

Observation of Liver Function Tests in Children with Acute Hepatitis

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Abstract

Introduction: Hepatitis B is an infectious illness caused by hepatitis B virus (HBV) which infects the liver of hominoidea, including humans, and diagnosed by liver function tests (LFTs) and serologic tests. **Aims:** The present study was conducted to evaluate the prevalence of acute hepatitis caused by hepatitis B virus and observation of the LFTs for early diagnosis and severity of acute hepatitis. **Material and Methods:** The study was carried out on 94 children cases presenting with symptoms of acute hepatitis. Hepatitis B surface antigen (HBsAg) and Liver function tests like ALT, AST, ALP and bilirubin were tested. **Results:** HBV is responsible for 19.15% of acute hepatitis and showing a male preponderance. The elevation of ALT and AST was significant in positive cases compared to negative cases. Bilirubin and ALP values remained non-significant across the groups. **Conclusions:** the present study shows that importance of liver function tests early in the clinical course to manage the acute stage of hepatitis because rapidly worsening liver functions shows an impending acute liver failure.

Keywords: HBV, LFTs, liver, acute hepatitis

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INTRODUCTION

Hepatitis B is an infectious illness caused by hepatitis B virus (HBV) which infects the liver of hominoidea, including humans, and causes an inflammation called hepatitis. About a one third of the world's population, more than 2 billion people have been infected with the HBV [1]. This includes 350 million chronic carriers of the virus. In India, Hepatitis B surface antigen (HBsAg) prevalence among general population ranges from 2 to 8%, placing India in intermediate HBV endemicity zone and the number of HBV carriers is estimated to be 50 million, forming the second largest global pool of chronic HBV infections [2].

Transmission of HBV results from exposure to infectious blood or body fluids; possible forms of transmission include unprotected sexual contact, blood transfusions, re-use of contaminated needles and syringes, and vertical transmission from mother to child during childbirth [3].

A nonspecific viral prodrome is followed by commonest symptoms like anorexia, nausea,

and often fever or right upper quadrant pain. Jaundice often develops, typically as other symptoms begin to resolve. Most cases resolve spontaneously, but some progress to chronic hepatitis. Occasionally, acute viral hepatitis progresses to acute liver failure. Diagnosis is by liver function tests (LFTs) and serologic tests to detect the virus.

The present study was conducted to evaluate the prevalence of acute hepatitis caused by hepatitis B virus and observation of the LFTs for early diagnosis and severity of acute hepatitis.

MATERIAL AND METHODS

The study was carried out on 94 cases presenting with symptoms of acute hepatitis in the OPD or admitted in the paediatric wards of Ram Bahadur Memorial Hospital, Bharatpur Medical College, Bharatpur, Rajasthan, India. Both males and females children up to age 15 years were included in the study. Consent was taken from parents. Detailed history and clinical examination was done, followed by appropriate blood tests, liver function tests,

total serum bilirubin, Australia antigen status and USG liver.

Hepatitis B surface antigen (HBsAg) was tested with commercial kit. Alere Truline Rapid test kit for HBsAg test is an *in-vitro* immunochromatographic, one step assay designed for qualitative determination of HBsAg in human serum or plasma based on the principle of lateral immunoassay which was used for testing of HBsAg. It is a qualitative, lateral flow immuno-assay for the detection of HBsAg. The presence of the coloured line at test line indicates positive result, while its absence indicates a negative result. There is less than 1% false positive result; so it is highly specific. End point is distinct and easy to read. The test is performed as per manufacturer's instructions.

Serum ALT, AST, and ALP were determined by enzymatic colorimetric techniques using commercial kits produced by Transasia Bio-Medicals Ltd., Germany, Erba on an automated clinical chemistry autoanalyzer.

The study group was divided into four according to age (0-1 years, 2-5 years, 6-10 years and 11-15 years), sex of the child, parameters of liver function test and Australia antigen positivity rate.

Statistical Analysis

All results were expressed as mean \pm SD for quantitative data. Frequency (%) was used for qualitative data like gender. The parameters of liver function tests were analyzed by Mann-Whitney U-test. The level of significance was set at $P < 0.05$. Data was analyzed using SPSS (IBM Corporation, Armonk, NY) version 22.

RESULTS

A total of 94 patients under age 15 years presenting with icterus and other symptoms of

acute hepatitis were included in the study. There were 66 (70.21%) males and 28 (29.79%) females showing a male preponderance. All patients presented with icterus had fever and elevated liver enzymes at the time of diagnosis.

Table 1 shows that in each age group, number of male patients presenting with acute hepatitis outnumbered female patients. There were 66 male children compared to 28 female children in total. Most cases were in 2-10 years age group. The difference is not significant statistically (Pearson chi square=13.012, $df=12$, $p=0.368$).

According to Table 1, HBV is responsible for 19.15% of acute hepatitis in this study. According to age-wise distribution, HBV is responsible for maximum cases in the 2-5 years age group. The difference is not significant statistically (Pearson chi-square=9.325, $df=12$, $p=0.675$). 13 male children (13.83%) and 5 female children (5.32%) were positive for HBsAg out of 94 children presenting with acute hepatitis.

Table 1 shows a higher rate of positivity of HBsAg among male children compared to female children across all age groups except in 6-10 years age group where reverse trend was observed. This difference is statistically not significant (Pearson chi-square=9.325, $df=12$, $p=0.675$).

Independent sample Mann-Whitney U test was performed to see the association of liver function test parameters with HBV infection. The elevation of SGPT and SGOT was significant in the HBsAg positive cases when compared to negative cases. Bilirubin and ALP values remained non-significant across the groups (Table 2).

Table 1: Age Group-wise and Sex-wise Distribution of Hepatitis B Surface Antigen (HBsAg) Positivity Rate.

Age Group (years)	Male (%)	Positive (%)	Female (%)	Positive (%)	Total Positive
0-1 (n=5)	3 (60)	1 (20)	2 (40)	0 (0)	1 (20)
2-5 (n=35)	24 (68.57)	7 (20)	11 (31.43)	1 (2.8)	8 (22.86)
6-10 (n=30)	21 (70)	2 (6.66)	9 (30)	3 (10)	5 (16.67)
10-15 (n=24)	18 (75)	3 (12.50)	6 (25)	1 (4.17)	4 (16.67)
Total (n=94)	66 (70.21)	13 (13.83)	28 (29.79)	5 (5.32)	18 (19.15)

Table 2: A Comparison of Serum SGOT, SGPT, ALP and Bilirubin (IU/L) amongst HBsAg Positive and Negative Cases.

LFT Parameters	HBsAg Positive Cases (Mean ± SEM) IU/I	HBsAg Negative Cases (Mean ± SEM) IU/I	P-value
SGOT/AST	489.68±116.04	581.36±91.76	0.042
SGPT/ALT	538.81±104.89	622.11±92.41	0.013
Bilirubin	4.163±0.6189	3.898±0.6271	0.403
ALP	369.31±132.24	321.63±107.94	0.085

DISCUSSION

The present study shows that more male children were presented with acute hepatitis than female children. Therefore acute hepatitis is commoner in males. Australia antigen was positive in 19.15% of cases diagnosed as acute viral hepatitis. Chadha *et al.* from Pune reported HBV as a cause for 5.4% of acute viral hepatitis cases; similarly in studies from New Delhi in 1984 and 2002, the rates were 9 and 7.6% respectively; also from Lucknow, the rate was 9.79% [4-7]. Study done from Hong Kong showed incidence of HBV to be 8% of all acute viral hepatitis in children [8]. From Kathmandu, Nepal, HBV was responsible for 5% of causes of acute hepatitis in children under 15 years of age [9].

In present study, there was slight increase in frequency of HBV infection in acute hepatitis with age from an average of 17.5% in less than 5 years age group to an average of 22.3% in more than 5 years age group. Similar results were seen by Panda *et al.*, where the values were 11.5% in <5 years to 57.5% in >10 years age group [10]. Thapa *et al.* also documented an increasing incidence of HBV infection with age [11]. Our study also shows that more male patients were positive for HBsAg (13.83%) compared to female patients (5.32%). Another study also showed greater positivity amongst the males (18.1%) than females (15.8%) [12]. In India, it is estimated that 15-25% of the current 40 million HBV carriers will develop cirrhosis and liver cancer; greater risk is seen when infection is acquired in infancy and early childhood years. Of the 26 million infants born every year, about 1 million is the risk group of getting chronically infected [13].

Table 2 shows the liver function parameters where the mean bilirubin was 3.96 mg/dl, mean SGOT was 574.81 IU/l, SGPT was 611.82 IU/l and ALP was 331 IU/l at first

diagnosis of the patients. Such level of transaminases indicates acute hepatic injury. In another study by Giannini *et al.* and Shweta *et al.*, similar findings were found with moderate elevation of transaminases [14, 15].

CONCLUSION

Over 4 million acute hepatitis B cases are diagnosed every year which leads to one fourth of cases becoming chronic carriers. The chronic stage accounts for 1 million deaths per year due to chronic active hepatitis, cirrhosis and hepatocellular carcinoma [16]. This study shows distribution of acute viral hepatitis cases caused by hepatitis B with age group and gender in children. It also shows that HBV is responsible for 19.15% of acute hepatitis B, so an important cause of morbidity in this part of the country. It shows that importance of liver function tests early in the clinical course to manage the acute stage of hepatitis because rapidly worsening liver function shows an impending acute liver failure. The limitations of this study are that subjects were taken from the hospital and do not represent community statistics. Also, sample size was quite small and only HBsAg status was looked into and taken into account.

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