Prevalence of hepatitis B and hepatitis C in populations of college students in Gujranwala

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ABSTRACT

The prevalence of Hepatitis B and Hepatitis C infections was assessed among college students in district Gujranwala of Punjab province as there is insufficient published literature on this subject. HBsAg and AntiHCV screening were done in students aged between 16 to 21 years of both sexes in various colleges of district Gujranwala who presented themselves as voluntary blood donors. A total of 2502 subjects were screened for hepatitis-B and Hepatitis-C, 1770 male and 732 female subjects. The total prevalence of Hepatitis-B and Hepatitis-C was found to be 4.08% (102/2502). Individually, the prevalence of hepatitis-B in population of college students was 1.76% (44/2502) and it was more common in male subjects 2.15% (38/1770) in comparison to female subjects with 0.84% (6/732). The prevalence of hepatitis-C in the population of college students was 2.32% (58/2502) and it was also more common in male subjects 2.60% (46/1770) in comparison to 1.68% (12/732) in female subjects. The prevalence of Hepatitis-B and Hepatitis-C in the normal population of college students of Gujranwala district was found to be 1.76% and 2.32%. Compared to general populations of Pakistan, the seroprevalence of Hepatitis B and C is low in the normal population of college students of Gujranwala. It might be possible to conclude that these student populations perhaps are not at higher risk of contracting hepatitis-B and hepatitis-C infections as compared to other populations.

Key Words: Hepatitis B, Hepatitis C, prevalence of Hepatitis in Gujranwala and Pakistan.

INTRODUCTION

Hepatitis B and hepatitis C are serious health problems worldwide. These viral diseases are transmitted through blood and blood products, sexual contacts and intrafamilial transmission. There are about 350 million people with chronic hepatitis B virus (HBV) infection and about 170 million people with chronic hepatitis C virus (HCV) infection worldwide (Previsani & Lavanchy, 2002). Pakistan is one of the worst afflicted countries with hepatitis B and hepatitis C. Seroprevalence of hepatitis C in Pakistan is higher than in other countries of the region like India, Nepal, Myanmar, Iran and Afghanistan (Hutin et al., 2004). 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, 2007-2009). Still there are very few population based studies to estimate the exact incidence of hepatitis in different areas (Waheed et al., 2009).

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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, 2007-2009) reveals that prevalence of hepatitis B and hepatitis C is 2.5% and 5%, respectively in general population of Pakistan. Gender wise analysis showed slight preponderance of males for HBV all over Pakistan but no difference was seen in HCV (PMRC, 2007-2009).

Another small study indicates a prevalence of hepatitis C in Pakistan as 3% (range 0.5-31.9%) showing significant variation in areas of the country (Ali et al., 2009). Intraprovince prevaleance 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. HCV was highest in Punjab (6.7%) followed by Sindh (5.0%), Balochistan (1.5%) and Khyber Pakhtoonkhwa (1.1 %) (Chaudhary et al., 2005). The overall HBsAg prevalence in Punjab province was 2.4% and for HCV it was 6.7%. 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. In district Gujranwala the prevalence of hepatitis B is reported as 2.9% with approximately 112000 persons having this virus and the prevalence of hepatitis C is 6.3% with 243000 persons suffering from this disease (PMRC, 2007-2009). Aslam & Aslam (2001) reported a population prevalence of 23.8% of hepatitis C in Gujranwala. Less information is available at population level showing the prevalence of hepatitis B and hepatitis C in Gujranwala. It appears that students are at high risk of contracting these viral infections as they are exposed to multiple risk factors. Little is known about the prevalence of Hepatitis B and hepatitis C in college going student populations. Present study was carried out in Gujranwala district of Punjab, Pakistan; the fifth most populated and industrial district within Punjab province. The objective of present study was to assess the incidence of hepatitis B and hepatitis C in this group of population.

MATERIALS AND METHODS

Blood Sampling

A hepatitis-B and hepatitis-C screening study was conducted among the apparently healthy male and female population of college students who presented them as volunteers for blood donation during blood donation camps held in different colleges in district 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 and HCV screening was based on the detection of antibodies against the related viruses in the sera using enzyme immunoassays.

Enzyme immunoassay for detection or confirmation of hepatitis B surface antigens

The HBsAg kit (DS-EIA-HBsAg, DSI S.r.l. 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.

Enzyme immunoassay for detection of antibodies to viral hepatitis C

The Hepatitis C kit (EIA-ANTI-HCV DSI S.r.l. Italy), based on an enzyme immunoassay for detection of IgG and IgM antibodies to viral hepatitis C in human blood serum, was used. Polystyrene stripped 96-well plate coated with recombinant antigens (E.coli) analogous to structural (HCV-NS5-Ag) proteins of viral hepatitis C is first treated with the diluted sample and HCV antibodies are captured if present, by the antigens. In second incubation bound HCV antibodies are detected by the addition of highly specific monoclonal mouse antibodies to human immunoglobulin G and M conjugated with horseradish peroxidase (HRP). The enzyme captured on solid phase acts on chromogen and generates color that is proportional to the anti-HCV antibodies present in the sample which was determined by the ratio of the OD of each sample to the calculated cut-off value.

RESULTS

A total of 2502 subjects were screened for hepatitis-B and hepatitis-C. Average age of the subjects was between 17 to 22 years. Among these 1770 (70.74%) were male and 732 (28.54%) were female subjects. The total prevalence of both Hepatitis-B and Hepatitis-C in population of college students was found to be 4.08% (102/2502) with Hepatitis-C having a higher prevalence of 2.32% (58/2502) in comparison to Hepatitis-B prevalence of 1.76% (44/2502). 4.75% (84/1770) of the total male population of students and 2.46% (18/732) of the total female population of students were positive for Hepatitis-B and Hepatitis-C infections. Predominance of male population in the total number of positive cases was 82.35% (84/102) in comparison to females with 17.65% (18/102). No subject was found to have co-infection of both Hepatitis-B and Hepatitis-C (Table 1).

Individually, the prevalence of hepatitis-B in population of college students was 1.76% (44/2502) and it was more common in male subjects 2.15% (38/1770) in comparison to female subjects with 0.84% (6/732). The prevalence of hepatitis-C in the population of college students was 2.32% (58/2502) and it was also more common in male subjects 2.60% (46/1770) in comparison to 1.68% (12/732) in female subjects.
DISCUSSION

The World Health Organization (WHO) estimates that about 3% of the world's population (about 180 million people) are infected with hepatitis C virus (HCV). Each year about three to four million persons are newly infected, 70% of whom will develop chronic hepatitis. Hepatitis-C is responsible for 50-75% of all liver cancer cases (Umer et al., 2010). Hepatitis B virus (HBV) infection is a 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., 2004; Li et al., 2010). There are about 400 million people suffering from chronic HBV infection (Alam et al., 2007). In a population based national survey conducted by Pakistan Medical Research Council (PMRC, 2007-2009), it has been revealed that the overall prevalence of hepatitis-B was 2.5% and hepatitis-C was 4.9% in general populations of Pakistan (PMRC, 2007-2009).

Table 1. Prevalence of hepatitis among college students of district Gujranwala, Pakistan.

<table>
<thead>
<tr>
<th>Prevalence of Hepatitis</th>
<th>Total Subjects</th>
<th>Positive cases</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1770</td>
<td>84</td>
<td>4.75</td>
</tr>
<tr>
<td>Female</td>
<td>732</td>
<td>18</td>
<td>2.46</td>
</tr>
<tr>
<td>Total</td>
<td>2502</td>
<td>102</td>
<td>4.08</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prevalence of Hepatitis B</th>
<th>Total Subjects</th>
<th>Positive cases</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1770</td>
<td>38</td>
<td>2.15</td>
</tr>
<tr>
<td>Female</td>
<td>732</td>
<td>06</td>
<td>0.84</td>
</tr>
<tr>
<td>Total</td>
<td>2502</td>
<td>44</td>
<td>1.76</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prevalence of Hepatitis C</th>
<th>Total Subjects</th>
<th>Positive cases</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1770</td>
<td>46</td>
<td>2.60</td>
</tr>
<tr>
<td>Female</td>
<td>732</td>
<td>12</td>
<td>1.68</td>
</tr>
<tr>
<td>Total</td>
<td>2502</td>
<td>58</td>
<td>2.32</td>
</tr>
</tbody>
</table>

The objective of the present study was to estimate the prevalence of hepatitis-B and hepatitis-C infections among volunteer blood donor students both male and female in colleges of district Gujranwala, Pakistan. Many studies have been published about the prevalence of hepatitis in different regions of Pakistan. Most of the studies are based on clinical or hospital populations or from the volunteer blood donors. However studies about the prevalence of hepatitis in Gujranwala district were very limited and no previous study has been found about the occurrence of these infections in populations of college students in this region. The frequency of hepatitis-B in Punjab, Pakistan 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. 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, 2007-2009). The frequency of hepatitis-C in Punjab, Pakistan is 6.7% varying from 1.9% to 13.1% in different districts. The frequency of hepatitis-C in Gujranwala was 6.3% (58/926). It has been estimated that about 243,000 persons are affected from hepatitis-C in Gujranwala. Th frequency of hepatitis-C in surrounding districts/regions was: Sialkot (7.0%), Hafiz Abad (12.9%), Narowal (4.0%), Sheikupura (8.7%), Lahore (6.8%), and Gujrat (5.4%) (PMRC, 2007-2009). Umar. et al (2010) have reported that the frequency of hepatitis C infection in Pakistan is 4.7%, varying from 0.4% - 33.7%. Aslam & Aslam (2001) have reported that in Gujranwala, the occurrence of anti-HCV-positive serology was 23.8% and in Lahore, the occurrence of anti-HCV-positive serology was 15.9% . Alam & Ahmad (2001) have reported 15.6% of the blood donors in Sialkot as carrier of hepatitis. Mujeeb et al., (2000) has studied the seroprevalence of HBV and HCV infections among college going students and found that 2.21% were HbsAg and 0.5% were anti HCV positive. The prevelance of HBV and HCV in college going students was significantly lower (< 3.0%) than 30% seroprevalence among paid donors and 7% among family/replacement blood donors. Khan et al., (2006) have reported that in Liaqatpur, among 1426 blood donors studied, the prevalence for hepatitis B was 5.96% and it was 0.07% for HCV. Bangash et al., (2009) found 5% of the healthy blood donors at Kurram Agency, Northern Area, Pakistan, positive for hepatitis B surface antigen (HBsAg) and 1.1% positive for HCV antibody. In another study, the total prevalence of Hepatitis B and Hepatitis C was found to be 12.99% (Ahmad et al., 2006). In the present study total prevalence of both Hepatitis-B and Hepatitis-C in population of college students was found to be 4.08%. The prevalence of hepatitis-B was 1.76% which is less in comparison to general population of the Gujranwala district which is 2.9% (PMRC, 2007-2009). The prevalence of hepatitis-C was 2.32%. This is lower than the reported figure from general population of district Gujranwala which is 6.4%. This low incidence of hepatitis in college students is perhaps due to high level of awareness and education about the disease.

Present study shows that predominance of male population in the total number of positive cases was 82.35% in comparison to female subjects with 17.65%. Individually, the prevalence of hepatitis-B in male subjects (2.15%) was higher in comparison to female subjects where it is 0.84%. Similarly the prevalence of hepatitis-C was also higher in male subjects (2.60%) in comparison to 1.68% in female subjects. Similar findings were seen in other different studies done in the country where frequency of hepatitis in males predominate females (Khan & Rizvi 2003; Mashud et al., 2004; Khan & Siddiqui 2007; Farooqi & Farooqi, 2000 (a)). Khan et al., (2006) has also reported higher prevalence of HBV in males (6.03%) compared with 5.05% in females. In some studies however higher prevalence have been reported in female subjects than males (Farooqi & Farooqi, 2000(b); Chaudhry et al., 2005). The reason for higher prevalence in males may be attributed to the fact that in Pakistan males enjoy a greater freedom and social mobility as a result they have more exposure to multiple risk factors and greater chances of contracting the viral infection.
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


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