

Original Article

Risk Factors and Transmission Patterns of Hepatitis B Virus Among Hospitalized Patients

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ABSTRACT

Background: Hepatitis B virus (HBV) infection remains a significant public health concern, particularly in developing countries, due to its chronic complications and modes of transmission. Understanding the demographic distribution, clinical presentation, and transmission patterns is essential for effective prevention and control strategies. This study aimed to assess the risk factors, transmission patterns, and clinical features of HBV among hospitalized patients. **Methods & Materials:** This hospital-based observational study was conducted at the Department of Medicine and the Department of Hepatology at Bangabandhu Sheikh Mujib Medical University (BSMMU) and Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh, between June 2012 and September 2012. A total of 100 hospitalized patients diagnosed with HBV infection were included in this study. **Results:** The majority of HBV cases were observed among young adults, with 76% of patients falling between the ages of 18 and 47 years. Males accounted for 72% of the cases, with a male-to-female ratio of 2.57:1. Clinically, the most frequent symptoms were anorexia (50%), abdominal pain (40%), and abdominal discomfort (40%), with 40% of patients being asymptomatic. Mental status was preserved in 95% of patients, while 5% exhibited confusion, potentially due to hepatic complications. Vertical transmission was the most common risk factor (30%), followed by lifestyle-related exposures (22%) and life events (13%). Surgical interventions, both major (7%) and minor (9%), along with infusion- and transfusion-related exposures, were also noted. Specific transmission routes included appendectomy, dental procedures, accidental pricking, abortions, and high-risk behaviors such as having multiple sexual partners (45.45%) and sharing grooming tools in barbershops (22.73%). **Conclusion:** HBV infection predominantly affects young, economically active males and is often transmitted vertically or through lifestyle-related practices. A significant number of patients remain asymptomatic, underscoring the need for routine screening and targeted awareness programs to address modifiable risk factors and improve early detection.

Keywords: Hepatitis B Virus, Clinical features, Risk Factors, Transmission Patterns

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INTRODUCTION

Hepatitis B virus (HBV) remains one of the most widespread bloodborne pathogens globally and is a leading cause of chronic liver disease and hepatocellular carcinoma. It is estimated that approximately 350 million individuals worldwide are chronic carriers of HBV [1]. The prevalence of chronic HBV infection varies significantly across different regions. High endemicity (defined as >8% hepatitis B surface antigen carriage) is observed in all socioeconomic groups in sub-Saharan Africa, much of the Far East, parts of Eastern Europe and Central Asia, Greenland, remote areas of northern Canada, the Western Pacific, the Middle East, and the Amazon River basin. Intermediate endemicity (2–7%) is reported in parts of Southern and Eastern Europe, Central and Southwest Asia, additional regions in the Middle East, Russia, Japan, the

areas surrounding the Amazon basin, Northern Africa, Central America, and the Caribbean. Conversely, low endemicity (<2%) is found in Northern and Western Europe, most of North America, Mexico, Australia, New Zealand, and Southern South America [2]. In high-endemicity regions, HBV is primarily transmitted during infancy and childhood, although individuals of all ages may be affected. The lifetime risk of acquiring HBV in these areas ranges from 20% to 60%, and roughly 40% of the global population lives in these regions [3]. Since most infections acquired during childhood are asymptomatic, acute disease often goes undetected. However, the long-term consequences—including chronic liver disease and liver cancer—are common in adulthood [4]. Notably, about 75% of the world's chronic HBV carriers reside in Asia and the Western Pacific [5]. It is estimated that 15–40% of chronically

infected individuals will go on to develop cirrhosis, liver failure, or hepatocellular carcinoma (HCC) [5], contributing to an annual death toll of 500,000 to 1.2 million people due to HBV-related complications^[6-8]. This high burden underscores the significant global health impact of HBV. A study conducted in Bangladesh involving 1,018 individuals from various age groups found that 5.5% tested positive for HBsAg. Among those, 58.9% were HBeAg positive while 41.09% were HBeAg negative. Males were disproportionately affected, especially between the ages of 16 and 50. Common risk factors identified in the study included unsafe injection practices, treatment by unqualified traditional healers, barbers, and body piercing [9]. The Asia-Pacific region shows wide variation in HBV prevalence. The lowest rates (<1%) are seen in North America, Australia, and New Zealand; Japan has moderate prevalence (2–4%), while China ranges from 5–18%. The highest rates (15–20%) are reported in Taiwan and several Southeast Asian countries^[10]. In these regions, HBV transmission occurs through multiple routes, including during infancy, early childhood, and adulthood. In contrast, low-endemicity countries—such as those in North America, Western and Northern Europe, and Australia—have a general population prevalence of 5–7%, but only 0.5–2% are chronic carriers^[11]. In these countries, most new infections occur among adolescents and young adults, particularly within high-risk groups such as injection drug users, men who have sex with men, healthcare workers, and patients requiring frequent transfusions or hemodialysis. HBV is transmitted through contact with infected blood or body fluids, either vertically (from mother to child), percutaneously, or through mucosal exposure. Behavioral risk factors include unprotected sexual activity, body piercing, tattoos, acupuncture, injection drug use, and participation in contact sports^[12,13]. The risk of sexual transmission is particularly high among individuals with multiple partners, men who have sex with men, and commercial sex workers. Percutaneous transmission can also occur via contaminated medical, dental, or cosmetic instruments, as well as through transfusions of infected blood products. In high-endemicity areas, HBV is most commonly acquired during early childhood through perinatal or horizontal (child-to-child) transmission^[14]. Globally, perinatal transmission remains a predominant mode of HBV spread. However, this pattern is gradually shifting due to the implementation of universal vaccination programs in many countries. In low-endemicity settings, HBV transmission is largely driven by unsafe injection practices and sexual contact.

RESULTS

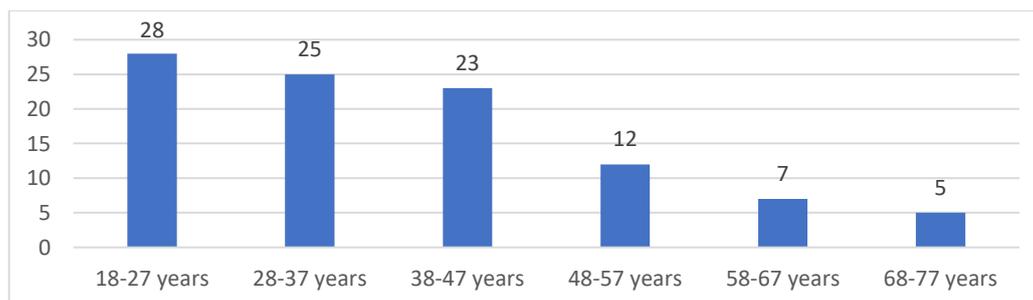


Figure – 1: Age distribution of our study subjects

The most commonly reported risk factor for newly diagnosed adult cases is injecting drug use, followed by unprotected sexual activity. It is worth noting that a significant proportion of patients—possibly up to one-third—may not be able to identify how they acquired the infection. Importantly, hepatitis B is not spread through casual contact, such as shaking hands, sharing towels, or eating utensils. Therefore, in this study, we aimed to assess the risk factors, transmission patterns, and clinical features of HBV among hospitalized patients at a tertiary care center.

METHODS & MATERIALS

This hospital-based observational study was conducted at the Department of Medicine and the Department of Hepatology at Bangabandhu Sheikh Mujib Medical University (BSMMU) and Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh, between June 2012 and September 2012. In this study, we included 100 adult patients diagnosed with Hepatitis B Virus (HBV) infection who were admitted to these departments during the study period. These are the following criteria to be eligible for enrollment as our study participants: a) Patients aged above 18 years; b) Patients serologically positive for Hepatitis B surface antigen (HBsAg); c) Patients who were willing to participate were included in the study. And a) Patients with any other viral infection; b) Patients with any history of acute illness (e.g., renal or pancreatic diseases, ischemic heart disease, asthma, COPD etc.) were excluded from our study. **Data Collection:** Patients admitted with features suggestive of hepatitis were initially evaluated by attending physicians, and those suspected of having HBV infection were referred to the study physician for further assessment. A detailed clinical history and relevant physical examination focusing on hepatobiliary symptoms were conducted, and patients meeting the inclusion criteria were enrolled. Structured interviews were carried out using a pre-designed case record form, and written informed consent was obtained before collecting immediate blood samples for serological testing of HBsAg to confirm HBV infection. **Statistical Analysis:** All data were recorded systematically in a preformed data collection form. Quantitative data were expressed as mean and standard deviation; qualitative data were expressed as frequency distribution and percentage. The data were analyzed using SPSS 17.0 (Statistical Package for Social Sciences) for Windows version 10. Ethical approval was obtained from the Ethical Review Committee of Bangabandhu Sheikh Mujib Medical University (BSMMU).

Figure 1 shows that the majority of cases were observed in younger adults, with the 18–27 years age group contributing the highest number of cases (28%), followed closely by the 28–37 years group (25%) and 38–47 years group (23%). This suggests that 76% of patients fall within the 18–47 years age range, highlighting a significant burden among individuals in their most economically productive years. The number of cases declines gradually with age: 12% in the 48–57 years group, 7% in the 58–67 years group, and the lowest at 5% in the 68–77 years group.

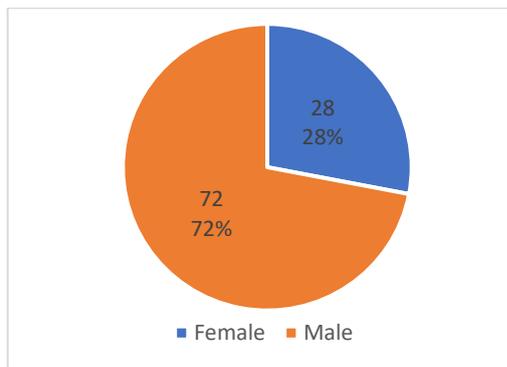


Figure – 2: Gender Distribution of our study subjects

The pie chart shows that most (72%) of the patients were male and 28% were female. The male and female ratio was 2.57:1 in the study.

Table – I: Distribution of clinical features and consciousness levels in patients with hepatitis B virus infection

Clinical Feature	N=100	Percentage (%)
Asymptomatic	40	40.0
Anorexia	50	50.0
Abdominal Pain	40	40.0
Abdominal Discomfort	40	40.0
Jaundice	20	20.0
Weight Loss	31	31.0
Haematemesis/Melaena	20	20.0
Abdominal Swelling	30	30.0
Consciousness Level		
Fully Conscious	95	95.0
Confused	5	5.0

Table I presents the frequency and percentage of various clinical features observed among 100 patients infected with the Hepatitis B virus. The most commonly reported symptoms were anorexia (50%), followed by abdominal pain (40%), abdominal discomfort (40%), and asymptomatic cases (40%), indicating a significant proportion of patients presented with non-specific or no symptoms. Other features such as weight loss (31%), abdominal swelling (30%), jaundice (20%), and haematemesis/melaena (20%) were also noted. In terms of mental status, a vast majority of patients (95%) were fully conscious and oriented, while 5% were confused, possibly reflecting hepatic encephalopathy or related complications.

Table – II: Transmission risk factors of hepatitis B virus among the study patients

Risk Factors	N=100	P (%)
Vertical Transmission	60	60.0%
H/O of HPV infection	30	30.0%
Major Surgery	7	7.0%
Minor Surgery	9	9.0%
Infusion Related	5	5.0%
Transfusion Related	6	6.0%
Related to Life Events	13	13.0%
Related to Lifestyle	22	22.0%
Unknown Etiology	7	7.0%

Table II presents the potential transmission risk factors for Hepatitis B among our study participants. The most frequently identified risk factor was vertical transmission (60%), suggesting a significant role of mother-to-child transmission. This was followed by lifestyle-related exposures (22%) and events linked to life circumstances (13%). Surgical procedures also contributed, with major surgeries accounting for 7% and minor surgeries for 9% of the cases. Other contributors included infusion-related (5%) and transfusion-related exposures (6%). Notably, 7% of patients had no identifiable risk factor, emphasizing the challenge in tracing exact sources in some cases.

Table – III: Transmission patterns of hepatitis B virus in our study subjects

Transmission Patterns		
Major Surgery	N=7	P(%)
Appendectomy	2	28.57
Cholecystectomy	1	14.29
Hysterectomy	1	14.29
Prostatectomy (TURP)	1	14.29
Caesarean section	1	14.29
Repair of Duodenal Ulcer Perforation	1	14.29
Minor Surgery N=9		
Dental Procedure	2	22.22
Circumcision	1	11.11
Hernia (Inguinal) Operation	1	11.11
Local abscess Operation	2	22.22
Local cyst Operation	3	33.33
Life Events N=13		
Accidental Pricking	3	23.08
Vaccination	1	7.69
Abortion	2	15.38
Instrumental Delivery (episiotomy. Forcep)	2	15.38
Interventional Surgery-		0.00
Coronary angiography	1	7.69
Endoscopy	2	15.38
ERCP	2	15.38
Life Style N=22		
Shaving/Hair cutting in Barber shop	5	22.73
Toothbrush Sharing	1	4.55
Tattooing	1	4.55
I/V Drug Abuse	2	9.09
Nose/Ear piercing	6	27.27
Addiction	3	13.64
Multiple sexual partners	10	45.45

Table 3 shows the specific activities and procedures identified as transmission sources for Hepatitis B virus among the study patients, categorized into major surgery, minor surgery, life events, and lifestyle factors. Among patients who underwent major surgeries, the most common procedure linked to HBV transmission was appendectomy (28.57%), followed by cholecystectomy, hysterectomy, prostatectomy (TURP), caesarean section, and repair of duodenal ulcer perforation, each contributing 14.29% of cases in this subgroup. For those with minor surgical procedures, local cyst operations (33.33%) were the leading contributor, followed by local abscess operations (22.22%) and dental procedures (22.22%). In this group, accidental pricking injuries (23.08%), abortions, and instrumental deliveries (each 15.38%) were significant events associated with transmission. Additionally, endoscopic procedures like ERCP, standard endoscopy, and even coronary angiography were reported as life events. The most commonly identified lifestyle-related transmission was having multiple sexual partners (45.45%), emphasizing the importance of sexual transmission. Other frequent behaviors included nose/ear piercing (27.27%), shaving/haircuts at barbershops (22.73%), and addiction-related exposures (13.64%).

DISCUSSION

Hepatitis B virus (HBV) remains a major global public health concern and is a leading cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma (HCC). It is estimated that approximately 2 billion individuals show serological evidence of past or present HBV infection, with over 350 million being chronic carriers. Alarmingly, about 75% of these chronic carriers reside in Asia and the Western Pacific region. Clinical progression varies, but 15–40% of those infected may eventually develop cirrhosis, liver failure, or HCC. Mortality from HBV infection is significant, with an estimated 500,000 to 1.2 million deaths reported annually [15]. In our study, the age distribution showed that no age group is entirely immune to HBV infection. The highest incidence was observed among individuals aged 18–27 years (28%), followed by 28–37 years (25%) and 38–47 years. Individuals below 20 years accounted for around 6% of cases, suggesting early exposure, possibly through perinatal transmission. Similar trends were reported by Khan et al., who found the highest infection frequency in the 21–30 age group (34.93%) and a declining trend in older populations [16]. Likewise, Al-Busafi et al. observed that nearly three-quarters of HBV-infected individuals were between 20 and 39 years old [17]. Gender-based distribution in this study revealed a higher prevalence among males (72%) compared to females (28%), resulting in a male-to-female ratio of 2.57:1. This aligns with previous findings from Pakistan, Oman, and Iran, where male predominance was similarly noted [16–19]. Globally, men consistently represent the majority of HBV cases [17,20,21]. Regarding clinical presentation, 40% of our patients were asymptomatic. Among symptomatic individuals, the most common manifestations included anorexia (50%), abdominal pain (40%), abdominal discomfort (40%), weight loss (35%), abdominal swelling (30%), jaundice (20%), and gastrointestinal bleeding (20%). These findings are consistent with descriptions by Jin-Lin Hou et al., who highlighted that in

cirrhotic patients, symptoms like weight loss, anorexia, and abdominal discomfort may signal the onset of HCC [22]. Vertical transmission emerged as the most prevalent risk factor in this study, accounting for 60% of cases, emphasizing the ongoing challenge of mother-to-child transmission. Other notable contributors included lifestyle-related exposures (22%), major surgeries (7%), minor surgeries (9%), infusion (5%), and blood transfusion (6%). This mirrors findings from Oman, where family history, surgical interventions, and body piercings were commonly associated with HBV transmission [23]. Iatrogenic transmission, although less frequent, remains a concern. A case-control study in Iran found surgery to be an independent risk factor for chronic HBV carriage [24]. Hospital-acquired infections, including dental work, surgery, and transfusions, were significant in Bahrain and Yemen [25,26], whereas studies from other Arab and African countries reported minimal impact of surgical procedures on HBV transmission [27]. These discrepancies may reflect differences in healthcare practices, particularly in sterilization, disinfection, and screening protocols. Lifestyle-related transmission modes in this study included multiple sexual partners (45.45%), body piercing (27.27%), barbershop-related shaving/haircuts (22.73%), and addiction-related exposures, including intravenous drug use (9.09%). Barbershop-related exposures are particularly relevant in the Middle East, where studies have shown that many barbers reuse razors and lack awareness of transmission risks [28,29]. Household transmission through shared use of personal items such as razors, toothbrushes, and towels has been widely reported and may lead to early horizontal transmission, especially among family members. Access to personal sanitization tools within the household has been shown to provide some protective effect [30,31]. Colin et al. emphasized that HBV is transmitted through percutaneous or mucosal exposure to infected blood or other bodily fluids. The highest viral concentrations are found in blood and serum, but semen and saliva are also infectious. Modes of transmission include perinatal, household (non-sexual), sexual contact, needle-sharing, and healthcare-associated exposures [32]. In contrast to our findings, Al-Busafi et al. reported low engagement in high-risk behaviors such as intravenous drug use (IDU) and multiple sexual partnerships, with only 16.8% reporting the latter [17]. These behaviors, while primary risk factors in low endemic regions like the United States, where sexual transmission and IDU account for 40.9% and 18.2% of acute HBV infections, respectively, may be less influential in high endemic areas [33]. For example, in China, no significant association was observed between HBV and these behaviors [34]. Nonetheless, in the Middle East, the prevalence of HBV among IDUs ranges widely from 6% to 44.3%, highlighting the varying regional dynamics of transmission [24,28]. HBV infection patterns are influenced by a combination of age, gender, perinatal and lifestyle factors, and healthcare-related exposures. Regional epidemiology, healthcare infrastructure, and cultural practices play a significant role in shaping transmission dynamics, underlining the need for public health strategies and rigorous infection control practices.

Limitations of the study

Our study was a double-center study. We took a small sample size due to the short study period. After evaluating those patients, we did not follow up with them for the long term and did not know other possible interference that may happen in the long term with these patients.

Conclusion and recommendations

In our study, we found that Hepatitis B virus (HBV) continues to pose a significant public health challenge, especially among hospitalized patients who may be more vulnerable to infection due to greater exposure to potential risk factors. These risks often arise from unsafe medical practices, surgical procedures, repeated injections, and the use of unsterilized equipment. In healthcare environments where infection control measures are insufficient, hospitals can unintentionally become hotspots for HBV transmission. Additionally, individual factors such as a lack of awareness regarding HBV status, dependence on untrained practitioners, and high-risk behaviors such as unprotected sex and intravenous drug use increase the risk. Recognizing these risk factors and transmission patterns is vital not only for safeguarding patients but also for preventing hospital-acquired infections. To effectively combat the spread of HBV, it is essential to strengthen infection control protocols, enhance vaccination and screening efforts, and educate both healthcare professionals and the public. Further study with a prospective and longitudinal study design, including a larger sample size, needs to be done to validate the findings of our study.

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