Short Communication
The frequency of hepatitis B and C among blood donors: a hospital-based study in Sana’a, Yemen

Background: Hepatitis B and C viruses (HBV and HCV) are the most important agents responsible for transfusion transmitted infections. They are considered one of the major problems associated with blood transfusion practices.

Aim: To find out the frequencies of HBV and HCV among healthy blood donors.

Methodology: A 2-year retrospective study from July 2008 to June 2010 was conducted at the blood bank unit at the University of Science and Technology Hospital (USTH), Sana’a, Yemen. All individuals between 18 and 50 years old who came for blood donation were included. Clinically anaemic, past history of jaundice were excluded. The total number of blood donors was 3602. The screening for hepatitis B surface antigen and anti HCV in sera was done by Microparticles Enzyme Immunoassay (MEIA) on the AxSYM Abbott System.

Results: The frequencies of HBV and HCV among blood donors were 1.72% and 1.05% respectively. The increase in the number of HBV and HCV positive cases in the second year compared with the first year was not statistically significant (P = 0.80 and P = 0.81 respectively).

Conclusion: HBV and HCV remain a major problem of blood transfusion in Yemen. It is essential to apply strict criteria for the selection and screening of blood donors to avoid unsafe transfusion.

Key Words: Hepatitis B virus, Hepatitis C virus, Blood Donors, Blood transfusion.

INTRODUCTION
Viral hepatitis is one of the serious health problems in the world [1]. Hepatitis B and C viruses (HBV and HCV) are the most common viral infections worldwide leading to high rates of morbidity and mortality in the developing countries [2, 3]. HBV infection is a contagious disease that may be transmitted vertically from mothers to offspring or horizontally by means of blood products and body secretions [4]. HBV as well as HCV are a major cause of chronic Hepatitis [5]. HBV has tainted about 2 billion people worldwide [6]. Carriers are about 400 millions, of which 250 million subsist in Asia [7]. HCV infection is another common chronic blood borne infection with an estimated 3.9 million persons infected by the virus and a high rate of progress to liver cirrhosis [8]. The prevalence rate of HCV in the world is about 3% (200 million people) as reported by World Health Organization (WHO) [9]. About half of the cases may develop into chronic cases, which are at high risk of liver cirrhosis and liver cancer [10]. Evaluation of data on the frequency of HBV and HCV among blood and plasma donors permits an assessment of the occurrence of infections in the blood donor population and consequently the safety of the collected donations [11]. It also gives an idea of the epidemiology of these diseases in the community [11]. Blood transfusion services are poor in Yemen, well below WHO standards due to limitations in current blood screening practices. Thus, some HBsAg negative individuals, positive for antibodies against HBV core antigen (anti-HBc) and/or HBsAg (anti-HBs) continue to be positive for HBV DNA. Donation by such individuals is a potential source of HBV transmission to the recipients [12-14].

Few studies to investigate the prevalence of HBV and HCV in Yemen have shown different prevalence rates. Sallam et al. reported different frequencies of HBV and HCV in four Yemeni communities (blood donors in Sana and Aden and residents in Soqatra and African minorities) as shown in Table 1 [15].

Scott et al. found that the carrier rate of an HBV surface antigen (HBsAg) among the general population was 12.7% [16] and a prevalence of HCV was 2.6% [17], while it was reported by Al-Robasi and Al-Harbi that the prevalence of HBsAg among blood donors was 9% [18]. In Egypt, Jordan, Oman, Palestine, Yemen and Saudi Arabia high endemicity rates of HCV has been reported [19]. The prevalence of HCV is also inconsistent. It has been reported that the prevalence of antibody to HCV in Egypt was 15% [20], while only 3.3% in Saudi Arabia [21] and 0.95% among blood donors in Syria [22]. This study aimed to find out the frequency and trends of the HBV and HCV infections in two consecutive years among healthy blood donors at the blood bank unit of the University of Science and Technology Hospital, Sana’a-Yemen.

MATERIALS AND METHODS
This study was conducted on blood donors at the blood bank unit of the University of Science and Technology Hospital (USTH) from 1 July 2008 to 30 June 2010. Blood donation depends on a semi-voluntary base in which relatives and friends of patients are asked to donate blood for their patients. This study was approved by the Ethics and Research Committee, Ministry of Public Health and Population, Yemen.

Inclusion Criteria:
The all persons (18 – 50 years old) who were present for blood donation at the University of Science and Technology Hospital were included.

Exclusion Criteria:
Individuals with anaemia or past history of jaundice as well as those with the last blood donation not exceeding 4 months were excluded.

Procedures:
In this retrospective study, we reviewed 3602 blood donors over a period of 2-years (1/7/2008-30/6/2010) from the records of blood bank unit at USTH. Blood samples from
3602 donors (10 ml each) were tested for anti-HCV and HBsAg. The screening was based on Microparticles Enzyme Immunoassay (AxSYM Abbott). A third generation of Microparticle Enzyme Immunoassay (Sandwich uses microparticles coated with monoclonal anti HBs) was used for detection of HBsAg and a recombinant antigen of HCV was used to detect HCV antibodies. Specimens, which proved repeatedly reactive in two separate tests, were considered positive.

RESULTS
A total of 3602 blood units were collected from male donors (91.6% semi voluntary and 8.4% replacement donors). The mean age was 26.3 years (age range 18-50 years). Out of 3602 donors investigated, 62 (1.72%) were positive for HBsAg and 38 (1.05%) were positive for anti-HCV (Table 2). Only one case was positive for both HBV and HCV. Of the 1638 blood samples investigated during the first year, 25 (1.52%) were positive for HBV and 15 (0.91%) were positive for HCV. Of the 1964 blood samples investigated during the second year, 37 (1.88%) were positive for HBV and 23 (1.17%) were positive for HCV (Table 2).

DISCUSSION
It is generally accepted that the diagnosis of HBV and HCV is based on the presence of the HBsAg and HCV antibodies in the blood (23). The occurrence of HBV and HCV was investigated by serological methods and the results in two consecutive years were compared to assess the trends of the infection. This study showed that the total frequencies of HBV and HCV within the blood donors in Yemen were 1.72% and 1.05% respectively. The data also showed that there is an increase in the rate of infection of HBV from 1.52% in the first year to 1.88% in the second year and HCV from 0.91% in the first year to 1.17% in the second year as shown in Figure 1. However, this increase was not statistically significant ($p = 0.80, p = 0.81$) for HBV and HCV respectively. The frequency of HBV shown in this study was different from that reported in previous studies conducted in Yemen by Scott et al. and Alrobasi et al. which were 12.7% and 9% respectively (16, 18).

HBV in our study was 1.72%, almost comparable to other studies in different countries, 2% in Karachi (24) and 1.8% in Peshawar (25). However, it is much higher than that reported in Iran (1.07%) (26), Greece (0.35%) (27) and Mexico (0.16%) (28). Hepatitis C in blood donors was 1.05%, which is lower than that reported in Africa (6%) (29), in India (5.1%) (29) and in Japan (1.5%) (30). Moreover, it is higher than that reported in USA (0.6%) (30), in Finland (0.24%) (31) and in UK (0.17%) (31). The differences may be attributed to geographical and socio-economic differences as well as differences in the selection of subjects. Furthermore, the use of more than one marker such as HBsAg, anti HBc and HBV DNA, which have been used in the previous studies, may contribute to these variations (32-37). Therefore, routine blood donor screening for anti-HBC has been implemented in several countries and this led to a reduction in the hazard of post-transfusion HBV infection (8). This study illustrates that the rate of HBV infection was higher than that of HCV, which is similar with other studies carried out in many countries (38, 39).

CONCLUSION
We conclude that there was an increase in the frequency of HBV and HCV infections in the blood donors between 2008 and 2010. In addition, the difference between the results of this study and the results of the previous studies might be attributed to the variations in sample size and locations. Therefore, it is highly recommended that a comprehensive study should be done to involve all hospitals and medical centers to better reflect the accurate prevalence rate of HBV and HCV. Serious concerns should also be given to the safety of the blood supply in Yemen. Since the absence of HBsAg in the blood of healthy individuals may not be enough to guarantee absence of circulating HBV, multiple markers should be implemented in the screening of blood donors. The occurrence of these infections amongst voluntary blood donors should be monitored carefully by applying strict guidelines in the selection process of donors.

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REFERENCES
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Table 1: Viral hepatitis in four Yemeni communities

<table>
<thead>
<tr>
<th>Blood donors</th>
<th>No. of Positive (%)</th>
<th>Blood donors</th>
<th>No. of Positive (%)</th>
<th>Blood donors</th>
<th>No. of Positive (%)</th>
<th>Blood donors</th>
<th>No. of Positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sana’</td>
<td>493 (15%)</td>
<td>Aden</td>
<td>494 (33.7%)</td>
<td>Soqatra</td>
<td>99 (26.3%)</td>
<td>African</td>
<td>97 (19.6%)</td>
</tr>
<tr>
<td>HBSAg</td>
<td>74 (15%)</td>
<td></td>
<td>33 (6.7%)</td>
<td></td>
<td>26 (5.1%)</td>
<td></td>
<td>19 (5.2%)</td>
</tr>
<tr>
<td>Anti-HCV</td>
<td>1 (0.2%)</td>
<td>494</td>
<td>3 (0.6%)</td>
<td>99</td>
<td>5 (5.1%)</td>
<td>97</td>
<td>5 (5.2%)</td>
</tr>
</tbody>
</table>

Table 2: Frequency of HBV and HCV among blood donors at USTH in two consecutive years

<table>
<thead>
<tr>
<th></th>
<th>Total donors Blood</th>
<th>No. of Positive</th>
<th>% positive</th>
<th>Total donors No. of Positive</th>
<th>Total %</th>
<th>Difference (P-Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBSAg</td>
<td>1&quot; year</td>
<td>1638</td>
<td>25</td>
<td>1.52</td>
<td>62</td>
<td>1.72</td>
</tr>
<tr>
<td></td>
<td>2&quot; year</td>
<td>1964</td>
<td>37</td>
<td>1.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti-HCV</td>
<td>1&quot; year</td>
<td>1638</td>
<td>15</td>
<td>0.92</td>
<td>38</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>2&quot; year</td>
<td>1964</td>
<td>23</td>
<td>1.17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 1: Infection rate of HBV and HCV in blood donors for two consecutive years