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ETIOLOGICAL PROFILE OF VIRAL HEPATITIS IN NORTH INDIA: A CROSS SECTIONAL STUDY

Dr. Puneet Bali[1], Dr. Ashwin Arora[2], Dr. Manish Kumar[3]
1. Assistant Professor, Department of Pediatrics, Military Hospital Jalandhar, Jalandhar Cantt, Punjab, India - 144005
2. Head of Department, Department of Pediatrics, Military Hospital Jalandhar, Jalandhar cantt, Punjab, India - 144005
3. Associate Professor, Department of Pediatrics, Military Hospital Jalandhar, Jalandhar cantt, Punjab, India - 144005

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Corresponding author
Dr. Manish Kumar

ABSTRACT

Introduction: Viral hepatitis continues to remain an important public health concern, particularly in developing nations like India. Majority of such cases present with a mild anicteric illness in children. Severe illness, including progression to acute liver failure is also known to occur.
Objective: To study the seroprevalence of markers of viral hepatitis in children less than 5 years, who present with jaundice.
Materials and methods: We performed a cross sectional study on 397 children less than 5 years of age who presented with jaundice to the hospital. The study population was screened for serological markers of the hepatotropic viruses. A structured questionnaire was drafted to enquire about the immunization status and source of potable water.
Statistical analysis used: Statistical analysis was performed using the Epi Info software 3.5.4 version 2012.
Results: Our study showed that Hepatitis A was the commonest cause of acute viral hepatitis in children less than 5 years of age, followed by Hepatitis E virus. Hepatitis A and E co infection was the most common type of co infection.
Conclusion: The efficacy of vaccination against Hepatitis A and B has been reiterated in our study. Using any method of water filtration protects against Hepatitis A and E infection.

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INTRODUCTION

Despite the availability of effective vaccines, improved socio economic status, better sanitation and hygiene, and increase in health awareness, viral hepatitis continues to remain an important public health problem in

most developing countries, including India. The various hepatotoxic viruses which are commonly implicated for the causation of viral hepatitis are Hepatitis's A, B, C, D and E, Herpes simplex virus, Cytomegalovirus, Epstein – Barr virus, Varicella zoster virus, HIV, Adenoviruses, Enteroviruses, Parvoviruses, Arboviruses & Rubella. The hepatotropic viruses are a heterogeneous group of infectious agents that cause a similar acute clinical illness. Most afflicted Pediatric patients remain anicteric, with a mild illness. The symptom because of which medical attention is most commonly sought is jaundice. Tender hepatomegaly, splenomegaly and lymphadenopathy are usual. Extra hepatic symptoms such as rash and arthritis are seen with Hepatitis B and C infections. Histopathological findings include balloon degeneration of the hepatocytes and centrilobular necrosis. As a marker of cytopathic injury to the hepatocytes, there is a rise in the serum transaminases. Abnormal bile flow at the canalicular level consequent to hepatocyte damage results in cholestasis, leading to an elevate bilirubin level. Altered synthetic function, characterized by deranged prothrombin time is used to define the severity of acute liver dysfunction, and is one of the criteria for further referral to a transplant center. The present study was undertaken to determine the seroprevalence of viral hepatitis in children less than 5 years of age who present with jaundice.

METHODS

This was a hospital based cross sectional study performed at a tertiary care Pediatric Centre of a tertiary hospital of northern India. The study was conducted over a two-year period between June 2018 to Jun 2020. The study protocol was approved by the institutional ethics committee. Children between one and five years of age who were either admitted or reported to the outpatient with history of jaundice were included in this study, after obtaining written parental consent. Children at high risk for developing jaundice such as cases undergoing chronic dialysis, Haemolytic anaemia, Thalassemia, diagnosed cases of enteric fever, dengue, children receiving multiple blood transfusions, children with clinical or radiological evidence of biliary obstruction or chronic hepatitis, and children with other infectious causes of hepatitis, such as CMV and EBV were excluded from the study. All children enrolled in the study were screened for markers of acute viral hepatitis including IgM anti HAV, HBsAg, IgM anti HCV, and IgM anti HEV by ELISA technique. A structured questionnaire was prepared and the family members were inquired about the child's immunization status, the source of potable water, and history of previous jaundice. The sample size was calculated taking a precision of 0.15 at 5% level of significance. A study group of 384 patients was sufficient for our study. Univariate and bivariate frequency tables were generated based on categorical data. Association between parameters was studied using chi-square test at appropriate level of significance. Association was considered statistically significant if p was < 0.05.

RESULTS

A total of 397 patients who were either admitted, or presented with jaundice in the outpatient department over a 24-month period were included in this study. Maximum number of patients were in the 3-4-year age group (40.8%), followed sequentially by 4-5-year age group (30%), 2-3-year age group (18.6%), and the 1-2-year age group (10.6%). Males outnumbered females by a ratio of 1.8:1 of all the patients enrolled in the study, a total of 141 (35.5%) were positive for one or more serological markers of viral hepatitis. 16 out of these 397 cases had co infection with two different types of hepatitis viruses (4%). Hepatitis A virus was found to be the commonest type of viral hepatitis, with IgM anti HAV being detected in a total of 89 patients screened (22.4%). The second most

common type of viral hepatitis was Hepatitis E, with IgM anti HEV positivity in 50 patients (12.6%). Hepatitis B surface antigen (HBsAg) was detected in 17 out of the 397 cases screened (4.3%). One patient was found to be positive for marker of Hepatitis C virus infection (0.3%). Hepatitis A and E co infection was found in 14 cases (3.5%), and was the most common type of co infection, while Hepatitis B and A co infection was found in 2 cases (0.5%).

On assessment of the immunization status, 339 out of the 397 patients (85.4%) were immunized completely as per the national immunization schedule. A total of 58 subjects (14.6%) were partially immunized, having missed one or more doses of their vaccines. 11 out of the 339 completely immunized children (3.2%), and 6 out of the 58 partially immunized children (10.3%) were found to be HBsAg positive. This difference was statistically significant (p = 0.014)

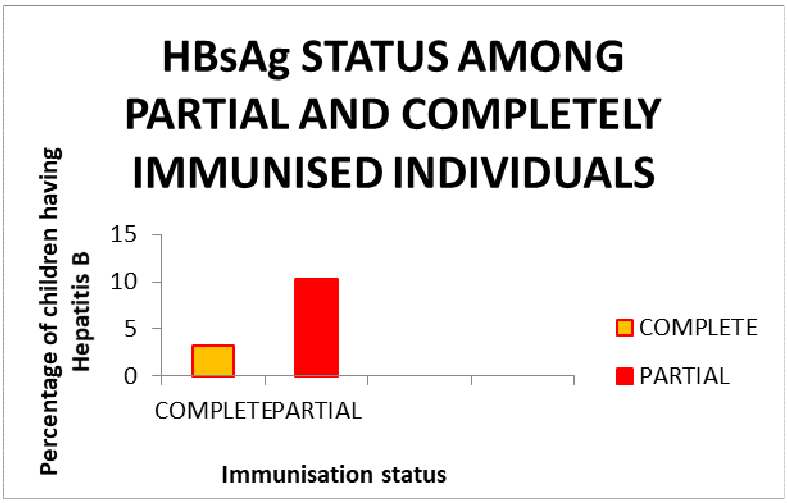

Fig 1: HBsAg Status

A total of 57 patients out of the 397 evaluated were vaccinated against Hepatitis A infection (14.3%). Four children out of the 57 vaccinated (7%), and 85 children out of the 340 un vaccinated group (25%) were positive for Hepatitis A markers. This difference was statistically significant (p= 0.003)

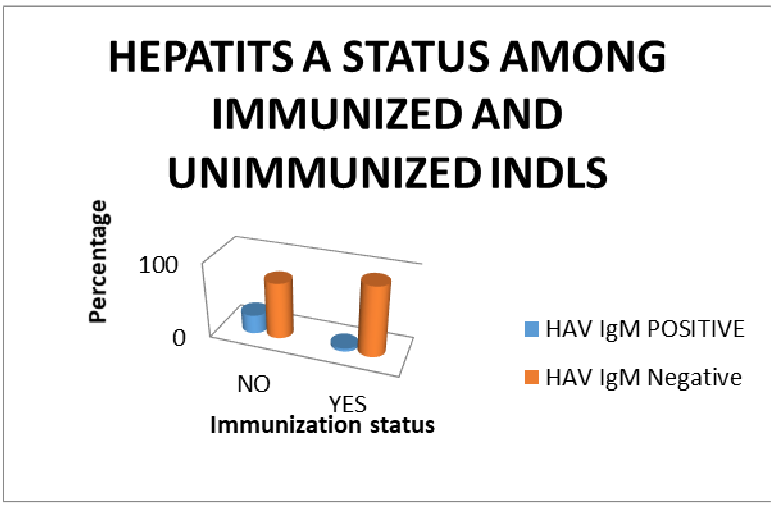

Fig 2: Hepatitis A Status

On evaluation of the source of potable water, it was assessed that 5% of families (n= 20), used water from the direct supply point without any filtration, and 95% (n= 377), used some source of water filtration. Hepatitis A was most common in children who were consuming unfiltered water (57%), and Hepatitis E was most commonly seen in children of families using candle filters as a source of filtration (14.2%).

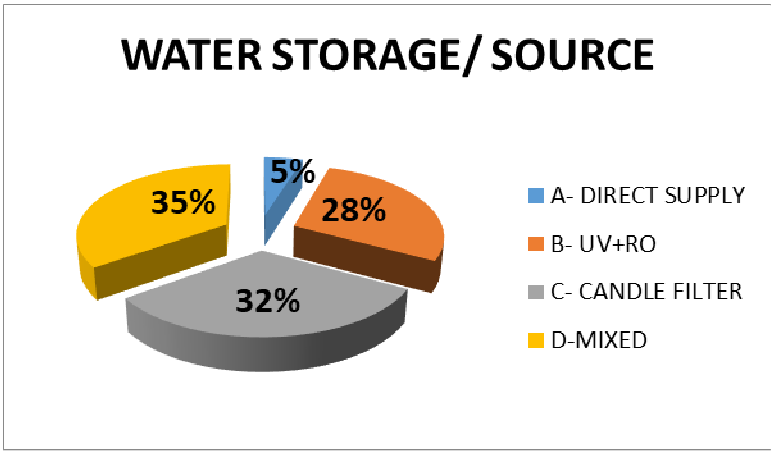

Fig 3: Water Storage/ Source

DISCUSSION

Several studies have been done in India and other countries, which have depicted a varying prevalence of the different hepatotropic viruses: HAV (4.5-67%), HBV (7.2-42%), HCV (0.2-10.6%), and HEV (11-66.3%).[1,2,3,4] In our study, HAV was the most prevalent hepatotropic virus, causing acute viral hepatitis in nearly 23 % of cases. In similar epidemiological studies done by Gupta S et al.[5]and Verma Yet al[6], Hepatitis A was found to be the most common etiological agent of acute viral hepatitis, with a higher prevalence as compared to our study (27% and 57% respectively). Other studies have shown a low seropositivity of Hepatitis A in children less than 5 years of age, and increasing number of symptomatic cases in adults as compared to the asymptomatic cases in children [7]. This phenomenon can be attributed to the epidemiological shift occurring secondary to progressively improving hygiene and sanitation. Our study clearly demonstrates the benefits of administering Hepatitis A vaccination, with a statistically significant advantage ($p < 0.003$) to the immunized group.

Hepatitis E was the second most common hepatotropic virus causing acute viral hepatitis in our study (12.6%). The incidence is lower as compared to other studies done by

Kumar et al [8] in Chandigarh where 40% of cases were because of Hepatitis E virus, and Chandra et al [9] in Rajasthan, where nearly 39% of cases were caused by Hepatitis E. The lower incidence in our study could be attributed to the higher socio economic status of the study population, and availability of better sanitation.

In our study, Hepatitis A was found more frequently in children of families using untreated potable water (57%), and Hepatitis E was more common in children consuming water filtered through candles (14.2%). Similar high seropositivity (84%) for Hepatitis A was found in a population based study conducted by Chandra et al [9] in Rajasthan.

Hepatitis B surface antigen was found in 4.3% of our study population. This was similar to the positivity rates in studies

conducted by Qamer S et al [10] and Chakravarthi al al[11].There was no significant difference in the prevalence of HBV infection (HBsAg) in different age groups in children below five years. This indicates that majority of infection in this age group occurs through vertical transmission. To decrease the significant morbidity and mortality in later life associated with HBV infection, children less than five are the group where intervention should be targeted. Incomplete vaccination had a higher positivity rate for HBsAg as compared to the completely vaccinated group ($p = 0.014$), reiterating the importance of administering the first dose of hepatitis B vaccination at birth. Hepatitis C was found in one patient (0.3%) which is similar to other studies done on Indian population [12,13]. Co infection with HAV and HEV was found in 3.5% of our study population, which was lower when compared to other studies [5,14]. This can be attributed to better immunization practices, higher socio economic status, and better sanitation facilities accessible to the study population.

CONCLUSION

Our study reveals that Hepatitis A followed by Hepatitis E are the commonest cause of acute viral hepatitis. Vaccination against Hepatitis A is an effective measure for reducing its incidence. Untreated water is an important source of transmission of Hepatitis A and E. Use of any means of water filtration is strongly advocated. Frequent servicing of the UV and RO water purifiers, and regular change of candles in candle filters should be ensured. Lastly, the importance of Hepatitis B vaccination programme is reiterated, and parents should be encouraged to administer this vaccine to their children.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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