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(Received November 7th, 2010 Revised December 14th, 2010 Accepted December 20th, 2010 Published online January 3rd, 2011.)

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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 Abott 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:

All the 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 Alobasi 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 HBe 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-HBe 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.

ACKNOWLEDGEMENT

The authors thank the management of USTH and all the members in the blood bank unit for their cooperation and support.

REFERENCES

- 1-Quaide Azam, Mohammad Fayyaz, Muhammad Ayub Khan, Ghulam Mohyud Din Chaudhary, Masroor Ali Qazi. Hepatitis B, C & HIV; Sero-Prevalence of Infection in Blood Donors. *Professional Med J Dec.* 2006; 13: pp. 632-636.
- 2-Liu WC, Mizokami M, Buti M, Lindh M, Young KC., et al. Chang TT Simultaneous quantification and genotyping of hepatitis B virus for genotype A to G by Real-Time PCR and Two-Step Melting Curve Analysis. *J. Clin. Microbiol.* 2006; 44: pp. 4491-97.
- 3-Masroor Alam M, Zaidi SZ, Malik SA, Shaukat S, Naeem A., et al. Molecular epidemiology of hepatitis B virus genotypes in Pakistan *BMC Infectious Dis.*, 7: 115.
- 4-Maynard JE, Hepatitis B. *Global importance and need for control Vaccine.* 2007: pp. 18-20.
- 5-Sayed Moayed Alavian, Behzad Hajarizadeh, Masoad Ahmedzad-Asl, Ali Kabir Kamran Bagheri Lankarani. Hepatitis B virus infection in Iran :Asymptomatic Review. *Hepatitis Monthly.*2008; 8 (4): pp. 281-294.
- 6-Umar M, Bushra HT, Younis N, Bashir N .Clinical spectrum of chronic liver disease due to HBV, HCV and dual infection a comparative study. *Pak J Gastroenterol.* 1999; 13: pp. 1-3.
- 7-Schreiber GB, Busch MP, Kleinman SH, Korelitz JJ. The risk of transfusion-transmitted viral infections. *The Retrovirus Epidemiology Donor Study. N Engl J Med.* 1996; 334: pp. 1685-1690.
- 8-Lee Wm. Hepatitis B virus infection. *N Engl Med.* 1997; pp. 1733-45.
- 9-Kleinman SH, Kuhns MC, Todd DS, Glynn SA, McNamara A et al. Frequency of HBV DNA detection in US blood donors testing positive for the presence of anti-HBe: implications for transfusion transmission and donor screening. *Transfusion.* 2003; 43: pp. 696-704.
- 10-Schiff E. Hepatitis Central, Current information on Hepatitis C and treatment for medical profession, Uni Miami. 2002; pp. 1-2.
- 11-Hepatitis C, Fact Sheet No 204 Geneva, World Health Organization. 2000.
- 12-Bhattacharya P, Chandra PK, Datta S, Banerjee A, Chakraborty S et al. Significant increase in HBV, HCV, HIV and syphilis infections among blood donors in West Bengal, Eastern India 2004-2005: Exploratory screening reveals high frequency of occult HBV infection. *World J Gastroenterol.* 2007; 13(27): pp. 3730-3733.
- 13-Weber B, Melchior W, Gehrke R, Doerr HW, Berger A et al. Hepatitis B virus markers in anti-HBe only positive individuals. *J Med Virol.* 2001; 64: pp. 312-319.

14-Wang JT, Wang TH, Sheu JC, Shih LN, Lin JT et al. Detection of hepatitis B virus DNA by polymerase chain reaction in plasma of volunteer blood donors negative for hepatitis B surface antigen. *J Infect Dis.*1991; 163: pp.397-399.

15-Weinberger KM, Bauer T, Bohm S, Jilg W. High genetic variability of the group-specific a-determinant of hepatitis B virus surface antigen (HBsAg) and the corresponding fragment of the viral polymerase in chronic virus carriers lacking detectable HBsAg in serum. *J Gen Virol.* 2000; 81: pp. 1165-1174.

16-T. A. Sallam, C.Y.W. Tong, L. E. Cuevas, Y. A. Raja'a, A.M. Othman et al. Prevalence of blood-borne viral hepatitis in different communities in Yemen. *Epidemiol. Infect.* 2003; 131: pp. 771-775.

17-Scott DA, Burans JP, Al-Ouzeib HD, et al. A seroepidemiological survey of viral hepatitis in Yemen Arab Republic. *Trans R Soc Trop Med Hyg.* 1990; 2: pp. 288-291.

18-Scott DA, Constantine NT, Callahan J, et al. The epidemiology of hepatitis C virus antibody in Yemen. *Am J Trop Med Hyg.* 1992; 46: pp. 63-68.

19-Al-Robasi AA, Al-Harbi L. Prevalence of markers for human immunodeficiency virus (HIV-1), hepatitis B and syphilis among blood donors in Yemen. *Yemeni Med J.* 1996; 2: pp. 58-60.

20-Andre´ F. Hepatitis B epidemiology in Asia, the Middle East and Africa. *Vaccine.* 2000; 18 (Suppl): pp. S20-S22.

21-Frank C, Mohamed MK, Strickland GT et al. The role of parenteral antischistosomal therapy in the spread of hepatitis C virus in Egypt. *Lancet.* 2000; 355: pp. 887-891.

22-Al-Bahrani A, Panhotra BR. Prevalence of HBsAg and anti HCV antibodies in blood donors of the Al-Hasa region of the Saudi Arabia. *Ann Saudi Med.* 2001; 21: pp. 234-235.

23-Othman BA, Monem FS. Prevalence of hepatitis C antibodies among intravenous drug abusers and prostitutes in Damascus, Syria. *Saudi Med J.* 2002; 23: pp. 393-395.

24-Allain JP. Occult hepatitis B virus infection: implications in transfusion. *Vox Sang.* 2004; 86: pp. 83-91.

25-Akhtar S, Hounus M, Adil S, Hassan F, Jafri S. Epidemiologic study of chronic hepatitis B virus infection in male volunteer blood donors in Karachi, Pakistan; *BMC Gastroenterol.* 2005; 5: pp. 26.

26-Ahmad J Tag A.S, Rahim A, Shah A, Rehman M. Frequency of hepatitis B and hepatitis C in healthy blood donors of NWFP: A single Center experience. *JPMI* 2004. Vol; 18(3): pp. 343-352.

27-Chavanini AA, Sabir MR. Hepatitis B surface antigen & anti hepatitis C antibodies among blood donors in Islamic republic of Iran. *East Mediter Health J.* 2000; 6(5-6): pp. 1114-6.

28-Koulentaki M, Spanoudakis S, Kantidaki E, Drandakis, P, Tzagarakis N et al. Prevalence of hepatitis B & C markers in volunteer blood donors in Crete. A 5-year study. *J Viral Hepat.* 1999 May; 6(3): pp. 243-8.

29-Ayala Gij, Guerra AFJ, Mora BP, Casillas RA. Prevalence of viral markers for hepatitis B, C and human immune deficiency virus in volunteers blood donors in Northwest Mexico *Rev Gastroenterol Mex* 1997; 62(4): pp. 250-253.

30-Ali N, Nadeem M, Qamar A, Qureshi AH, Ejaz A. Frequency of Hepatitis-C virus antibodies in blood donors in Combined Military Hospital, Quetta. *Pak J Med Sci.* 2003; 19(1):pp. 41-4.

31-Ryan KE, McLennan S, Barber JA, Hewitt P. Followup of anti-HCV blood donors. *BMJ.* 1994;308: pp. 696.

32-Rahman M, Akhtar G, Lodhi Y. Seroprevalence of Hepatitis C antibodies in blood donors. *Pak J Med Sci.* 2002;18(3):pp.193-6.

33-Badur S, Akgun A. Diagnosis of hepatitis B infections and monitoring of treatment. *J Clin Virol.* 2001; 21: pp. 229-237.

34-Allain JP. Occult hepatitis B virus infection. *Transfus Clin Biol.* 2004; 11: pp. 18 25

35-Conjeevaram HS, Lok AS. Occult hepatitis B virus infection: a hidden menace? *Hepatology.* 2001; 34: pp. 204-206.

36-Comanor L, Holland P. Hepatitis B virus blood screening: unfinished agendas. *Vox Sang.* 2006; 91: pp. 1-12.

37-Brechot C, Thiers V, Kremsdorf D, Nalpas B, Pol S et al. Persistent hepatitis B virus infection in subjects without hepatitis B surface antigen: clinically significant or purely "occult"? *Hepatology.* 2001; 34: pp.194-203.

38-Lai ME, Farci P, Figus A, Balestrieri A, Arnone M et al. Hepatitis B virus DNA in the serum of Sardinian blood donors negative for the hepatitis B surface antigen. *Blood.* 1989; 73: pp. 17-19.

39-Arora DR, Sehgal R, et al. Prevalence of parenterally transmitted hepatitis viruses in clinically diagnosed cases of hepatitis. *Indian j Med Microbiology.* 2005; 23: pp.44-7.

40-Ghavanini AA, Sabri MR. Hepatitis B surface antigen and anti-hepatitis C antibodies among blood donors in the Islamic republic of Iran. *Eastern Mediterranean Health Journal.* 2000; 6: pp.1114-6.

Table 1: Viral hepatitis in four Yemeni communities

	Blood donors Sana'	No. of Positive (% positive)	Blood donors Aden	No. of Positive (% positive)	Blood donors Soqatra	No. of Positive (% positive)	Blood donors African	No. of Positive (% positive)
HBsAg.	493	74 (15%)	494	33 (6.7%)	99	26 (26.3)	97	19 (19.6%)
Anti-HCV	493	1 (0.2%)	494	3 (0.6%)	99	5 (5.1%)	97	5 (5.2%)

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

		Total Blood donors	No. of Positive	% positive	Total No. positive	Total %	Difference (P-Value)
HBsAg	1 st year	1638	25	1.52	62	1.72	0.80
	2 nd year	1964	37	1.88			
Anti-HCV	1 st year	1638	15	0.92	38	1.05	0.81
	2 nd year	1964	23	1.17			

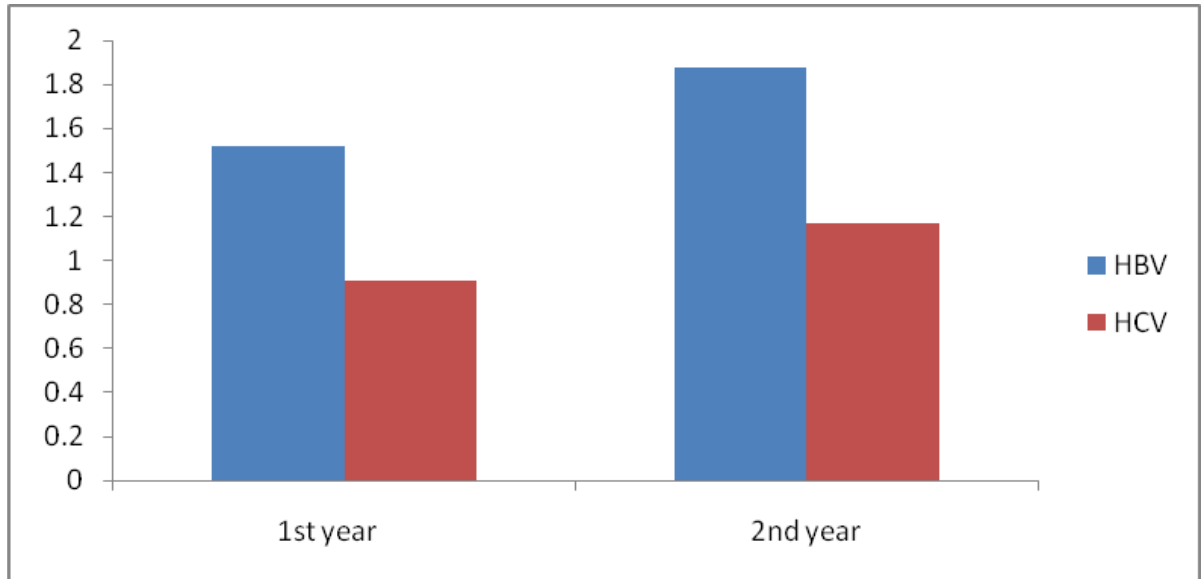


Figure 1: Infection rate of HBV and HCV in blood donors for two consecutive years