

## Original Research Article

# Prevalence of Hepatitis B among jaundiced cases in paediatric age group

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### ABSTRACT

**Background:** Hepatitis B virus (HBV) infection is a global health problem. Over two billion people have been infected with hepatitis B virus globally, of whom over 350 million are chronic carriers. Vertical (mother to child) and horizontal early childhood transmission are the main routes of HBV transmission and are responsible for most chronic infections. The aim of this study was to study the role played by different modes of transmission of HBV and to study the burden of hepatitis B in pediatric age group.

**Methods:** All children below 12 years of age, admitted for jaundice, of both sexes, during one year study period were included. 50 patients (control) who were not suffering from jaundice or known liver disease were also included.

**Results:** Prevalence of HBsAg positivity among jaundiced children was 15.24%. There was increase in HBsAg positivity with increase in the age signifying role of horizontal mode of transmission in Hepatitis B virus infection.

**Conclusions:** HBV infection is an important health problem in paediatric age group. Horizontal mode of transmission plays important role in the spread of HBV infection among children.

**Keywords:** Childhood transmission, HBV infection, Horizontal transmission, Prevalence

### INTRODUCTION

Hepatitis B is a potentially life threatening liver infection caused by the hepatitis B virus (HBV). Hepatitis B virus (HBV) is a DNA virus with approximately 3200 base pairs. Approximately 350-400 million people are chronically infected with HBV and more than 3 billion people have been exposed to HBV worldwide.<sup>1</sup>

The average estimated carrier rate of HBV in India is 4% with a total pool of approximately 36 million carriers.<sup>2</sup>

However, most of India's carrier pool is established in early childhood, predominantly by horizontal spread due to crowded living conditions and poor hygiene. Childhood hepatitis constitutes a significant population of hospital admission in India. Worldwide, the overall frequency of pediatric liver disease is 1:8000. According

to a study in U.S, it amounts to almost 15000 hospital admissions per year.<sup>3</sup> Acute and subacute liver failure are common complications of viral hepatitis in India and HBV is reckoned to be the aetiological agent in 42% and 45% of adult cases respectively. There is a serious dearth of data regarding true prevalence of HBV in India.

Prevalence of hepatitis B is higher than average in high risk groups like patients with chronic kidney disease, on dialysis, with thalassemia, hemophilia or leukaemias or those receiving immunosuppressive or cancer chemotherapy and household contacts of HBV carriers.<sup>4</sup>

So the present work is undertaken at the upgraded department of Pediatrics, PMCH to test the patients of Jaundice admitted for presence of HbsAg (by latex agglutination method) and to know the role played by different modes of transmission of hepatitis B.

## METHODS

This was a prospective and descriptive clinical study conducted at the upgraded department of Pediatrics, Patna Medical College Hospital, a tertiary care centre in Bihar. Patients were recruited from in patient wards. Approval from the institutional ethics committee was obtained and the study was conducted from August 2018 to January 2020.

### Inclusion criteria

- Children below 12 years of age, of both sexes were included in the study. The subjects were further divided in two groups the controls and the cases. The control (50 in number) were selected from the admitted patients of the paediatric wards, who were not suffering from jaundice or from known liver disorders.

### Exclusion criteria

- All children above 12 years of age presenting with jaundice.
- Children presenting with deranged liver profile without jaundice.

A detailed history and physical examination were recorded in the clinical proforma. The investigations analyzed during the study period includes-hemogram, serum bilirubin (total, direct and indirect), serum alkaline phosphatase, serum glutamic pyruvate transaminases (SGPT), serum glutamic oxaloacetic transaminase (SGOT)serum protein (total, albumin, globulin and A/G ratio) and detection of Australian antigen (HBsAg) was done using readymade kits(Latex agglutination Method).

Results were interpreted as positive when there was visible agglutination within five minutes and as negative test when there was no agglutination. Based on above investigations jaundice cases were further divided in following etiological groups:

- Acute viral hepatitis
- Fulminant Hepatic failure
- Chronic Hepatitis
- Icterus neonatorum
- Drug induced jaundice
- Neonatal septicemia
- Hemolytic Jaundice

Data was analyzed using standard statistical software. To know the significance of difference in percentage of HBsAg positivity between two subgroups Chi square test was used. Yates correction was applied, if with one degree of freedom the observed value was less than 5.

## RESULTS

In this study 60% of the cases were males and 40% were females and approximately 42% of cases of jaundice were from 9-12 years of age group (Table 1). There was no significant difference in prevalence of HBsAg positivity among males and females when chi-square test is applied ( $p>0.1$ ).

Total 50 controls were selected (60% males and 40% females), maximum number of controls (42%) were from 9-12 years age (Table 2). Total 2 (4%) controls were positive for HBsAg in their serum. One positive control was from <1 year age and another from 9-12 years age group (Table 3).

**Table 1: Age and sex distribution in cases of Jaundice.**

Age group	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
<1year	10	9.52	9	8.57	21	20
1- 4 years	12	11.43	6	5.72	16	15.24
5-8years	13	12.38	11	10.47	24	22.85
9-12years	28	26.67	16	15.24	44	41.91
	63	60	42	40	105	100

**Table 2: Age and sex distribution of controls.**

Age group	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
< 1 year	6	12	4	8	10	20
1-4 years	5	10	3	6	8	16
5-8years	6	12	5	10	11	22
9-12years	13	26	8	16	21	42
Total	30	60	20	40	50	100

**Table 3: HBsAg positivity among controls.**

Age group	Total		HBsAg positive	
	Number	Percentage	Number	Percentage
<1 year	10	20	1	10
1-4 years	8	16	0	0
5-8years	11	22	0	0
9-12 years	21	42	1	4.76
Total	50	100	2	4

**Table 4: HBsAg positivity among jaundice cases in different age group.**

Age group	Total		Hbsag positive	
	Number	Percentage	Number	Percentage
<1 years	21	20.00	1	4.76
1-4 years	16	15.24	1	6.25
5-8 years	24	22.85	5	20.83
9-12 years	44	41.91	9	20.45
Total	105	100	16	15.24

**Table 5: Sex distribution of HBsAg positive cases of Jaundice.**

Sex	Total		Hbsag positive	
	Number	Percentage	Number	Percentage
Male	63	60	10	15.87
Female	42	40	6	14.28
Total	105	100	16	15.24

**Table 6: HBsAg positivity among different etiologies of Jaundice.**

Etiology	Total Cases		HBsAg positive s	
	Number	Percentage	Number	Percentage
Acute viral hepatitis	66	62.86	9	13.63
Fulminant hepatic failure	17	16.19	3	17.64
Chronic hepatitis	5	4.76	2	40.00
Icterus neonatorum	5	4.76	0	0.00
Drug induced jaundice	5	4.76	0	0.00
Neonatal sepsis	3	2.85	0	0.00
Hemolytic jaundice	4	3.81	2	50.00
Total	105	100	16	15.24

**Table 7: HBsAg positivity among jaundice cases with definite history of parenteral exposure in last 6 months.**

Age group	Total HBsAg positive cases	Number of positive cases with history of parenteral exposure		Number of positive cases without history of parenteral exposure	
		Number	Percentage	Number	Percentage
< 1 Year	1	1	100	0	0.00
1 – 4 years	1	1	100	0	0.00
5 – 8 years	5	2	40	3	60.00
6 -12 years	9	3	33.33	6	66.66
Total	16	7	43.75	9	56.25

There is increase in HBsAg positivity in 9-12 years age group compared to incidence of HBsAg positivity of the present series but that is not statistically significant

( $p>0.1$ ). There is increase in HBsAg positivity in 9-12 years and 5-8 years age groups in comparison to <1 year

and 1- 4-year age group and that is statistically significant ( $p < 0.05$ ) (Table 4).

There is no significant difference in prevalence of HBsAg positivity among males and females when chi square test is applied ( $p > 0.1$ ) (Table 5).

HBsAg positivity rate is maximum (50%) in hemolytic jaundiced cases and 40% in cases of chronic hepatitis. HBsAg positivity rate in acute viral hepatitis was 13.63% and 17.64% in fulminant hepatic failure. In none of the other etiologies HBsAg was detected (Table 6).

Total 43.75% HBsAg positive cases had definite history of parenteral exposure (blood transfusion/ intramuscular or intravenous injection) in last 6 months. In age <1 year and 1-4 years age group 100% HBsAg positive cases had history of parenteral exposure, both were patients of hemolytic jaundice with history of multiple transfusions (Table 7).

## DISCUSSION

In the present study 105 cases of jaundice was studied. 60% of the cases were males and 40% were females. The cases of jaundice were also divided in four age groups. Depending upon age the maximum number (41.91%) of cases were from 9-12 years of age.

In the present study 50 controls were tested for the presence of HBsAg in the blood and 2 (4%) were positive for HBsAg. HBsAg positive case was <1 years age and another from 9-12 years age.

The presence of HBsAg in persons who is not suffering from jaundice and free from liver disease (control) signifies chronic HBsAg carrier status (Hoofangle JH).<sup>5</sup> The HBsAg positivity in children below 15 years in India ranges from 1.3 to 12.7%.<sup>6</sup> The age related HBsAg prevalence has been assessed in several studies. In a multicentric study Tandon et al, have reported a positivity rate of 2.1% in the preschool age group.<sup>7</sup> Another study conducted by Tandon et al, (1991) HBsAg prevalence was studied in sera from 982 children that showed that HBsAg prevalence was 2%. A similar prevalence was noted by Panda et al, from Delhi who identified 12.2% HBsAg positivity in 1-5 years and 10% in 6-15 years age group.<sup>8</sup>

Based on these studies and study conducted by Kant L et al, observed that HBsAg prevalence in the different parts of the country varies and national average for HBsAg carrier in our country is 1.3 -12.7%.<sup>9</sup> The 4% HBsAg positivity among controls observed in the present study is in accordance with the observations of Kant L. and WHO. But this 4% positivity among controls cannot be taken as HBsAg carrier rate of this region (North Bihar) because number of children taken as control in the present study is less, the population under study is not representative of whole population, therefore not free

from selection bias. Nonetheless, it indicates that HBsAg carriers are present in the community and gives a fair idea about the epidemiology of HBV infection in the region.

The cases of jaundice in the present series were investigated to find the etiology. The commonest etiology observed was acute viral hepatitis which constituted 62.86% of cases. The other etiologies were fulminant hepatic failure (16.19%), chronic hepatitis (4.76%), icterus neonatorum (4.76%), neonatal sepsis (2.85%) and hemolytic jaundice (3.81%).

Somaiah G et al, also found that most common infectious etiology for jaundice was malaria followed by viral hepatitis.<sup>10</sup>

The number of HBsAg positive children in the present study among total 105 cases of jaundice was 16 (15.24%). It was observed that incidence of HBsAg positivity increases with age. The maximum incidence (20.83%) was observed in 5- 8 years age group. There was no significant difference in the HBsAg positivity between 5-8 years and 9-12 years age group.

There was increase in HBsAg positivity in 5-8 years and 9-12 years age group compared to HBsAg positivity of the present series but when statistically compared it is insignificant ( $p > 0.1$ ).

Significant increase in the HBsAg positivity rate among 5-8 years and 9-12 years children observed in the present study indicate that major exposure of HBV occurs in the preschool age and horizontal mode of transmission plays significant role in acquisition of HBV infection.

Indian association for study of liver (INASL, 1996) raised the unresolved issue of discrepancy between the report from Madras, Delhi and Pune. It observed that in one study HBsAg positivity increases with age and in other decreases with age.<sup>11</sup> In the present study no significant difference in the HBsAg positivity rate between males (14.87) and females (14.28%) was observed.

This finding is in accordance with the observation of INASL.<sup>12</sup> Raju et al, reported 31% HBsAg positivity in fulminant hepatic failure whereas, Tandon et al, reported 21% HBsAg positivity in fulminant hepatic failure.<sup>13</sup> Sarin et al, observed 9% incidence of HBV markers in fulminant hepatic failure.<sup>14</sup>

Total 5 (4.76%) cases of chronic hepatitis were tested for HBsAg and 2 cases gave positive result for HBsAg. Thus 40% cases of chronic hepatitis were HBsAg positive. However, Krishnamurthy et al, observed that 73% of the cases of chronic hepatitis are HBsAg positive.<sup>15</sup> In another study by Acharay et al, 50% patients of chronic hepatitis were HBsAg positive.<sup>16</sup> All the studies were done in adult patients with advanced liver disease, this may be the cause of the difference in the prevalence of

HBsAg positivity in chronic hepatitis between the present study and other studies.

HBsAg was detected in 2 cases of hemolytic jaundice (50%) out of 4 cases. Both HbsAg positive cases had received multiple transfusion from voluntary as well as professional blood donors. Nebbia G et al, observed that thalassaemic required repeated blood transfusion and hence are exposed to very high risk of hepatitis B infection.<sup>17</sup>

Amarapurkar, reported 45% HBsAg positivity in thalassaemic children.<sup>18</sup> Thus 40% HBsAg positivity of the present series among cases of hemolytic jaundice indicates that these children acquired HBV through multiple transfusions which is in accordance with observations of Amarapurkar et al. In the present study none of the cases of neonatal sepsis, icterus neonatorum, drug induced jaundice showed HbsAg in their blood. It is thus established that none of these conditions are HBV related.

All the relatives of jaundice cases in the present study were asked for definite positive history of parenteral exposure during last 6 months, this period falls well within the incubation period of HBV. 43.7% of HbsAg positive cases had history of parenteral exposure within this period.

Traditionally parenteral route has been recognised as main route of HBV transmission. But in less than half of the HBsAg positive cases, history of parenteral exposure was present.

All the patients with positive history of parenteral exposure does not acquire HBV infection. This suggests other routes of transmission of hepatitis. Beasley RP, suggested person to person contact may transmit HBV infection from infected household contacts, through exposure of infected blood or body fluids, scratches, skin lesions, open wounds, shared needles.<sup>19</sup> Thus person to person contact (horizontal transmission) might have played role in acquiring HBV in about 60% HBsAg positive cases of present series.

## CONCLUSION

Hepatitis B infection is an important health problem amongst healthy as well as jaundiced children of both sexes. Horizontal mode of transmission plays important role in the spread of HBV infection among children. Since HBV infection is an “iceberg disease”, so large portion of infected person are hidden in the society. Further studies are needed to find the role played by perinatal transmission in the spread of HBV infection.

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