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A prospective study of Hepatotropic virus infection in children-its prevalence and presentation

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Abstract
Introduction: Acute viral hepatitis is major health problem and important cause of morbidity and mortality.
Aims and Objective: To determine the prevalence of Hepatitis A, B, C and E in acute viral hepatitis in children.
Material and Methods: A prospective study was done on 185 children who presented with acute viral hepatitis in age group 0-18 years. Serum samples were tested for Anti-HAV IgM, Anti-HEV IgM, Hepatitis B surface antigen and Anti HCV antibodies.
Results: HAV (68.1%) was found to be the leading cause of acute viral hepatitis followed by HBV, HEV and least common was HCV. Acute hepatic failure was present in 6.5% children of acute viral hepatitis. HAV was found to be the most common cause of acute hepatic failure.
Conclusions: HAV remains the commonest cause of acute viral hepatitis and acute liver failure. It can be controlled by improving basic sanitation and socio-economic status.

Keywords: acute viral hepatitis, hepatitis A, sanitation

1. Introduction

Acute viral hepatitis is a major public health problem in India despite improving sanitation, health awareness and socio-economic conditions. Hepatitis means "inflammation of the liver". Six types of viruses can cause viral hepatitis which include Hepatitis A virus (HAV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), Hepatitis D virus (HDV), Hepatitis E virus (HEV) and Hepatitis G virus (HGV). HDV is an incomplete virus and exists only with co-infection with HBV. India is hyper-endemic for Hepatitis A and E [1].

Globally HAV is the most common cause of acute viral hepatitis which is responsible for about 1.4 million new infections each year [2]. HAV is a single stranded non-enveloped virus of Picornaviridae family which spreads through faecal-oral route and is due to bad hygiene and sanitation [3].

HBV is a double stranded DNA virus of Hepadnaviridae family. It is transmitted via permucosal or percutaneous exposure to infected body fluids or blood products and via vertical route [4]. Over 90% of infants, 50% of children and 5% of adults with acute hepatitis B will develop chronic infection [5].

HCV is an enveloped, single stranded RNA virus of Flaviviridae family. It spreads via percutaneous or permucosal exposure to infectious blood or blood products. It is generally asymptomatic, with a strong tendency (up to 80%) for progression to persistent and chronic infection [6]. Both HCV and HBV infected patients have propensity for chronic infection and may progress to cirrhosis and hepatocellular carcinoma.

HEV is positive stranded, non-enveloped RNA virus Hepeviridae family which spreads via faeco-oral route [7].

It is an emerging pathogen which causes significant disease in endemic countries and is considered to be the leading cause of enterically transmitted viral hepatitis illness. As there are few studies on prevalence of hepatitis in children in north India, Therefore, this study was done to determine the prevalence of hepatotropic viruses among children presenting as acute viral hepatitis in Northern India so that appropriate management of cases as well as preventive strategies for this part of the country could be planned.

2. Materials and Methods

A prospective study was conducted in the department of Pediatrics in a tertiary care hospital Chandigarh from May 2015 to May 2016 after taking informed written consent from parents. Children of age group of 0-18 years suffering from acute viral hepatitis or acute liver failure were included in the study. Disease which have clinical presentation of acute hepatitis without hepatotropic viral etiology like TORCH infection, enteric fever, malaria, dengue, hemolytic anemia, Wilson's disease, autoimmune and drug induced jaundice were excluded from the study.

Acute hepatitis was diagnosed on the basis of clinical features (Jaundice <3 months of age; right upper abdominal pain, anorexia, nausea, vomiting, low grade fever, pruritus, hepatomegaly with or without ascites); biochemical features like elevation of serum bilirubin, alanine aminotransferase (ALT), aspartate transaminase (AST) to at least five fold and without any stigmata of chronic liver disease. Patients who had INR > 1.5 with encephalopathy or INR>2 without encephalopathy were considered to have acute hepatic failure [8]. Blood samples of the children were analyzed for Anti-HAV IgM and Anti HEV IgM antibodies using ELISA kits. Hepatitis B surface antigen and Anti HCV antibodies were analysed by enhanced chemiluminescence testing. The clinical

picture and relevant investigation like serum bilirubin, AST, ALT, Alkaline phosphatase (ALP), Albumin-Globulin ration (A:G), prothrombin time and INR were obtained from patient records.

Data was analyzed using Statistical package for social sciences (SPSS) software and is represented in the form of frequency and percentage.

3. Results

Out of 185 children, 103(55.67%) were male and 82(44.33%) were female. Male to female ratio was 1.25:1. We found that, HAV was the most common etiology of acute viral hepatitis in our hospital (68.11%) followed by HBV (15.67%), HEV (10.27 %) and HCV (5.95%) (Table 1). Co-infection was not seen in our study.

Table 1: Prevalence of various hepatotropic virus

Hepatotropic virus	No. of children with acute hepatitis	Prevalence
HAV	126	68.11%
HBV	29	15.67%
HCV	11	5.95%
HEV	19	10.27%
Total	185	100%

We observed that, adolescent group was predominantly affected amongst all group for all hepatotropic viruses (59.46%) followed by age group 6-9 years (26.49%) and age group 4-5 years (11.35%). Very few cases were seen in age group <1 year and 1-3 year. (Table 2).

Table 2: Age group wise distribution of children with acute hepatitis

Age group	HAV (n=126)	HBV (n=29)	HCV (n=11)	HEV (n=19)	Total
<1 year	0	3 (10.33%)	0	0	3 (1.62%)
1-3 year	0	2 (6.95%)	0	0	2 (1.08%)
4-5 year	18 (14.28%)	3 (10.33%)	0	0	21 (11.35%)
6-9 year	30 (23.81%)	9 (31.03%)	3 (27.27%)	7 (36.84%)	49 (26.49%)
10-18 year	78 (61.91%)	12 (41.36%)	8 (72.72%)	12 (63.16%)	110 (59.46%)

In our study, all children presented with jaundice and anorexia. Second most common presentation was nausea and vomiting followed by right upper quadrant abdominal pain and low grade fever. Least common presentation was pruritus which was not seen in HCV infection. On examination, hepatomegaly was present in almost all cases of hepatitis followed by splenomegaly and ascites which was not seen in HCV infection. (Table 3)

Table 3: Clinical presentation in children in various hepatitis

Clinical presentation	HAV (n=126)	HBV (n=29)	HCV (n=11)	HEV (n=19)
Jaundice	126 (100%)	29 (100%)	11 (100%)	19 (100%)
Abdominal pain	100 (79.3%)	26 (89.6%)	6 (54.5%)	14 (73.6%)
Nausea vomiting	115 (91.2%)	27 (93.1%)	3 (27.2%)	17 (89.4%)
Anorexia	126 (100%)	29 (100%)	11 (100%)	19 (100%)
Pruritus	20 (15.8%)	10 (34.4%)	0	2 (10.5%)
Fever	76 (60.6%)	21 (72.4%)	5 (45.4%)	11 (57.8%)
Hepatomegaly	117 (92.8%)	22 (75.8%)	11 (100%)	17 (89.4%)
Splenomegaly	28 (22.2%)	8 (27.58)	0	2 (10.5%)
Ascites	13 (10.3%)	11 (37.9%)	0	1 (5.2%)

Acute hepatic failure was present in 12(6.5%) of 185 children of acute viral hepatitis. Of these 12 children, 8 (66.67%) were found to have HAV infection followed by 2 (16.67%) with HBV and 1 (8.33 %) with HCV and HEV.

4. Discussion

In our study we had male preponderance (1.25:1). Salahuddin M *et al*., [9] Gupta P *et al*. [10] and Nandi B *et al*. [11] also stated that, boys are more commonly affected than girls. Similar to Gupta P *et al*, [10] we also found that, adolescents age group is the most commonly affected by hepatotropic viruses thus proving the fact of epidemiological shift as reported by Mathur *et al*. [12].

The prevalence of hepatotropic virus in children is varied in different areas. In this study, HAV was found to be the most common cause of acute viral hepatitis followed by HBV, HEV and HCV. The prevalence rate of our study was similar to Gupta P *et al*, [10] Jain P *et al*. [13] Kaur R *et al*. [8] and Nandi B *et al*. [11] found HEV infection to be the most prevalent. This is thought to be due to poor hygiene, overcrowding and poor sanitation as HAV is being shredded abundantly in faeces. Due to illiteracy and low socio economic status proper sanitation methods are not followed in many places.

As the majority of our patients belong to villages, we found the prevalence of HBV to be quite high which was almost comparable to Gupta P *et al*. [10] It may be due to re-use of syringes while vaccination of children by untrained medical practitioners, sharing of needles while tattooing and piercing of ear. Second most common reason for HBV infection could be due to lack of awareness about the importance of immunization.

In acute phase, most of the HCV infected children are symptomless. Minimal nonspecific symptoms are initially found in approximately 15% of children [14]. So, HCV infections are left under-diagnosed in acute phase due to absence of symptoms. Similar to Jain P *et al*, [13] we also found slightly high prevalence of HCV infection. This raises an alarm that HCV is circulating at a high frequency in Chandigarh. On the contrary, Gupta P *et al*. [10] noted less prevalence of HCV in their study.

Prevalence of HEV infection in our study was comparable to Gupta P *et al*. [10] whereas Poddar U *et al*. [15] had high prevalence. As there is no vaccine for HEV, so the only preventive strategy for HEV is by improving basic sanitation and socio-economic status.

Jaundice, anorexia, nausea & vomiting, right upper quadrant abdominal pain and low grade fever were the common presenting symptoms. Salahuddin M *et al*, [9] Kaur R *et al*. [8] and Nandi B *et al*. [11] also observed the similar results. Similar to Salahuddin M *et al*. [9] and Nandi B *et al*, [11] features of cholestasis and pruritus were present in all hepatotropic virus except HCV. On examination, hepatomegaly was present in most cases of viral hepatitis. Splenomegaly was present in 22% cases which was similar to Salahuddin M *et al*. [9] and Poddar U *et al*. [15] Ascites was present in slightly less number of cases in comparison to Salahuddin M *et al*. [9] and Poddar U *et al*. [15].

HAV was the major cause of acute liver failure followed by HBV. HCV and HEV had the same rate. It was almost similar to Gupta P *et al*. [10].

The limitation of this study was that as it was conducted on hospitalized children, the clinical profile may not be generalized to the community. Secondly, we did not look for serology for non-hepatotrophic viruses like Epstein Barr virus, Herpes simplex virus and Cytomegalovirus.

5. Conclusion

Acute viral hepatitis is a major public health problem. HAV remains the commonest cause of acute viral hepatitis and acute liver failure. Clinical presentation was not much helpful in differentiating the hepatotropic viruses.

Acute viral hepatitis can be controlled by improving basic sanitation and socio-economic status. Hepatitis A and Hepatitis B are vaccine preventable diseases, so more awareness regarding their vaccination is needed to be spread in Indian society.

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