Hyperendemic Foci of Hepatitis B Infection in Arunachal Pradesh, India


Abstract
Aim: To study the prevalence of hepatitis B virus (HBV) infection among an isolated tribe of Northeast India that migrated long back from Tibet.

Methods and Materials: Randomly selected 438 subjects from Idu Mishmi tribe of Arunachal Pradesh were screened for hepatitis B surface antigen (HBsAg), hepatitis B core antibody (anti-HBc), hepatitis B surface antibody (anti-HBs), envelope antigen (HBeAg) using ELISA kits.

Results: The point prevalence of HBsAg was found to be 21.2% (93/438). Anti-HBc prevalence was 92.3% (193/209). Anti-HBs above 10 IU/ml were detected in 48% (96/200). Prevalence of HBeAg was higher (42.1%, 16/38) in children (less than 15 years) compared to adolescent and adults (32.7%, 18/55). History of hepatitis was significantly associated with positive HBsAg status (p<0.000).

Conclusion: Hepatitis B virus infection is hyperendemic among Idu Mishmi tribe of Arunachal Pradesh, India. Though, the route of transmission could not be ascertained, but the high HBV infection (78.6%) among less than 5 yrs and the finding of 58.4% of HBsAg positive mothers bearing HBsAg positive child indicates possibility of vertical transmission in this setting. ©

INTRODUCTION

Hepatitis B virus (HBV) infection is one of the world's leading cause of mortality with an estimated over one million deaths per year and over 350 million chronically infected people worldwide. It is estimated that approximately 2 billion people have serological evidence of past or present HBV infection, and approximately 75% of chronic carriers live in Asia and the Western Pacific. It is reported that 15-40% of chronically HBV infected patients would develop cirrhosis, liver failure, or hepatocellular carcinoma (HCC). HCC and liver disease are still the major health concern for HBV carriers, accounting for 76% of reported deaths in males and 63% of reported deaths in females in one large cohort study from China.

India has been placed by WHO under intermediate zone (2-7% prevalence) for HBsAg prevalence, but the distribution of the infection is by and large patchy. Prevalence among the isolated tribal groups is high to very high. Northeastern region of India is the abode of several tribal communities that migrated from different direction over different points of time. Arunachal Pradesh, a sub-Himalayan Northeastern state of India, has more than 20 major tribal groups, maintaining their tradition, behavior and cultural identity.

Among the tribes of Arunachal Pradesh, some have migrated from Tibet. One such major tribe, Idu Mishmi, belonging to Mongoloid stock of Tibeto-Burman linguistic group, migrated from the Lobha tribe of Tibet. Dibang valley of Arunachal Pradesh is the main place of inhabitance of this tribe.

Local doctors were reporting high prevalence of Australia antigen (HBsAg) among them. The present study was conducted to find out the prevalence of HBV infection, its pattern and risk factors of transmission among the specific ethnic group isolated from the mainstream Indian population.

METHODS AND MATERIALS

The study was a cross-sectional one, conducted at Anini, the district headquarters of Upper Dibang valley of Arunachal Pradesh, India. Anini, situated at an altitude of 1800 meters above sea level, has limited communication with outside world and the district covers an area of 9000 sq km with an approximate native population of 7152 (2001 census of India), mostly belonging to Idu Mishmi’s tribe. This Mongoloid tribe belongs to the Lhoba tribe of Tibet, and has remained as a closed community since ages. A total of
438 randomly selected subjects with unknown HBsAg status were interviewed (parents or guardians in case of minor) after getting written and informed consent. A structured questionnaire was used to record the demographic information and clinical history. They were screened for HBsAg (surface antigen). In 209 random samples, HBcAb (core antibody) was screened; HBeAg (envelope antigen) was screened among the HBsAg positives while quantitative HBsAb (surface antibody) estimation was done in 200 random samples, using EQUIPAR, ELISA kits, Italy. To study the prevalence and possibility of vertical transmission, the data of women in reproductive age group along with their offspring were separately analyzed. Results were analyzed using SPSS statistical software.

**Results**

The enrolled subjects were between 2 to 57 years of age with a median of 20 years (interquartile range 10-28 years) and females accounted for 54.8%. The point prevalence of HBsAg was 21.2% (93/438). Prevalence of HBsAg among males (25.7%) was significantly higher than females (17.5%, p=0.03; 95% CI: 1.03-2.59) (Table 1). Tattooing was practiced after the age of 12 years among them and no significant difference in prevalence of HBsAg was seen between the tattooist (22.9%) and non-tattooists (20.9%, p=0.68) (Table 1). It was also observed that, 7 (58.4%) out of 12 HBsAg positive mothers had also at least one HBsAg positive offspring (Not shown in tables). Age distribution of serological markers of HBV infection is shown in Table 2.

Though no overt clinical disease was detected during investigation, yet detailed probing and comparison between HBsAg positive and negative subjects revealed that past history of hepatitis / jaundice (p<0.000, 95% CI: 2.7-11.6) (Table 1), symptoms like anorexia (p<0.000), fatigue (p<0.000) and signs like hepatomegaly were significantly associated with HBsAg positivity (Not shown in tables).

Circulating envelope antigen (HBeAg) in serum was detected in 36.6% (34/93) of the HBsAg positive subjects. Prevalence of envelope antigen was higher (42.1%; 16/38) among children (less than 15 years) compared to adolescent and adult (32.7 %; 18/55). Prevalence of HBV infection (HBcAb) was 92.3% (193/209) in 209 random samples. Though females in reproductive age group (15 to 45 years)

![](data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAAIgAAAAHcCAYAAAAj7h5AAAA0lBMVEXC5fH6gAAAAASUVORK5CYII)
Table 2: Age distribution of serological markers of HBV infection

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>No.</th>
<th>HBsAg</th>
<th>No.</th>
<th>No. of positives (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Anti-HBc</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HBsAb</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HBeAg</td>
</tr>
<tr>
<td>2-5</td>
<td>52</td>
<td>10(19.2)</td>
<td>14</td>
<td>11(78.6)</td>
</tr>
<tr>
<td>6-15</td>
<td>123</td>
<td>27(21.9)</td>
<td>73</td>
<td>70(95.9)</td>
</tr>
<tr>
<td>16-25</td>
<td>124</td>
<td>32(25.8)</td>
<td>68</td>
<td>65(95.6)</td>
</tr>
<tr>
<td>26-35</td>
<td>104</td>
<td>18(17.3)</td>
<td>41</td>
<td>35(85.4)</td>
</tr>
<tr>
<td>&gt; 35</td>
<td>35</td>
<td>6(17.1)</td>
<td>13</td>
<td>12(92.3)</td>
</tr>
<tr>
<td>Total</td>
<td>438</td>
<td>93(21.2)</td>
<td>209</td>
<td>193(92.3)</td>
</tr>
</tbody>
</table>

showed a protective HBsAb of 46.7% only, yet evidence of contact with the virus was much higher (88.3% were positive for HBeAb).

**DISCUSSION**

Prevalence of hepatitis B carrier state among Idu Mishmi can be grouped under very high category when compared to other contemporary studies in India and its neighbours.10-13 In India, prevalence of HBV infection is patchy. Though, overall prevalence is low or intermediate, yet among the isolated tribal groups it is high.6-7 Tribal population in India is about 8.2% (over 82 million) of the total 1.03 billion according to the census of India 2001,13 therefore it is becoming a matter of great public health concern.

Earlier reported prevalence from Arunachal Pradesh is 8.4%.14 With passage of more than 20 years since the above reported study and increasing awareness, vaccination coverage, it was expected to be further low. However, the present study showed that the prevalence among some tribe is not only high in comparison to previous study but are in the very high category in global context. Such unabated increase in prevalence over the years is a matter of serious concern to public health administrators. Prevalence of HBV infection and HBsAg was 61% and 16% among Tibetans residing in Nepal, with perinatal and childhood transmission becoming important factors in transmission.12 High prevalence in their ancestral homeland (Tibet) might explain the high prevalence in the present study. Perhaps this tribal group escaped investigation in earlier studies or awareness; vaccination coverage has not reached them due to isolated nature.

In the present study, we detected a very high prevalence (92.3%) of HBV infection as evidenced from presence of HBeAb. The HBsAg positivity of 21.2% further substantiate that the Tibetans residing in Tibet or elsewhere has a higher prevalence rate of HBV infection. HBsAg prevalence among general population ranged from less than 0.1% to 11.7% in different studies from India,2 with an average of 4.7%.11 According to another group of authors, the corrected prevalence of carrier rate is much lower at 1.42%.15 There is scanty data reporting anti-HBc (HBV infection) prevalence data among the general population in India. However, besides tribal groups, higher prevalence of HBe antibody (signifying HBV infection) amongst specified risk groups like commercial sex workers (87.3%) or injecting drug users (95-100%) has been reported from India.16-18 But, present report of over 90% HBeC antibody among apparently healthy persons at community level, without any reported risk factor indicates existence of pockets with high natural transmission of HBV virus.

In our study, nearly ninety percent of the females in their reproductive age group had shown HBeC antibody, whereas only less than 50% had sufficient level of protective antibody. However, in other studies among blood donors, pregnant women and in general population indicate anti-HBs positivity around 18-20%.19 Moreover, 39.3% of HBsAg positive females of reproductive age group also had envelope antigenaemia. They are capable of transmitting the virus to the offspring. In a reported study, it was observed that HBV infection is about 87.5% among the offspring born to HBe antigen positive mothers as against <10% infection in children to HBe negative mothers.19 High HBeAg positivity and HBsAg positive mothers, combined with high HBsAg positivity among children (<15 years) indicates vertical transmission or infection in early childhood, might be the main transmission pattern in this setting. Infection at birth or early childhood usually results in chronic carrier state, high prevalence of chronic carriers above 10% can be possible if vertical transmission or infection in early childhood forms the major mode of transmission.5,20

High prevalence of chronic carriers of hepatitis B among the tribal population, seen in our study as well as studies on tribal population elsewhere in India,6,7 may be due to the amplifying effect of vertical transmission for generations in a closed community. It may be mentioned here that in the present study, we also detected a significantly higher prevalence of HBsAg among family members, parent and offspring.

Though we expected, yet could not establish positive association of Australia antigen with tattooing. This is probably because tattooing is usually practiced after adolescence when development of chronic carrier state is unlikely.

From the present study, it can be concluded that hepatitis B infection is hyperendemic among Idu-Mishmi’s of Arunachal Pradesh, India bordering China. It is probable that infection is occurring early in life either during perinatal period (vertical transmission) or during early childhood. However, a better picture of the transmission dynamics either vertical or horizontal within this closed community.
will come up only after a detail investigation on a large cohort of different tribes including the mother and the offspring.

Acknowledgements

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REFERENCES


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