

Hepatitis B Risk Factors are Frequently Present in Children at Jinnah Postgraduate Medical Centre in Karachi

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ABSTRACT

Background: Infection with the hepatitis B virus (HBV) poses a serious threat to global public health. More than 300 million instances of chronic hepatitis are brought on by it, which is the primary cause of liver disease. This study was conducted to determine the risk factors of HBV in children at Jinnah Postgraduate Medical Centre, Karachi, Sindh, Pakistan.

Materials and methods: This cross-sectional study was conducted at the Department of Gastroenterology, Jinnah Postgraduate Medical Centre, Karachi, Sindh, Pakistan from January 2019 to April 2022. A total of 134 children aged below 16 years with HBV were recruited in this study. Demographic information was recorded. Screening for HBV was done in all patients. Investigations including liver biochemistry, hepatitis B surface antigen (HBsAg), and HBV DNA polymerase chain reaction (PCR) were conducted in the hospital along with a complete blood count and ultrasound whole abdomen. All information was collected on a predesigned proforma and evaluated using statistical package for the social sciences (SPSS), version 25.0, software.

Results: The mean age of patients was 11.02 ± 2.19 years. There were 57.46% males. The frequent risk factor was vertical transmission in 47% of children followed by blood transfusion in 23.9% of children, horizontal transmission in 13.4% of children, and prior history of surgical or dental intervention in 17.2% of children.

Conclusion: In this study, vertical transmission was the most common route of transmission of HBV. Additionally, 11% of family members were HBV positive. None had concomitant hepatitis C virus (HCV) and HDV infection. All pregnant females should be screened. Children on chronic blood transfusion therapy should be screened annually. Additionally, birth-dose HBV vaccination should be implemented as a key step in HBV prevention among Pakistani children.

Keywords: Blood-borne transmission, Hepatitis B virus, Horizontal transmission, Perinatal transmission.

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INTRODUCTION

Infection with the hepatitis B virus (HBV) poses a serious threat to global public health. More than 300 million instances of chronic hepatitis are brought on by it, which is the primary cause of liver disease.¹ These infected people pass away every year as a result of the infection's ensuing consequences, such as chronic liver disease (CLD) and hepatic cancers.² About 47% of instances of hepatocellular carcinoma (HCC) and 44% of cases of CLD are caused by HBV.³ With an 8% prevalence rate, this illness has the most negative effects in sub-Saharan Africa.^{4,5}

Hemodialysis and intravenous (IV) drug abuse have also been documented as routes of transmission.⁶ One of the studies from Pakistani described that causative agents of chronic HBV and hepatitis C virus (HCV) infection were history of intervention (32.55%), contact with hepatitis patient (25.99%), traveling abroad (20.25%) and chronic blood transfusions (14.51%). A study by Jafri et al.⁷ reported that HBV was most predominant in patients who received therapeutic injections (62.2%) despite using new syringes and needles.⁸

In another study by Hashmi et al.,⁹ blood transfusion was a risk factor present in children followed by vertical transmission in 41.9%, horizontal transmission in 9.6%, and prior history of surgical or dental intervention recorded in 3.2% of children.¹⁰

Even though numerous studies have been conducted throughout the world, there is variability in the studies that are published on an international level and a dearth of local studies. This study intended to analyze the disease burden in our population,

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which resulted in new research protocols including stringent screening and HBV birth-dose vaccination.

MATERIALS AND METHODS

The cross-sectional study was started from January 2019 to April 2022 at the Department of Gastroenterology, Jinnah Postgraduate Medical Centre (JPMC), Karachi, Sindh, Pakistan. After obtaining approval from the ethical committee and written informed consent from parents, all children below 16 years with HBV were enrolled using a non-probability consecutive sampling technique. A total of

Table 1: Associated factors of HBV with gender

Factors	Gender		Total	p-value
	Male N (%)	Female N (%)		
Blood transfusion				
Yes	14 (43.8)	18 (56.3)	32	0.072
No	63 (61.8)	39 (38.2)	102	
Vertical transmission				
Yes	43 (68.3)	20 (31.7)	63	0.017*
No	34 (47.9)	37 (52.1)	71	
Horizontal transmission				
Yes	5 (27.8)	13 (72.2)	18	0.006*
No	72 (62.1)	44 (37.9)	116	
History of surgery				
Yes	17 (73.9)	6 (26.1)	23	0.08
No	60 (54.1)	51 (45.9)	111	

*shows statistical significance at probability level of $p < 0.05$

134 children were enrolled. Demographic information (including name, age, and gender) was recorded. Screening of HBV and HDV and other investigations including liver biochemistry, complete blood count, and ultrasound abdomen of all patients were conducted in the hospital. Furthermore, HBV DNA (qualitative or quantitative) was done in HBV-positive patients.

All information such as age gender, place of residence, socioeconomic status, duration of disease, and factors (blood transfusion, vertical transmission, horizontal transmission, family history, and history of surgery) were collected. The data were collected on a predesigned proforma. Patients with negative polymerase chain reaction (PCR)/hepatitis B surface antigen (HBVeAg) results and the patients who did not give consent were excluded from the study.

Data were put and evaluated using Statistical Package for the Social Sciences (SPSS), version 25.0, software. Percentages and frequencies were expressed for qualitative variables such as socioeconomic status, gender, and risk factors. Data were stratified for gender socioeconomic status, and duration of disease. For poststratification, the Chi-square test/Fisher's exact test was applied to see the significance. A p -value ≤ 0.05 was considered significant.

RESULTS

A total of 134 children with HBV were enrolled in this study. The mean age was 11.02 ± 2.19 years and the mean duration of disease was 2.86 ± 1.41 months. There were 57.46% males and 42.54% females. In this study, the frequent risk factor was vertical transmission in 47% followed by blood transfusion in 23.9% of children, horizontal transmission in 13.4%, and prior surgical history or history of dental procedure was present in 17.2% of children. The rate of vertical transmission was significantly higher in males than females ($p = 0.017$) while the rate of horizontal transmission was significantly lower in males than females ($p = 0.006$). Furthermore, the rate of blood transfusion and history of surgery was insignificant between males, and females as shown in Table 1.

The rate of blood transfusion and history of surgery were significantly high in low socioeconomic status cases as shown in Table 2.

Table 2: Associated factors of HBV with socioeconomic status

Factors	Socioeconomic status			Total	p-value
	<20 K N (%)	20–50 K N (%)	>50 K N (%)		
Blood transfusion					
Yes	21 (65.6)	11 (34.4)	0 (0.0)	32	0.027*
No	50 (49.0)	33 (32.4)	19 (18.6)	102	
Vertical transmission					
Yes	31 (49.2)	20 (31.7)	12 (19.0)	63	0.309
No	40 (56.3)	24 (33.8)	7 (9.9)	71	
Horizontal transmission					
Yes	8 (44.4)	9 (50.0)	1 (5.6)	18	0.198
No	63 (54.3)	35 (30.2)	18 (15.5)	116	
History of surgery					
Yes	11 (47.8)	5 (21.7)	7 (30.4)	23	0.042*
No	60 (54.1)	39 (35.1)	12 (10.8)	111	

*shows statistical significance at probability level of $p < 0.05$

Table 3: Associated factors of HBV with the disease

Factors	Duration of disease		Total	p-value
	≤ 3 months N (%)	>3 months N (%)		
Blood transfusion				
Yes	20 (62.5)	12 (37.5)	32	0.231
No	75 (73.5)	27 (26.5)	102	
Vertical transmission				
Yes	42 (66.7)	21 (33.3)	63	0.31
No	53 (74.6)	18 (25.4)	71	
Horizontal transmission				
Yes	14 (77.8)	4 (22.2)	18	0.49
No	81 (69.8)	35 (30.2)	116	
History of surgery				
Yes	20 (87.0)	3 (13.0)	23	0.062
No	75 (67.6)	36 (32.4)	111	

However, the rate of risk factors was not significant with the duration of diseases as presented in Table 3.

DISCUSSION

Hepatitis B prevalence is recorded to be 2.04% in Pakistani children. The study was done in Lahore, Pakistan, in 1998 on 392 children.⁴ One more study shows a 0.5% prevalence of HCV in children.⁵ Chronic liver disease secondary to HCV was recorded to be 31.66% and was 5% to HBV in Pakistani children.¹¹ The antenatal transmission rate of HBV is 1.1% despite the administration of HBV immunoglobulins along with the vaccine to the baby at birth.¹²

One tertiary care setup in Pakistan reported that for patients who are on chronic blood transfusion, transmission incidences are as high as 54.2% for HCV and 9.2% for HBV.¹³ Hemodialysis and IV drug abuse have also been documented as the route of transmission.^{14,15}

One of the studies from Pakistan reported that causative agents for HCV chronic HBV infection were surgical intervention (32.55%), contact with hepatitis-positive patients (25.99%), traveling abroad (20.25%), and blood transfusions (14.51%).¹⁶ The average age was 11.02 ± 2.19 years in this study with the mean disease duration being 2.86 ± 1.41 months. There 57.46% of patients were male while 42.54% were female. These results support the findings of local literature already in existence. The mean age of pediatric HBV patients in research by Khan A et al. was 8.4 ± 4.5 years, which is unquestionably consistent with the findings of the current investigation.¹⁷ The male-to-female ratio discussed in the study of Khan A et al.¹⁸ was around 1.5:1, which is much less than the findings of the current study. Perhaps there are more male patients because of social factors that cause them to arrive at hospitals earlier.¹⁸ Another research on HCV infection in children and adolescents was conducted by Aziz et al.¹⁹ The male-to-female ratio was 1:2.6, and the mean age was 18.42 ± 2.59 years. Both ideas are also irrational in light of the current study.²⁰ Nevertheless, the male-to-female ratio in HCV infection, in one more study done by El-Shabrawi and Kamal.²¹ is 1.7:1 which is to a certain degree concordant with the outcome of the present study.¹⁹

According to research from Bangladesh, surgical procedures, IV and intramuscular (IM) injections, HBV-positive moms, and unhygienic haircuts by hairdressers are the main causes of HBV infection in children.²¹ A parenteral injection, a family history of HCV infection, surgery, blood transfusions, and previous hospitalization were all listed as risk factors for HCV transmission in children in another research from Egypt.²²

In this study, the frequent risk factor was perinatal transmission in 47%, followed by blood transfusion, horizontal transmission in 13.4% and previous history of surgical or dental intervention was positive in 17.2% of children reported. Concerning risk factors, the most common causative factor was a blood transfusion. Anwar and Hashmi¹⁷ study reported about 50.82% of patients had gone through blood component transfusion. Perinatal transmission from the mother was recognized in 27.05% of patients whereas 4.92% of patients had a previous positive family history. History of surgical or dental intervention existed in 15.57% of patients although 2.46% had a history of stitches after trauma.¹⁸

In the current study, perinatal transmission persisted as the primary method of transmission for individuals with HBV and HCV. There are no policies in place to prevent the perinatal transmission of HCV. Amniocentesis and other invasive intrapartum fetal monitoring procedures increase the risk of spread and should not be used. Immunoprophylaxis with HBV and the use of antiviral medicines to reduce maternal HBV DNA burden to the lowest level Reduce the perinatal spread of HBV infection by giving newborns immune globulin and recombinant HBV vaccination after birth. In 14 patients (14.43%), risk factors related to surgery were identified. Studies conducted elsewhere have also identified a greater risk of viral hepatitis transmission in connection with certain surgical and dental procedures.²³

In the HBV case, administration of HBV immunoglobulin and vaccine at birth, the vertical transmission rate is 1.1%. For patients who are on continuing transfusion, incidences are 9.2% for HBV and 54.2% for HCV have been analyzed from the hospital in Pakistan.²⁴ Hemodialysis and IV drug abuse have also been documented as routes of transmission.²⁵ In a study from Pakistan, the risk factors for chronic HBV and chronic HCV were history of surgery (32.55%), prior

contact with hepatitis infected patient (25.99%), traveling abroad (20.25%), and blood component transfusions (14.51%).²⁶ In a study, a common risk factor was perinatal transmission in 41.9%, followed by blood transfusion present in 32.2%, horizontal transmission in 9.6%, and a history of prior surgical or dental intervention existing in 3.2% children.²⁷

CONCLUSION

In this study, perinatal transmission was the first common route of transmission, and blood transmission of the second most common route. Children on transfusion therapy and pregnant females should be screened for. Antiviral agents should be made available in all healthcare facilities for the treatment of patients and for infected mothers to eliminate the virus and prevent transmission.

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