ORIGINAL ARTICLE

A hospital based retrospective study on hepatotropic viruses as a cause of acute viral hepatitis in children in Uttarakhand, India

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Abstract | Introduction | Methodology | Results | Conclusion | References | Citation | Tables / Figures

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Abstract

Introduction: Acute viral hepatitis in children is a serious health problem throughout the world. **Aims and Objective:** To determine the profile of Hepatitis A, B, C and E as a cause of acute viral hepatitis in children in a tertiary care hospital of Uttarakhand, India. **Material and Methods**: In this retrospective study, data was collected from the records of paediatric patients who underwent testing for one or more of the hepatitis viruses. Serum samples were tested for Anti-HAV IgM and Anti-HEV IgM by Enzyme Linked Immunosorbent Assay (ELISA) and Hepatitis B surface antigen and Anti HCV antibodies by enhanced chemiluminiscence. **Results:** Among total of 252 patients suffering from Acute Viral Hepatitis (AVH), males predominated over females with 72.2 % vs. 27.8 %. Hepatitis A virus (72.6 %) was found to be the leading cause of AVH in our hospital followed by HBV (16.7 %), HEV (9.5 %) and the least common was HCV (1.1 %). Co-infection was seen in only 2 cases i.e one as HAV-HEV (0.4%) and other as HAV- HBV (0.4%). Out of all the cases of AVH, 9.5 % were suffering from Acute Hepatic Failure. Hepatitis A virus was found to be the most common cause of acute hepatic failure (50 %), followed by Hepatitis B (37.5 %) and Hepatitis E (12.5 %). **Conclusions:** Hepatotropic viruses are quite prevalent in children in our country. Thus to control faeco-orally transmitted viruses i.e Hepatitis A and hepatitis E, awareness about healthy hygienic practices should be emphasized upon. Also hepatitis A vaccination can be recommended to be included in national immunization schedule. To prevent parenterally transmitted viruses like Hepatitis B and hepatitis C, use of sterile needles and syringes while tattooing, ear piercing and avoiding injections through unregistered medical practitioners should be done. Vaccination for hepatitis B should be routinely done.

Key Words

Hepatitis A; Hepatitis B; Hepatitis C; Hepatitis E; Children

Introduction

Viral hepatitis which is affecting children's health for a long time was first recognized in 1970's. Viral hepatitis is caused by six distinct viruses which are 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. Each belongs to an entirely different family of viruses, but they have certain degree of shared epidemiology and the target organ affected is common in all i.e liver. Each of the six viruses has world-wide distribution. (1,2,3,4)

HAV is a RNA virus classified under family Picornaviridae and it is transmitted via faeco-oral

route. (5) Hepatitis A virus is distributed worldwide and causes about 1.4 million cases each year. (6) This has been seen that due to improved personal and public hygiene along with efficient vaccination, the incidence of Hepatitis A has come down in developed countries but in developing countries such as India, it is still a matter of concern. HEV is also a RNA virus classified under family hepeviridae, transmitted by faeco-oral route and is prevalent in developing countries. (3,7)

HBV is the only DNA virus in hepatotropic viruses classified in the family Hepadnaviridae genus Orthohepadnavirus, with eight genotypes. The virus is transmitted mainly via blood, body-fluid contact, and vertical transmission. (8)

In the United States, recommendations for universal hepatitis B vaccination of infants were implemented in 1991 which showed greatest decline among children. By 2007, the incidence of acute hepatitis B in children <15 years had fallen to 0.02 cases per 100,000 population. Whereas, the incidence of acute hepatitis B in children was approximately 13.8 cases and 3.03 cases per 100,000 population in 1980s and 1990s, respectively. (9,10,11,12)

HCV belongs to the family Flaviviridae genus Hepacivirus, with six major genotypes. It was first identified in 1989 and it is transmitted in a manner similar to HBV. Hepatitis C is generally asymptomatic, with a strong tendency (up to 80%) for progression to persistent and chronic infection. (13,14) According to a recent report, there are approximately 115 million people infected with HCV in the world, 11 million of whom are younger than 15 years of age. (15) In the United States, antibodies to HCV are present in approximately 0.2 percent of children ages 6 to 12 and in 0.4 percent of those ages 12 to 19. (16,17) In comparison, the frequency of cases that are clinically identified are far lower (5 percent of the expected number), suggesting that screening and case identification of paediatric HCV are grossly inadequate. (18) Both HCV and HBV infected patients have propensity for chronic infection and may progress to cirrhosis and hepatocellular carcinoma later on.

The general epidemiological parameters of viral hepatitis remain unknown or under-reported because there are very few studies regarding prevalence of hepatotropic viruses in children from northern India.

Aims & Objectives

To determine the prevalence of hepatotropic viruses among children presented to the hospital either with acute or chronic hepatitis or hepatic failure.

Material and Methods

This retrospective study was conducted in a tertiary care hospital in Dehradun, Uttarakhand, India. Data was collected from a 4 year period i.e Jan 2011-Dec 2014 and was analyzed. Children between the age group of 0-18 years and suffering from acute viral hepatitis or acute liver failure were included in the study.

Laboratory investigations: Serum samples of the children were analysed in the Serology laboratory for Anti-HAV IgM antibodies (DSI, SRL, Italy) and Anti HEV IgM antibodies (DSI, SRL, Italy) using commercially available ELISA kits. Whereas Hepatitis B surface antigen and Anti HCV antibodies were assessed by Enhanced chemiluminescence testing method (ECi, Vitros, USA). Furthermore, the clinical picture and relevant investigation details of reactive patients such as Serum bilirubin, Aspartate transaminase (AST), Alanine transaminase (ALT), Alkaline phosphatase (ALP), Albumin-Globulin ration (A:G), prothrombin time and INR were obtained from patient records.

An Acute viral hepatitis case was defined as elevated serum alanine aminotransferase (ALT) levels or Aspatate aminotransferase of atleast five-fold with clinical jaundice and without evidence of chronic liver disease. Patients who had INR > 1.5 with encephalopathy or INR>2 without encephalopathy were considered to have acute hepatic failure.20

Statistical analysis: All data were analyzed using Statistical package for social sciences (SPSS) version IBM SPSS-22. Data is represented in the form of frequency and percentage.

Results

A total of 252 children were diagnosed as a case of acute viral hepatitis. Among whom, 182 (72.2%) children were male and 70 were female (27.8 %) thus giving male to female ratio as 2.6:1. Among all hepatotropic viruses, Hepatitis A virus was found to be the most common cause of AVH in our hospital (72.6 %) followed by Hepatitis B Virus (16.7 %), Hepatitis E Virus (9.1 %) and Hepatitis C Virus (1.1%). (Table 1) Co-infection was seen in only one case each i.e HAV-HEV (0.4%) and HAV- HBV (0.4%).

In our study, Adolescents (10-18years) were the predominantly affected group among children for all hepatotropic viruses (53.2%) followed by school going children (6-9years) 32.9% and pre-school children (12%). Very few cases were seen in toddlers and infants. Same pattern of positivity in correlation with age-group was seen in individual hepatotropic viruses (Table 2).

Of all the 252 children with acute viral hepatitis, 24 (9.5 %) were found to be suffering from acute hepatic failure. Out of these 24 children, 12 (50%) were found to have hepatitis A virus infection followed by 9 (37.5%) with hepatitis B virus and 3 (12.5%) with hepatitis E virus. None of the patients in our study were found to be in acute hepatic failure due to hepatitis C virus.

Discussion

Few studies across the world have reported varying prevalence of hepatotropic viruses in children. In the present study, HAV (72.6 %) was identified to be the most common cause of acute viral hepatitis followed by HBV (16.7% cases), HEV (9.5% cases) and HCV (1.1 %). Though, a study from North India also showed HAV being the predominant cause of acute viral hepatitis (44.7%) but the percentage of HAV is comparatively very high in our study. (19) A study from New Delhi in 2002 reported HEV to be the most prevalent hepatotropic virus (66.3 %) followed by HBV (8.6 %), HCV (3.1 %) and HAV (3.1 %) among children. (20)

The high prevalence rate of HAV infection in children is due to poor hygiene, overcrowding and poor sanitary conditions because of abundant shedding of HAV in faeces. Although the improvement in sanitary conditions is being focussed everywhere but still there are many places where these practices are not being followed either due to illiteracy or lower economic status. In our study adolescents and school going children are the most common age group affected by hepatotropic viruses thus also proving the fact of epidemiological shift of as reported by Mathur et al in their study. (21)

Safe and effective hepatitis A vaccines have been available since 1992, but they are not included in universal immunization programme in our country hence are significantly underused. (22) These vaccines are highly immunogenic and provide long-term protection against hepatitis A. In countries of intermediate endemicity, WHO recommends large-scale childhood vaccination to be considered as a supplement to health education and improved sanitation. (23, 24)

As reported by various studies, seropositivity for Hepatitis B in children below 15 years ranges from 1.3 - 12.7% in India. (25) In our study seropositivity for HBV is slightly higher i.e 16.7 %. The reason might be due to re-use of syringes while vaccination of children by untrained medical practitioners, sharing of needles while hand tattoing and ear piercing which are the common practices being followed in villages from where majority of our patients came from. Also, lack of Hepatitis B immunization can also be one of the leading causes of increased hepatitis B prevalence in our region.

In our study, the HEV prevalence in children (9.1%) was lower than that reported by other studies (16.3-66.3%). (26) As we all know that HEV does not have an effective vaccine, so it can only be prevented by improving sanitary conditions and socio-economic status.

Seropositivity for HCV was 1.1 % in our study which is correlating with nearly all studies on prevalence of HCV except in a study by Jain et al. showing a high (11.98 %) prevalence of HCV among children. 19,20

The age group most commonly affected in our study among children were adolescents (52.3 %) followed by school going children (26.1 %) and preschool children (9.5 %). Only 3 toddlers (7.1 %) and 2 (4.7 %) infants were suffering from AVH in our study (Table 2). In contrast with, a population based study in Chennai, revealed a higher prevalence of Hepatitis B in children less than one year (12.5%). (27)

A total of 24 children (9.5 %) were found to have acute hepatic failure. HAV was the major cause of AHF being (50 %) followed by HBV (37.5 %) and HEV (12.5 %). This is in contrast with some studies which reported HEV being the major cause for AHF. 20, (28) Hepatitis B being the second leading cause of AHF in various studies which is correlating with our study. (29). There were few limitations in the present study. The study was conducted in a tertiary care hospital and thus does not reflect the burden of hepatitis in the entire community. Population based studies conducted in field (for example: schools or primary health care unit) and also multi-centre studies may give more valuable data about seroprevalance rates of hepatotropic viruses.

Conclusion

To conclude, acute viral hepatitis is a significant problem in children. To combat and control the

infection, introduction of hepatitis A vaccination into the national immunization program seems to be rational for children aged >18 months. Safe sterile practices for injections, tattoing, ear piercing and vaccination is must for Hepatitis B and Hepatitis C prevention. Hepatitis E is less prevalent but still needs to be prevented by improving sanitary conditions and socio-economic status.

Recommendation

More widespread, multi-centric or field studies can be done to know the true burden of hepatitis in children. This will further help in controlling and combating acute viral hepatitis in children.

Limitation of the study

The study was conducted in a tertiary care hospital and thus does not reflect the true burden of hepatitis in the entire community.

Relevance of the study

The diseases caused by hepatotropic viruses can be controlled by improving sanitary conditions 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.

Authors Contribution

PG1, GM, NKB: conceptualized the study, PG1, MM, GM, NKB: collected data, PG1, MM, GM, NKB: interpreted data, SA, NKB, GM, NS: drafted the manuscript, PG1, MM, NKB, RKA, PG2, GM: provided critical intellectual inputs, PG1, MM, NKB, RKA, PG2, GM: approved the manuscript

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Tables

TABLE 1 PROFILE OF VARIOUS HEPATOTROPIC VIRUSES

Viral aetiology	No. of children with AVH	Prevalence
HAV	183 (M=128, F=55)	72.6 %
HBV	42 (M=32, F=10)	16.7 %
HEV	24 (M=20, F=4)	9.5 %
HCV	3 (M=2, F=1)	1.1 %
Total	252 (M=182, F=70)	

NOTE: HAV=Hepatitis A virus; HBV=Hepatitis B virus; HCV=Hepatitis C virus; HEV= Hepatitis E virus; M=Male; F=Female

TABLE 2 AGE-WISE DISTRIBUTION OF CHILDREN WITH POSITIVE SEROLOGY

	HAV (n=183)	HBV(n=42)	HEV(n=24)	HCV (n=3)	Total children
<1 year (Infants)	0	2 (4.8 %)	0	0	2(0.7)
1-3 years (Toddler)	0	3 (7.1 %)	0	0	3(1.2)
3-5 years (Preschool children)	26 (14.2 %)	4 (9.5 %)	0	0	30(12)
6-9 years (School children)	62 (33.9 %)	11(26.2 %)	9 (37.5 %)	1 (33.3%)	83(32.9)
10-18 years (Adolescent)	95(51.9 %)	22 (52.4 %)	15(62.5 %)	2 (66.7%)	134(53.2)