Sero-epidemiology of HBV Infection in Northern Sindh: A Population Based Study

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ABSTRACT

Study Design: Prospective Observational Study.
Place and duration of study: Liver Clinics, Ghulam Muhammad Mahar Medical College hospitals, Sukkur & Khairpur. From January 2008 to December 2011.
Methods: Using random cluster sampling 3989 healthy subjects were selected from 7 northern districts of Sindh (i.e Sukkur, Khairpur, Ghotki, Shikarpur, Jacobabad, Kandh-koat, & Naushero Feroz) attending Liver clinics of Ghulam Muhammad Mahar Medical college hospitals Sukkur & Khairpur, for screening purpose were enrolled from January 2008 to December 2011. The subject's age ranged from 6 to 65 years. Serum samples initially tested for HBsAg by immune chromatographic method. The positive cases were confirmed by third generation of ELISA for HBcAb, HBsAg. Hepatitis Delta antibody was checked in Elisa positive cases. Various risk factors were recorded and multivariate analysis was performed.
Results: The prevalence of HBsAg and HBcAb in Northern Sindh was 3.38% (95% CI 2.85;3.98). We found 8 cases of positive anti-HDV antibody. Predictors of HBsAg or HBcAb in multivariate analysis were age, marital status and addiction.
Conclusion: The rate of HBV infection in Northern Sindh was higher than other parts of province and country. Approximately 25% of general population in this province had previous exposure to HBV and 3% were HBsAg carriers. Parenteral injections abuse, intra familial and addiction were major routes of HBV transmission in this part of province

Keywords: Epidemiology; Hepatitis; HBV; Northern Sindh

INTRODUCTION

Hepatitis B virus (HBV) infection is a major cause of liver disease in the world. WHO has estimated that currently two billions people were infected with HBV and in more than 350 million people, acute infection has turned to chronic infection. It is also estimated that more than 500,000 deaths occur as a consequence of cirrhosis and hepatocellular carcinoma caused by chronic HBV infection annually. Hepatitis B is estimated to result in 563000 deaths annually. Given its large population (165 million) and intermediate to high rates of infection, Pakistan is among the worst afflicted nations. In developing countries 40-60% HBV infections in HCWs are attributed to sharp injuries. There are two billion people worldwide who have been exposed to Hepatitis B virus; of these more than 350 million are chronically infected with this virus. In Pakistan Hospital based serological testing has revealed that 48% of patients with chronic liver disease (CLD) and up to 66% patients with Hepatocellular carcinoma (HCC) were positive for HBsAg. The carrier rate of HBsAg is from 2.8% - 10% with variation in different groups in different areas of Pakistan. Pakistan has been categorized as having intermediate endemicity of HBV with 2-7 % HBsAg prevalence in general population. The major known risk factors for transmission of HBV are HBsAg positive pregnancy, transfusion, hospitalization, tattooing, and intravenous drug abuse and high risk sexual behaviors. The lack of information on HBV prevalence and distribution of risk factors among the general population is an obstacle for formulating effective policies to reduce the burden of HBV infection. This population based study was designed to determine the accurate estimate of HBV infection epidemiology and associated risk factors in Northern Sindh, as the available data is very scarce.

MATERIALS AND METHODS

The general population of 7 districts of Northern Sindh i.e., Sukkur, Khairpur, Ghotki, Shikarpur, Jacobabad, Kandh-koat, & Naushero Feroz) attending Liver clinics of Ghulam Mohammad Mahar
Medical college hospitals Sukkur & Khairpur, for screening purpose were enrolled from January 2008 to December 2011. Subjects between 6 and 65 years of age were included. The demographic characteristics of these districts are presented in Table I.

Our sample size (n=4536) by using \[\frac{\text{DEFF}^*Np(1-p)}{[(d^2/2)_{1-a}^2(N-1)+p(1-p)]}\] equation, when N was population size (1,440,518), P was hypothesized as % of frequency of outcome factor in the population (5%), d was confidence limits as % of 100 (absolute +/- %, here 2%) and DEFF was design effect for cluster surveys that was set to 1 had 99.99% confidence level. Clustered random sampling was used. Blood samples were obtained from each subject and a questionnaire was completed by a trained interviewer. The questionnaire included demographic and anthropometric data and risk factors for hepatitis. The blood samples were initially screened by rapid immune chromatographic method. The positive samples were transferred to the hospital laboratory for confirmation by ELISA method. Positive HBsAg cases were checked for anti-HDV antibody. HBsAg, HBcAb and anti-HDV antibody were evaluated using Enzygnost HBsAg, 5.0 kit (Dade Behring, Germany), Hepanostica anti-HBc Uni-Forn kit (Biomerieux, France), and DiaSorin ELISA kit (Italy) respectively. The study was approved by the Institutional ethics committee. Written informed consent was obtained from all subjects before data collection.

RESULTS

A total of 4526 subjects were interviewed from 7 districts of Northern Sindh. 537 subjects that refused to give blood samples or had inadequate samples or with missed laboratory data were excluded. A total of 3989 participants were analyzed. The demographic characteristics of study population are shown in Table 2. Totally, 941; 23.60% (95% CI 22.30; 24.93) and 135; 3.40% (95% CI 2.85; 3.98) subjects from 3989 participants were HBcAb and HBsAg positive respectively. In addition, we found 8 cases of positive anti-HDV antibody. In univariate analysis, there was a significant heterogeneity in the rate of HBsAg (\(p=0.003\)) and HBcAb (\(p=0.003\)) among various districts. Age, marital status, transfusion, addiction, history of dental procedures and hospitalization had significant \(p\) value in univariate analyses but only age, marital status and addiction were significant risk factors of HBsAg or HBeAb positivity in multivariate analysis.

Table 1: Demographic data of study population

<table>
<thead>
<tr>
<th>Age group</th>
<th>Sukkur</th>
<th>Khairpur</th>
<th>Shikarpur</th>
<th>Ghotki</th>
<th>N. Feroz</th>
<th>J. Abad</th>
<th>K. Koat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjects interviewed</td>
<td>1615</td>
<td>469</td>
<td>630</td>
<td>648</td>
<td>375</td>
<td>619</td>
<td>170</td>
</tr>
<tr>
<td>Male</td>
<td>45%</td>
<td>48%</td>
<td>43%</td>
<td>44%</td>
<td>48%</td>
<td>42%</td>
<td>50%</td>
</tr>
<tr>
<td>Age</td>
<td>9±0.4</td>
<td>27±0.7</td>
<td>28±0.6</td>
<td>28±0.6</td>
<td>28±0.8</td>
<td>29±0.6</td>
<td>28±1.5</td>
</tr>
<tr>
<td>Rural</td>
<td>15%</td>
<td>66%</td>
<td>59%</td>
<td>57%</td>
<td>92%</td>
<td>66%</td>
<td>58%</td>
</tr>
<tr>
<td>Currently married</td>
<td>55%</td>
<td>55%</td>
<td>57%</td>
<td>64%</td>
<td>63%</td>
<td>68%</td>
<td>56%</td>
</tr>
<tr>
<td>H/o Blood transfusion</td>
<td>5.2%</td>
<td>4.1%</td>
<td>3%</td>
<td>5.6%</td>
<td>2.4%</td>
<td>2.7%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Addiction</td>
<td>2.2%</td>
<td>1.9%</td>
<td>4%</td>
<td>6%</td>
<td>5.9%</td>
<td>4.2%</td>
<td>2.4%</td>
</tr>
<tr>
<td>IV addiction</td>
<td>0.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.2%</td>
<td>0.0%</td>
<td>0.2%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Others</td>
<td>13.3%</td>
<td>9.4%</td>
<td>9.2%</td>
<td>16%</td>
<td>0.5%</td>
<td>1.5%</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

Table 2: Sero prevalence of HBcAb in male and female subjects in different age groups.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Male%</th>
<th>Female%</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-29 years</td>
<td>13</td>
<td>13.8</td>
</tr>
<tr>
<td>30-45 years</td>
<td>26.2</td>
<td>25.7</td>
</tr>
<tr>
<td>46-65 years</td>
<td>54</td>
<td>38</td>
</tr>
</tbody>
</table>

DISCUSSION

Our study indicates that sero-epidemiology of HBV infection in general population of Northern Sindh was higher as compared to the studies of Bhatti et al(1996)\(^{14}\), Bukhari et al(1999)\(^{15}\), Ahmed et al(2000)\(^{16}\), Mumtaz et al(2002)\(^{17}\), Mehmood et al(2004)\(^{18}\). Chronic HBsAg carriers are living in this province and can be reservoir for transmission of HBV infection through close contacts, sharing needles or nosocomial interventions. Furthermore, these patients are at great risk of hepatocellular carcinoma, cirrhosis and liver failure that their management would pose a heavy burden on the local public health system. In addition, individuals who had positive HBcAb are a threat to the public health, since a proportion of them could have occult HBV infection with very low level of HBV-DNA in the serum and liver tissue but be negative for serum HBsAg\(^{19}\).

Patients with occult HBV infection can transmit the infection and have higher incidence of liver cirrhosis and hepatocellular carcinoma\(^{20}\). Unfortunately, there were no prior data available from this part of province.
to help to monitor changing epidemiology of HBV through time.

In multivariate analysis age, addiction, and marital status were independent risk factors for HBV seropositivity. Older subjects and married individuals had higher probability of HBV seropositivity. Age is a common risk factor that almost is reported in all of seroepidemiologic studies of HBV infection. The reason is that the risk and cumulative frequency of high risk behaviors increase with age and consequently increase the likelihood of HBV infection.

REFERENCES