A STUDY ON THE PERINATAL TRANSMISSION OF THE HEPATITIS B VIRUS

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Abstract

The purpose of this study was to determine the age wise prevalence of Hepatitis B virus (HBV) in children under five years and to analyze the relative importance of horizontal or vertical transmission. This study included 400 children in the age group of less than five years attending the outpatient department of pediatrics with minor complaints. History of HBV immunization was taken as the exclusion criteria. All the samples were tested for Hepatitis B surface antigen (HBsAg) and anti HBs using commercial ELISA kits. Liver function tests were performed on all the HBsAg positive patients. Hepatitis B nucleocapsid antigen (HBeAg) was detected in few HBsAg positive mothers. Overall HBsAg positivity in children below five years was 2.25%. There was no statistically significant difference in HBsAg positivity in the different age groups by chi square test. HBsAg positivity in mothers was 4.25%. However only in three cases the pair of mother and child were both positive for HBsAg. The mean anti HBs positivity in children was 23.75%. There was no statistically significant difference in the anti HBs positivity in different age groups of children. The observation that there is no statistically significant difference in the prevalence of HBV infection (HBsAg and HBs) amongst different age groups of children below five years signifies that a large proportion of HBV infection in children of this age is acquired via vertical transmission. It is also indicated that this mode of disease transmission is responsible for the majority of chronic carriers. Universal immunization of all infants is desirable to decrease the carrier pool and it is inferred from the present study that Hepatitis B immunization should begin at birth to have greater impact.

Key words: HBV, perinatal transmission, children

Infection with Hepatitis B virus (HBV) is of global importance because of its potential to cause acute and chronic hepatitis, liver cirrhosis and primary hepatocellular carcinoma. Worldwide over 300 million persons are chronically infected with HBV and 75% among these are in Asia alone.1-3 Modes of acquiring hepatitis B infection in children can be parenteral, vertical and horizontal. In areas of intermediate prevalence like India (carrier rate 2% and past infection in 20-50% population)4,5 vertical transmission of infection from mother to infants is a very important route of transmission of HBV.6-8 The risk of acquiring infection for a neonate can be as high as 85-90%, if the mother is HBeAg positive.9,10 It is generally agreed that risk of chronic infection with HBV is inversely related to age of onset of infection. Hence children become chronic most often and represent the most important reservoir of infection in the community. Thus prevention of infection in this group would be most important to decrease overall carrier rate11 identification of disease prevalence in the population and predominant mode of transmission is necessary before initiation of preventive measures.

The present study was therefore carried out to study the age wise prevalence of HBV infection in children below five years and to extrapolate the relative importance of either horizontal or vertical transmission.

Materials and Methods

The study was conducted in the department of microbiology and department of pediatrics, Maulana Azad medical college and associated Lok Nayak hospital, New Delhi between April 1999 and April 2000. In the present study, 400 children in the age group of less than five years attending the paediatrics OPD with minor complications that could be treated on out patient basis were recruited by simple random selection. Patients who had received hepatitis B vaccine, blood or blood products, whose date of birth was not known and who had been hospitalized or undergone any major surgical procedure were excluded from the study.

Detailed history and complete physical examination was performed on all the children. The history included history of present illness, any past history of jaundice, haematemesis, ascites, features of encephalopathy, chronic illness and treatment. Maternal history of jaundice or blood transfusion during antenatal period or in the past, pregnancy related complications and hospitalization was asked. Family history including number of family members, any known positivity for HBsAg in the family and any known high risk factor in the family were acquired. Complete general and physical and systemic examination with special reference to presence of signs of liver disease was done.

After fully informed consent was taken, 5 mL blood was
collected from all the subjects and their mother by venepuncture under all aseptic condition. Serum was separated and stored at –20°C.

Pathozyme ELISA kit was used for HBsAg determination in all the children and their mothers. Enzygnost anti HBs II test kit was used for qualitative determination of antibody to Hepatitis B surface antigen in children. HBeAg was tested using commercially available ELISA kits by Biochem Immunosystems. Liver function test were performed in all the HBsAg positive patients.

Results

Eight hundred children were screened in the present study. Among them four hundred cases were rejected on the basis of various exclusion criteria. For the analysis of results subjects included were divided in the age group of 0-<6months, 6-12, 12-<24, 24-<36, 36-<48 and 48-<60 months.

There was fair distribution and adequate representation of children in all age groups. Both males and females had adequate representation.

Overall HBsAg positivity in children below five years was 2.25%. There was no statistically significant difference in HBsAg positivity in the different groups by chi square test (Table). HBsAg positivity in mothers was 17 (4.25%). However, only in 3 cases, (one each in 12-24, 36-48 and 48-60 months age groups) the pair of mother and child were both positive for HBsAg. Serological evidence of HBV infection was present in 5/17 (29.4%) offsprings of HBsAg positive mothers.

The mean anti HBs positivity in children (Table) was 95/400 (23.75%). Of these 95 children, mother of only two (one each, in 6-12 and 24-36 months age groups) were HBsAg positive. There was no statistically significant difference in the anti HBs positivity in the different age groups in children below five years (by the chi square test). Females had slightly higher anti HBs prevalence (25.8%) against their male counterparts (22.1%) but the difference was not statistically significant. LFT was within a normal limit in all except one patient who was HBeAg positive in whom the transaminase levels were elevated.

Discussion

The expression pattern of HBV infection depends largely on age of acquiring infection. The proportion of patients with clinically apparent HBV infection increases from less than 10% in children below 10 years to 33-45% of infections in adults.12 In our study it is observed that average prevalence of HBsAg and anti HBs in children below five years is 2.25% and 23.75% respectively. These prevalence rates fall closely in the reported ranges of 0.5% for HBsAg4,5 and 11-20% for anti HBs.5 There is no significant difference in the prevalence of HBV infection (HBsAg and anti-HBs) in different age groups in children below five years. This indicates that majority of infection occurs in children below five years and hence the majority of chronic carriers in our population result from vertical transmission. In order to decrease the significant morbidity and mortality in later life associated with HBV infection, children are the most important group to intervene.

The average prevalence of HBsAg in the mothers was 4.25%. This is in accordance with reported average HBsAg prevalence of 2.2-7% in Indian women, although some studies report a higher prevalence.13 These prevalence rates conform to India’s status as an intermediate endemicity area as reported previously.6 Among the babies of HBsAg positive mothers, three were found to be HBsAg positive and two were anti-HBs positive. This gives the HBsAg positivity rate in carrier mothers as 17% (3/17) and that of HBsAg negative mothers as 1.5% (6/383). Thus, there is a significant difference in the HBsAg carrier mother against non-carriers.

As none of the babies or the mothers was symptomatic at any time and did not have deranged liver function, we assume that these mothers were asymptomatic carriers and passed the HBsAg positive status asymptomatically to their babies probably by perinatal transmission. The two anti-HBs positive babies may have acquired infection from the mother and later seroconverted.

The incidence of perinatal transmission of infection in our

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study was 29% (5/17) and incidence of HBsAg carriage due to perinatal transmission was 17% (3/17). Prevalence of persistence of infection in our study was found to be 60% (3/5). This level of perinatal transmission (10-40%) corresponds to an area of low HBsAg and high anti HBe prevalence.\textsuperscript{1,9,10} The incidence of chronicity after perinatal transmission in the present study was 60% as against the usual 70-95%.\textsuperscript{14}

As vertical infection is responsible for majority of infections it may be sufficient to screen all the pregnant women and immunize the high-risk infants. High risk strategy involves screening all the pregnant females for HBsAg and immunizing infants of only those mothers who are positive for it. However, in a large country like India where a large percentage of deliveries are still non institutional, this may not be feasible. Moreover, high risk strategy has failed to have significant impact on HBV related morbidity in general population, even in areas of low endemicity like US. Taking all this into account as well as the direct and indirect cost of screening and consequences of HBV infection, universal immunization of all infants is desirable to decrease HBV carrier pool.\textsuperscript{15} Therefore keeping in mind that vertical transmission is the most important mode of infection in children below five years, it is inferred that Hepatitis B immunization should begin at birth to have a greater impact.

References

ANNOUNCEMENT

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- Full text of the journal is now also available from Bioline International, Canada. The URL of the site is www.bioline.org.br/mb.