Prevalence of Hepatitis B virus infection among population of factory workers in Gujranwala (Punjab) Pakistan

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ABSTRACT

Present study is aimed at assessing the prevalence of Hepatitis B virus infection among factory workers of Gujranwala district of Punjab province (Pakistan) as there is insufficient published literature on this subject. HBsAg screening was done in factory workers of various industries of district Gujranwala who presented themselves as voluntary blood donors. A total of 852 male subjects were screened for hepatitis-B, 612 subjects between ages 17 to 25 years, 167 subjects between 26 to 35 years and 73 subjects with average age of more than 35 years. The total prevalence of hepatitis-B among factory workers was found to be 3.99% (34/852). The prevalence of hepatitis-B in subjects having age between 17 to 25 years was found to be 3.76% (23/612). Highest prevalence was found among subjects having age between 26 to 35 years which was 5.39% (9/167). The prevalence of hepatitis-B in subjects having age more than 35 years was found to be 2.82% (2/73). The prevalence of Hepatitis-B in the normal healthy population among male subjects working in various industries of Gujranwala district was found to be 3.99%. Compared to general populations of Pakistan, the seroprevalence of Hepatitis B is high in the population of male subjects working in industries of Gujranwala. It is concluded that these working class populations perhaps are at higher risk of contracting hepatitis-B infections as compared to other populations.

Key Words: Hepatitis B, Factory workers, Prevalence, Hepatitis B, Gujranwala, Pakistan.

INTRODUCTION

Hepatitis is known as an infection causing swelling and inflammation of the liver. Its chronic form may lead to cirrhosis or cancer. People, sometimes contact hepatitis with limited or no symptoms but usually it leads to jaundice, anorexia, poor appetite and diarrhea. Causative agents of hepatitis include; alcohol, poison, drugs and autoimmunity but most cases of hepatitis are reported to be by viruses. Hepatitis B is a major health problem worldwide especially in Asia, Africa, southern Europe and Latin America (Previsani & Lavanchy, 2002). Hepatitis B virus is transmitted through blood and blood products, sexual contacts. Intrafamilial transmission is also reported. There are about 350 million people with chronic hepatitis B virus (HBV) infection worldwide (Previsani & Lavanchy, 2002). Pakistan is one of the worst affected countries with hepatitis B. A number of studies have been conducted to find the prevalence of HCV and HBV in different areas of Pakistan (Ali et al., 2009; Waheed et al., 2009; PMRC 2009). There are very few population based studies to estimate the exact incidence of hepatitis in different areas (Waheed et al., 2009). This is also
because mostly the epidemiological studies concerning the prevalence of HBV and HCV are restricted to the hospitalized patients (Koulentaki et al., 2001; Choudhary et al., 2005). A country wide survey conducted from July 2007 to May 2008 by Pakistan Medical Research Council (PMRC, 2009) reveals that prevalence of hepatitis B is 2.5% in general population of Pakistan. Gender-wise analysis showed its slight preponderance in males all over Pakistan (PMRC, 2009). Intraprovince prevalence of the hepatitis B was very high in Balochistan (4.3%) while it was 2.5% in Sindh, 2.4% in Punjab and 1.3% in Khyber Pakhtoonkhwa. The overall HBsAg prevalence in Punjab province was 2.4%. High prevalence of HBV and HCV are seen in Vehari, Okara, Jhang, Islamabad, Attock, Rahim Yar Khan, Mandi Bhauddin, Gujranwala and Mianwali districts of Punjab province. People inhabiting the polluted areas may have higher frequency of viral hepatitis (Jordan, 2010; Sohail et al., 2010). Gujranwala an industrial city of Punjab (Pakistan) is located at 32.16° North, 74.18° East and is 226 meters (744 feet) above sea-level. There are 6500 small and medium entrepreneurs (SME’s) and 25000 Cottage industry of diverse nature including manufacturers of industrial machinery, fan industry, motor pumps industry, washing machine industry, electric goods, poultry feed, soap, ball point, rubber tube, metal utensils, melamine utensils, cutlery, kitchen ware, ceramics tiles, sanitary wares, sanitary fittings, agriculture appliances, woolen textiles and steel pipe industries etc. (GBC, 2013). Because of unregulated discharge of industrial wastes in the environment, the levels of pollution are also higher in some regions as compared to international standards (Rahman, 2002). Least information is available at population level showing the prevalence of hepatitis B in Gujranwala. It appears that people working in different industrial units are at high risk of contacting this viral infection as they are exposed to multiple risk factors. Little is known about the prevalence of Hepatitis B virus infection in factory workers. The objective of present study was to assess the perceived incidence of hepatitis B in population of people working in different industries of Gujranwala.

MATERIALS AND METHODS

Blood Sampling
A hepatitis-B screening study was conducted among the apparently healthy male population of factory workers who presented them as volunteers for blood donation during blood donation camps held in different industrial units located in Gujranwala, Pakistan during last few years. The blood was collected by authorized technician and the sera were separated from the coagulated blood by centrifugation at 5000 rpm for 10min. at room 4°C and stored at -20°C for further use. The HBV screening was based on the detection of antibodies against the related virus in the sera using enzyme immunoassays. All procedures were carried out with informed consent according to institutional guidelines.

Enzyme immunoassay for detection or confirmation of hepatitis B surface antigens
The HBsAg kit (DS-EIA-HBsAg, DSI S.r.I. Italy) was used for detection of hepatitis B surface antigen in blood serum (plasma), leukocyte interferon, human immunoglobulin and other blood preparations. Kit sensitivity is 0.1 IU/ml (“Second International Standard for HBsAg, subtype adw2, genotype A”, NIBSC Code; 00/588) when HBsAg detecting. For detection of hepatitis B surface
antigens, protocol provided by manufacturer was used. Briefly, the system uses two highly specific monoclonal antibodies directed to different epitopes. One monoclonal mouse antibodies to HBsAg (anti-HBsAg) coated onto the walls of microplate and second monoclonal antibodies to HBsAg (anti-HBsAg) labeled with the enzyme horseradish peroxidase (HRP) were used. The sample and the conjugate were added simultaneously to the plate and incubated at 42°C for two hours. After washing with washing solution, substrate was added and incubated at 18-24 °C for 25-30 min. in the dark place. Finally the reaction was stopped by adding stopping reagent and optical density was read at 450nm. The intensity of the color generated by the enzyme was proportional to the amount of antigens in the samples. The presence or absence of hepatitis B surface antigen (HBsAg) is determined by the ratio of the OD of each sample to the calculated cut-off value.

**Statistical analysis**

The data was analyzed by χ²-test using SPSS software, to find out the association between age groups and catching of hepatitis. Subjects were divided in three age groups: 17-25, 26-35 and subjects with age above 35 years. Age wise comparison was made to identify any association.

**RESULTS**

A total of 852 male subjects working in different industrial units of Gujranwala were screened for hepatitis B virus infection. Overall the prevalence of hepatitis in this population was 3.99% (34/852). The subjects were divided in three age groups.

**Table 1:** (a) shows prevalence of hepatitis B and cross tabulation of age groups verses hepatitis B (b) shows detail of χ²-test.

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Hepatitis B Positives</th>
<th>Hepatitis B negatives</th>
<th>Total</th>
<th>% of Hepatitis B</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-25 years</td>
<td>23</td>
<td>589</td>
<td>612</td>
<td>3.76</td>
</tr>
<tr>
<td>26-35 years</td>
<td>9</td>
<td>158</td>
<td>167</td>
<td>5.39</td>
</tr>
<tr>
<td>35 years and more</td>
<td>2</td>
<td>71</td>
<td>73</td>
<td>2.82</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>818</td>
<td>852</td>
<td>3.99</td>
</tr>
</tbody>
</table>

**b) Chi-Square Test**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Df</th>
<th>Asymp. Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>1.237a</td>
<td>2</td>
<td>0.539</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>1.193</td>
<td>2</td>
<td>0.551</td>
</tr>
<tr>
<td>Linear-by-Linear Assoc</td>
<td>0.020</td>
<td>1</td>
<td>0.888</td>
</tr>
<tr>
<td>Number of Valid Cases</td>
<td>852</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 2.91
The prevalence in subjects with age between 17-25 years was 3.76. Highest prevalence (5.39%) was found in second age group (26-35 years). In subjects having age more than 35 years, the prevalence of hepatitis B infection was 2.82. Data was analyzed statistically using SPSS. $\chi^2$-test was performed. The p-value indicates there is no association between age groups and catching hepatitis B (Table 1).

**DISCUSSION**

Hepatitis B virus (HBV) infection is a transmittable global health problem (Idrees et al., 2004; Zhu et al., 2008) with about 2 billion infected persons worldwide (Paraskevis et al., 2002; Zhu et al., 2008; Li et al., 2010). There are about 400 million people suffering from chronic HBV infection (Alam et al., 2007). A lot of work has been published about the prevalence of hepatitis in different regions of Pakistan. Most of the studies are based on clinical or hospital patients or from the volunteer blood donors. However studies about the prevalence of hepatitis in Gujranwala district are very limited and no previous study has been found about the occurrence of these infections in populations of factory workers in this region. According to official figures, overall prevalence of hepatitis-B was reported as 2.5% in general populations of Pakistan. The frequency of hepatitis-B in province Punjab was 2.4% varying from 0.7% to 5.7% in different regions of province, indicating pockets of infection. The prevalence of hepatitis-B in Gujranwala was reported to be 2.9% (27/926) indicating that about 112,000 persons are affected from this disease (PMRC 2009). The prevalence of hepatitis-B in Gujranwala is higher as compared to nearby districts/regions like Sialkot (2.2%), Hafiz Abad (2.2%), Narowal (2.1%), Sheikupura (1.6%), Lahore (1.4%), and Gujrat (0.8%) (PMRC 2009). Mujeeb et al., (2000) has studied the seroprevalence of HBV and HCV infections among college going students and found that 2.21% were HbsAg. Khan et al., (2006) have reported that in Liaqatpur, among 1426 blood donors studied, the prevalence for hepatitis B was 5.96%. Bangash et al., (2009) found 5% of the healthy blood donors at Kurram Agency, Northern Areas, Pakistan, positive for hepatitis B surface antigen (HBsAg). In another study, the total prevalence of Hepatitis B and Hepatitis C was found to be 12.99% (Ahmad et al., 2006). The total prevalence of both Hepatitis-B and Hepatitis-C in population of college students was found to be 4.08% with 1.76% for hepatitis-B which is less in comparison to general population of the Gujranwala district which is 2.9% (Ilyas et al., 2011; PMRC 2009). Overall frequency of hepatitis in factory workers is 4% which is higher as compared to general population of the city which is 2.9% (PMRC, 2009). The prevalence is much higher in factory workers as compared to 1.76% of college going students of the region. This might reflect a difference of awareness in these two populations based on education. At national level, the frequency of hepatitis B positive for male subjects between the ages of 20 to 29 years and 30 to 39 years has been reported as 2.4% and 3.7%, respectively. The frequency for the same age groups in Punjab province was 3.2% and 4.2% respectively (PMRC 2009). In the present study the prevalence of HBV among factory workers between the age 17-25 years and 26 to 35 years is 3.8% and 5.4%, respectively which is apparently higher as compared to figures at national and
provincial levels. This is an indication that people working in factories are more prone/exposed to these transmittable viruses. In order to identify the social habits which enhance the risk of infection by working in a specific environment of industry, the observation of culture and daily life routine seems to be extremely important. Seiji et al., (1991a) studied prevalence of HBsAg positive cases in the sera of 428 factory workers in coastal city of Yantsi (China) and found highest prevalence in China. However in another study, the infection rate of hepatitis B among factory workers was found lower than the values reported early in the 1980s for Beijing populations or the values for populations in other parts of China (Seiji et al., 1991b). The present study is the first report of a community based study on the prevalence of HBV among male subjects working in factories of Gujranwala. However the study has several limitations. Firstly, although the study is based on a good sample size, yet there is a need to conduct study on still larger scale involving socio demographic data of the subjects. Secondly the sample size should be large enough to analyze prevalence according to the nature of industry. In spite of these limitations, however, findings of the present study have important public health implications for hepatitis intervention programs. Our results and others indicate that there is an urgent need to undertake such studies in other populations so that populations with higher prevalence can be identified and ways can be devised for the prevention and cure of these viral infections.

REFERENCES


GBC (Gujranwala Business Centre) 2013. availablea at http://gbc.org.pk/index.php?option=com_content&view=article&id=49&Itemid=18


