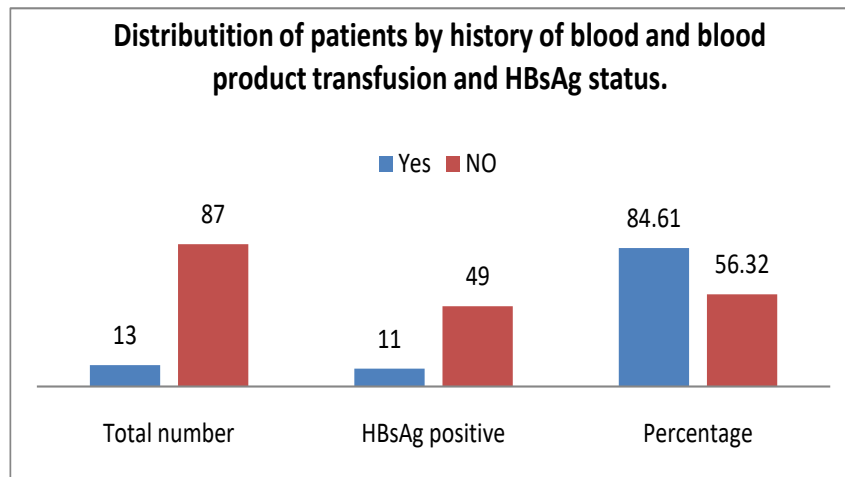
Graph-6: Seroprevalence of HBsAg in rural and urban people. (n=100)

The seroprevalence of HBsAg was much higher in urban people



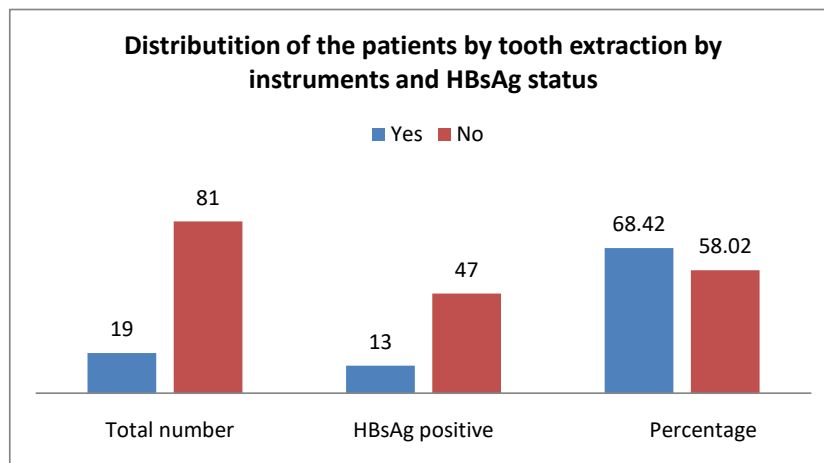
Graph-7: Distribution of the patients by marital and HBsAg status. (n=100)

The higher percentage of married persons was HBsAg positive.



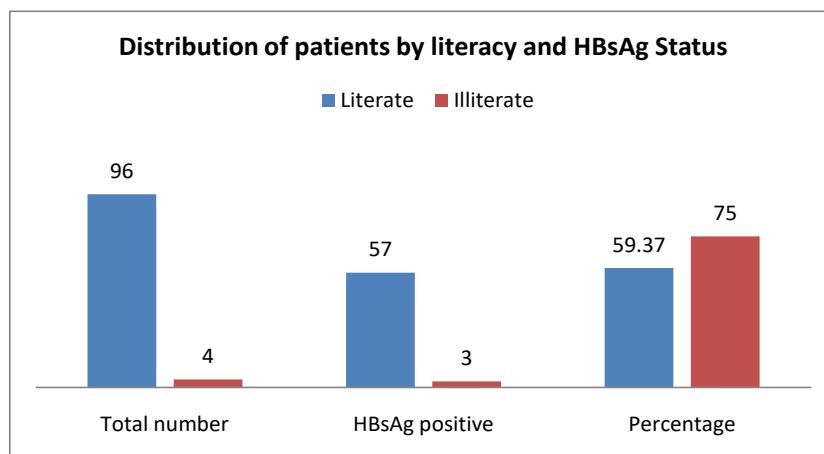
Graph-8: Distribution of patients by the history of blood and blood product transfusion and HBsAg status. (n=100)

A higher percentage of patients with a history of blood transfusion were HBsAg positive.



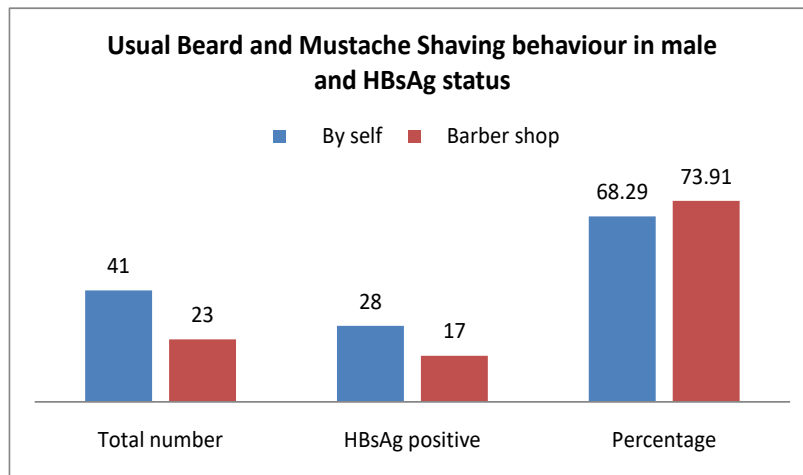
Graph-9: Distribution of the patients by tooth extraction by instruments and HBsAg status. (n=100)

A higher percentage of patients with a history of tooth extraction were HBsAg positive.



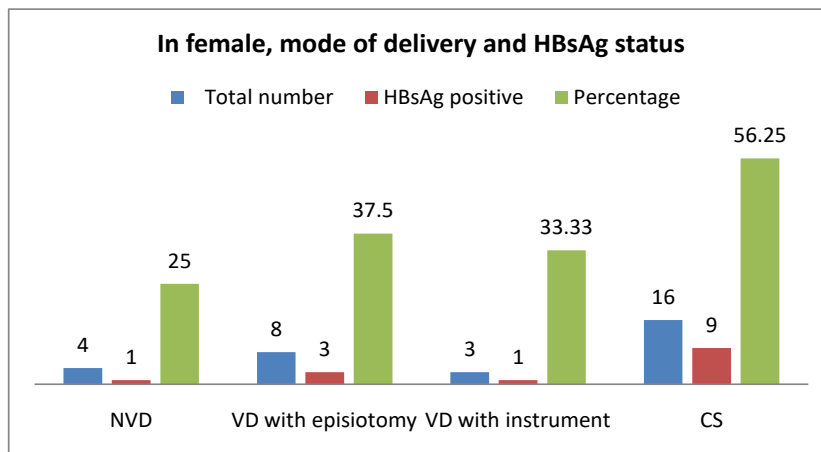
Graph-10: Distribution of patients by literacy and HBsAg Status. (n=100)

Shows a higher percentage of illiterate patients were HBsAg positive.



Graph-11: Usual Beard and Mustache Shaving behavior in male and HBsAg status. (n=64)

A higher percentage of patients with a history of shaving in barbershops were HBsAg positive.



Graph-12: In females, mode of delivery and HBsAg status. (n=31)

A higher percentage of patients with a history of Caesarian section (CS) and vaginal delivery (VD) with episiotomy were HBsAg positive.

DISCUSSION

In Bangladesh, liver disease, particularly chronic parenchymal liver disease, is a common hepatobiliary problem [13]. Chronic hepatitis B (HBV) infection is the most common cause of CLD in Bangladesh [14]. Therefore, a substantial number of hospitals admitted CLD patients are likely to be chronic carriers of HBV. A serological marker of HBV infection is hepatitis B surface antigen (HBsAg). After its first identification by Blumberg *et al.* [15], it has been widely used to identify chronic carriers of HBV. Therefore, these patients constitute a major medical health hazard for medical personnel and other patients by acting as a potential source of infection. The present study was undertaken to find out the seroprevalence of HBsAg among hospital admitted patients of acute and

chronic liver disease and its sociodemographic pattern. A total number of 100 patients aged between 18 to 49 years admitted into different medicine units of Dhaka Medical College Hospital were selected for the study. This present study was limited by its hospital inpatients-based data collection and hence unlikely to present the actual picture. Only a community-based study could find out the actual picture of seroprevalence of HBsAg among acute and chronic liver disease in Bangladesh.

Among 100 cases, the number of patients with acute viral hepatitis was 15, and the number of CLD patients was 85. Among 15 patients with acute viral hepatitis, 4 patients were HBsAg positive, which is about 26.66%. And among 85 patients of CLD 56 patients were found to be HBsAg positive, which is about 65.88%. Different previous reports of Bangladesh showed a wide range (30-62.5%) of HBsAg positivity in CLD patients [16]. Boxall EH showed a similarly high percentage in Iraq [17]. This high prevalence of HBsAg among cirrhotic patients is not surprising, considering

that the HBsAg prevalence amongst the general population of Bangladesh is between 7.8 to 8.6% [18].

High incidence of HBsAg positivity in CLD patients ranging from 20 to 60% has been reported from Greece, Italy [19], Africa, India, and Iraq [20]. All these countries have higher HBsAg seroprevalence [21] amongst the general population. Such association, however, was rarely observed in CLD patients in Australia and Great Britain [22]. This is consistent with their very low (0.1 to 0.2%) HBsAg seroprevalence among the general population [23]. The age and sex distribution in the present study is similar to other reports [24] 70.31% were male, and 41.66% were female. This male preponderance in this hospital corresponds to previous studies [25] and perhaps reflects females' social prejudice and avoidance of hospital admission [26]. Most patients were between 29 to 39 years (Graph. 2). This is similar to the previous studies.

The Occupational incidence (Graph.4) shows that people of almost all occupations are susceptible to becoming HBsAg positive and developing liver disease. This is similar to the previous findings [13]. Socioeconomic background analysis (Graph.5) showed that most of the HBsAg positive patients came from poor (62.79%) and middle class (62.22%) families, while only 41.66% came from the upper class. So, with declining economic status, HBsAg seroprevalence increases progressively, similar to a previous study done by Chowdhury. Other previous studies also commented about the higher preponderance of HBsAg seropositivity among lower socioeconomic groups in patients with liver disease, particularly CLD. Higher mortality and morbidity from cirrhosis in the lower economic class have also been reported from USA.

Analysis of Seroprevalence of HBsAg among Rural and urban residence revealed that urban residence has a higher (Graph.6) preponderance of becoming HBsAg positive than the rural residence. Graph.7 revealed that HBsAg positive cases were more (70.27%) than the unmarried patients (30.76). But the previous study of showed that unmarried people were more HBsAg positive than married people. It could be due to recent changes in the sociodemographic pattern.

Those who had received blood or blood product transfusion were more HBsAg positive (84.61%) than those who had not received (56.32%). Previous studies [13] have shown that injection, blood transfusion, and hospitalization positively correlate with HBsAg positivity among hospitalized patients. It was also observed by Ahmed Q [27] that history of injection, blood transfusion, and hospitalization are positively associated with HBsAg positivity among the general population. These findings indicate that the mire group might have an infection by receiving a blood transfusion or blood product. Most blood or

blood products have been screened out for hepatitis B, hepatitis C, AIDS, Syphilis, and malaria in Bangladesh. But unfortunately, these tests are not 100% sensitive and specific. Some patients had received transfusion 10-20 years back when screening for major diseases in the blood or blood product were not routinely practiced in Bangladesh. During that period, these patients might have acquired HBV infection.

It has been observed that HBsAg positive cases were more (68.42%) in the patients who had extracted their tooth by instrument than those who had never extracted their tooth by instrument, and they were 58.02%. The patient who had a history of surgery had a higher percentage (69.23) than those who had never gone through any surgical intervention, and it was relatively low (58.62%). This denotes that probably adequate measures were not taken during tooth extraction and any surgical procedure.

It was found that HBsAg cases were higher (75%) among illiterate people, and it was 59.3%. It was also observed by the previous study. This finding indicates that literacy might positively impact awareness of hepatitis B virus infection prevention. It was found that seroprevalence of HBsAg is higher in those who got their mustache and beard cut at the barbershop (73.91%), and it was relatively low in patients who got it by themselves (68.29%). A previous study revealed similar findings. This indicates that awareness about this matter may lower the prevalence of HBsAg among the general people. In the case of females, the seroprevalence was higher in those. Who underwent caesarian section or in whom episiotomy or instrumental delivery was needed, particularly in patients with caesarian section (56.25%). A similar finding was observed by Masud Rana.

CONCLUSION

HBsAg is mostly prevalent among the patients of liver disease, among those vulnerable to acquiring hepatitis B virus infection during their invasive treatment procedure. There was the highest percentage of HBsAg positive cases among the male sex, younger age group, Illiterate persons, low monthly family income group. It was observed that seroprevalence of HBsAg was more among the patients who had received blood and blood product in the past, had undergone surgery, and had a history of instrumental tooth extraction.

The sample size of the present study was very small. Even though it was tried to explore a small segment of the problem of hepatitis B infection in our country, the findings of this study can provide a few guidelines to future researchers. It also has some limitations.

RECOMMENDATIONS

- Health education programs should be geared up among hospital staff and the general population to prevent HBV infection.
- High-risk persons should be vaccinated against HBV infection.
- If possible, a blood test for HBsAg should be done in all hospitalized patients, particularly those of CKD, thalassemia, malignancies, etc. These patients, if found HBsAg negative, should be vaccinated.
- This research also indicates that further study is needed in other hospitals and communities. There should be a national survey to determine the actual figure of this problem in our country.

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