Blood Borne Viral Hepatitis Among Blood Donors in Amran Governorate, Yemen

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Abstract

This study was aimed at determining the prevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) and associated risk factors among blood donors in Amran governorate. All samples from a blood bank in Amran, Yemen, 953 were tested for hepatitis B surface antigen (HBs-Ag) and anti-hepatitis C virus (HCV) antibodies. Data were collected by questionnaires with blood samples. Of the 953 participants, 61 (6.4%) were positive for HBs-Ag and 6 (0.63%) for anti-HCV. In multivariate analysis, history of: cupping (*RR* = 5.2), parenteral injury (*RR* = 2.5), history of family jaundice (*RR* = 1.84), visit dentists (*RR* = 1.5), surgery (*RR* = 1.2) and blood transfusion (*RR* = 1.1) were significantly associated with being positive for HBs-Ag. Those with a history of cupping (*RR*=1.45), visit to dentists and history of family jaundice (*RR* = 1.1) were significantly likely to be positive for anti-HCV positivity. The prevalence of HBV and HCV among blood donors in Amran governorate is still high compared to many other governorates of Yemen.

Keywords: Amran governorate, Blood donors, Viral Hepatitis, Yemen

Introduction

About 350 million people worlwide have chronic hepatitis B virus (HBV) infection, and about 125 million have been infected with hepatitis C virus (HCV), putting viral HBV and HCV infection among the world's greatest infectious disease problems. These diseases are therefore important candidates for public health measures aimed at prevention, early diagnosis, and treatment (1).

HBV and HCV are major causes of chronic liver diseases worldwide, especially cirrhosis and hepatocellular carcinoma (2). These viruses are transmitted through blood, vertically from mothers to offspring and horizontally through blood products and body secretions (3).

The trend rates of these infections among blood donors should be assessed and evaluated, to ensure the safety of blood supply and the efficiency of donor screening (4). This information could also reflect the occurrence of these diseases in the community. Consequently, it will help in estimating the dangers associated with blood transfusion, as well as in modifying donor-screening strategies to reduce the transmission of infections (5).

The problem of chronic infection with HCV may be greater than generally recognized. While effective vaccines currently exist for HBV, a fully protective HCV vaccine is not yet available and current treatment methods for HCV infection are not highly effective or globally applicable. Public health interventions, therefore, continue to be the only effective method of preventing HCV infection (6). Any strategy to prevent HCV infection must therefore be based on accurate data, including information about its incidence and prevalence. Such information is at present lacking in many developing countries (7).

The prevalence of chronic HBV infection varies geographically, from high (>8%), intermediate (2-7%) to low (< 2%) (8).

According to the World Health Organization (WHO), the endemicity of infection is considered high in Yemen, where the prevalence of positive HBsAg ranges from 8% to 20%, and up to 50% of the populations generally have serological evidence of previous HBV infection (9, 10). In other studies, the prevalence of HBs-Ag in Yemen is 12.7% –18.5% (11). However, the prevalence of antibodies to HCV is 1.7% in healthy volunteers (12). Most of the epidemiological studies were done in different cities in Yemen, the prevalence rates of HBs-Ag and HCV antibodies are 10.5% and 2.3% in Sana'a, 4.75% and 0.6% in Aden, 5.6% and 0.8% in Hajah, 26.3% and 5.1% in Soqotra, 1.81%, and 1.99% in Ibb respectively (10, 13).

Although Amran city is the nearest populated governorate beside of Sana'a (50 Km, north) the capital city and data for prevalence of HBs-Ag and HCV antibodies in Amran city were inadequate. Therefore, the main aim of this study is to determine the prevalence of HBs-Ag and HCV antibodies among blood donors at the blood bank unit in the Amran General Hospital, Amran governorate, and to determine the risk factors using HBs-Ag and HCV antibodies as indicators for infection. Such information may

raise awareness regarding the need for urgent action to prevent HBV and HCV transmission in Yemen.

Material and Methods

Study area

This cross-sectional study was conducted during a period of one year at the blood bank unit of the Amran General Hospital, Amran governorate, Yemen (Map 1).

Map 1: Geographical sit of Amran governorate in Yemen.

During this period, all donated samples (n = 953) were tested for HBV and HCV. Blood donation in Yemen is semi-voluntary in that friends and relatives of patients donate blood. A full history was taken from each studied individual and the findings recorded in a pre-designed questionnaire.

Serology test

Five milliliters of whole blood were collected from each subject. Then the sera were separated. HBs-Ag and HCV antibodies were detected by commercial kits, rapid diagnostic test- cassette (One step HBs-Ag Test, Accu Bio Tech Co., Ltd. German) and (Rapid Anti-HCV Test, Accu Bio Tech Co., Ltd. German). Positive samples were confirmed by enzyme immunoassay (EIA) for hepatitis B surface antigen and HCV antibodies with commercial kits (International, Inc., USA-3892 – HBs-Ag) and (International, Inc., USA, 4762- HCV antibodies). Also, negative samples with (EIA) were confirmed by Polymerase Chain Reaction (PCR) (Abbott Real Time) for both HBV– DNA and HCV- RNA.

This study was approved by the Ethics and Research Committee of the University of Sana'a, faculty of Science, Yemen. In addition, written and verbal consent was

obtained from the respondents who agreed to participate in this study. The respondents were assured about the confidentiality of the information and that the laboratory results would not be disclosed to any other persons.

Statistical analysis

The data were coded, tabulated and analyzed. The following statistical analyses were carried out (14). The *chi-squared test* was used for categorical data. *RR* Relative risk to detect the ratio of incidence among different groups *P <0.05* was used as the cut-off level of significance.

Results

A total of 953 volunteers who attended the blood bank and donated blood at Amran General Hospital. They were initially screened for HBs-Ag and HCV antibodies and a total of 61 donors (6.4%) were positive for HBs-Ag and 6 donors (0.63%) were positive for anti-HCV antibodies. All of HCV and HBV infected individuals were males (Table 1).

Table (1) shows the sociodemographic profile and relevant history of blood donors were anti-HCV and HBs-Ag positive. It was found that the highest HBV seropositive rate was among the aged group of 30–35 years, among males (100%), among those who lived in rural areas (57.38%) and among framers and primary level of study persons (21.31% and 39.34%). The rate of HCV-Ab. positivity was similarly highest among males (100%), rural residents (66.6%) and unemployed (33.33%). However, by age and study level, the highest rate was in the age group 30–40 years (16.67%) and illiterate was (50%).

A statistically insignificant difference was found in the proportion of illiterate donors who were HBs-Ag positive (*P*= 0.05). The prevalence of hepatitis B and hepatitis C was significantly lower among those with cupping (*P* = 0.00) and higher among those with a history of parenteral injury and blood transfusion (*P* = 0.002 and *P* = 0.001) who had HBs-Ag positive followed by surgery, dental treatment and family history of jaundice respectively (*P* = 0.0001, 0.0001, 0.0001) that was listed in Table (1).

Table (2) shows the risk factors associated with hepatitis B and C virus infection among blood donors in Amran governorate. History of cupping had highly significantly associated with increased positive for HBs-Ag and HCV antibodies (*RR*= 5.2 and1.45) followed by Parenteral injury for positive HBs-Ag only (*RR*= 2.5). Those with history of surgery were significantly less likely to be positive for HBs-Ag (*RR*= 1.2) but not significant with the positive of HCV antibodies.

Table 1: Prevalence of hepatitis B virus and hepatitis C virus infections among blood donors by sociodemographic profile and relevant history

Variable	HBsAg	*P* value	Anti-HCV	*P* value
Gender:		0.8		0.79
Male	61 (6.4%)		6 (0.63%)	
Female	0		0	
Age group (years)		0.51		0.79
18-25	6 (9.84%)		0 (0.0%)	
26-30	11 (18.03%)		1 (16.67)	
31-35	21 (34.42%)		2 (33.33%)	
36-40	15 (24.59%)		2 (33.33%)	
41-45	5 (8.20%)		1 (16.67%)	
>45	3 (4.92%)		0 (0.0%)	
Residence		0.089		0.32
Urban	26 (42.62%)		2 (33.33%)	
Rural	35 (57.38%)		4 (66.67%)	
Occupation		0.96		0.9
Private Sector	10 (16.39%)		1 (16.67 %)	
Farmers	13 (21.31 %)		1 (16.67 %)	
Public sector	9 (14.75 %)		1 (16.67 %)	
Students	12 (19.67 %)		1 (16.67 %)	
Soldiers	6 (9.84%)		0 (0.0%)	
Unemployed	11 (18.03%)		2 (33.33 %)	
Level of study		0.05		0.7
Illiterate	13 (21.31 %)		3 (50 %)	
Primary	24 (39.34 %)		1 (16.67 %)	
Secondary	16 (26.23%)		1 (16.67 %)	
University	8 (13.11 %)		1 (16.67 %)	
History of:				
Family jaundice	8 (0.84%)	**0.0001**	2 (0.21%)	**0**
Surgery	19 (1.99%)	**0.0001**	3 (0.31%)	0.18
Blood transfusion	41 (4.3%)	**0.001**	4 (0.42%)	0.52
Visit to dentist	11 (1.15%)	**0.0001**	1 (0.1)	**0**
Cupping	2 (0.21%)	**0**	0 (0.0 %)	**0**
Parenteral injury	47 (4.93%)	**0.002**	5 (0.52)	0.35

Table 2: Risk factors of hepatitis B and C virus infection among blood donors in Amran governorate

	HBsAg Positive (n=61)		*P-value*	χ2	R.R	HCV-Ab Positive (n=6		*P-value*	χ2	R.R
Family his. of jaundice	NO	YES	0.0001	336.32	1.84	NO	YES	0	23.1	1.1
NO	830	8				830	2			
YES	62	53				62	4			
Surgery	NO	YES	0.0001	73.43	1.2	NO	YES			
NO	718	19				718	3	0.18	1.82	
YES	175	41				175	3			
Blood transfusion	NO	YES	0.001	11.2	1.1	NO	YES	0.52	0.41	
NO	754	41				754	4			
YES	138	20				138	2			
Visit to dentist	NO	YES	0.0001	213.91	1.5	NO	YES	0	24.01	1.1
NO	794	11				794	1			
YES	98	50				98	5			
Cupping	NO	YES	0	717.4	5.2	NO	YES			
NO	878	2				878	0	0	221.8	1.45
YES	14	59				14	6			
Parenteral injury	NO	YES	0.001894	9.65	2.5132	NO	YES			
NO	498	47				498	5	0.35	0.89	
YES	394	14				394	1			

Discussion

HBV and HCV infections are common serious complications of blood transfusion. Prevention of transfusion-transmitted infections in developed countries has been achieved by reducing unnecessary transfusions, using only regular voluntary donors, excluding donors with specific risk factors and systematic screening of all donated blood for infection. By contrast, in many developing countries none of these interventions is applied uniformly and the risk of transfusion-transmitted infections remains high (15).

The prevalence of hepatitis B among blood donors at the national blood bank service in Amran Governorate, Yemen found in this study was 6.4%. Much higher rates (7.1%, 9.8%, 15% and 6.7 %) have previously been reported among Yemeni blood donors (16, 17; 18).

These differences in the prevalence rates might be explained by the geographical differences in the availability of services and programs or might reflect a true reduction in prevalence over time. The prevalence of HBs-Ag in the general population seems to be relatively high in Yemen. In a seroepidemiological survey of hepatitis in Yemen in 1988, it was reported a prevalence of HBs-Ag at 12.7% (19). Although it is difficult to compare the prevalence rates reported in our study (among blood donors) with that reported by Scott *et al*. (among the general population), it seems that the rate of HBs-Ag has decreased dramatically. Introducing the hepatitis B vaccine within the national immunization programs, improvement of the people's knowledge about hepatitis risk factors through educational programs, and the availability of measures to diagnose hepatitis in health centers and blood banks might explain this decrease. Many other studies in nearby countries have shown a lower prevalence of hepatitis B among blood donors, it was 4.0% recorded in Saudi Arabia (20), 4.3% in Egypt (21), and 3.3% in Pakistan (22).This may be because there was insufficient protection for patients admitted to hospitals in Yemen. Sterilization, disinfection and general standards of training and proficiency are generally lacking in most hospitals in Yemen.

The current study was documented that the history of family jaundice; blood transfusion, dental procedures, cupping and history of parenteral injury were associated with an increased of hepatitis B infection. The significant association between HBs-Ag positivity and history of blood transfusion, cupping and dental treatment are consistent with the findings of other studies (23, 24).

In this study, it was found that 0.63% of the blood donors were positive for anti-HCV. A similar study among blood donors in Yemen was recorded that about 0.6 % of the donors in Aden Governorate were infected with hepatitis C (18). Also, it was reported that the prevalence of hepatitis C in Sana'a was 0.2% and 0.6% in Aden (18).The prevalence of hepatitis C among blood donors is nearly equal to that reported from the neighboring countries including Oman (0.5%) (25). Such small differences in prevalence rates may be explained by methodological differences between studies.

The history of cupping, visit dentists and history of family jaundice were significantly associated with HCV infection in this study. The lack of associations between HCV infection and other variables, including surgery and parenteral injury may be explained by the fact that only 6 people were positive for anti-HCV.

The seroprevalence rates of hepatitis B and hepatitis C are high in Yemen and nationwide efforts are required to identify infected individuals. Transmission of hepatitis B and C through unscreened blood transfusion, reuse of unsterilized syringes and medical equipment are well documented in the pertinent literature. Moreover, people having cupping, history of dental treatment, circumcision and shaving by barbers are also at increased risk due to reuse of equipment. Efforts should be made for the promotion of behavior changes among the public and health care workers to use sterilized medical instruments and screened blood.

Conclusion

In conclusion, the prevalence of hepatitis B and C among blood donors in Amran governorate is still high compared to many other governorates of Yemen. Given the lack of information on the prevalence of hepatitis B and C among the population in Yemen, we recommend a population-based study for the assessment of hepatitis B and C prevalence as a first step to implement control measures. Increased coverage of hepatitis B vaccination would further reduce that rate.

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التهابات الكبد الفيروسية المنقولة بالدم بين مانحي الدم في محافظة عمران، اليمن

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المُلَخَّصُ

هدفت الدراسة لتحديد انتشار فيروسي التهاب الكبد-الوبائي والسيني وعوامل الخطورة لهما بين مانحي الدم في محافظة عمران. جميع عينات الدم 953 جمعت من بنك الدم في المحافظة وتم اختبارها لفيروسي التهاب الكبد-الوبائي والسيني لمكونات الضد والاجسام المضادة لكل فيروس. بيانات المانحين جمعت بواسطة استمارة أستبان. وجد ان 61 (6.4%) من أصل 953 مصابين بفيروس التهاب الكبد-الوبائي و6 (0.63%) مصابين بفيروس التهاب الكبد-السيني. من خلال تحليل بيانات المانحين الاحصائية لتحديد عوامل الخطورة المشاركة في التهاب الكبد الفيروسي الوبائي وجد ان الحجامة اول هذه العوامل (RR = 5.2) يليها الجروح الحقن (RR = 2.5) والتاريخ المرضي الصفار (RR = 1.84) والتردد لعيادات الاسنان (RR = 1.5) والعمليات الجراحية (RR = 1.2) واخرها نقل الدم (RR = 1.1). بينما وجد ان عوامل الخطورة المشاركة في التهاب الكبد الفيروسي السيني كانت الحجامة اول هذه العوامل (RR = 1.45) والتردد لعيادات الاسنان والتاريخ المرضي الصفار (RR = 1. 1). استنتجت الدراسة ان انتشار فيروسي التهاب الكبد-الوبائي والسيني بين مانحي الدم في محافظة عمران. لازالت عالية مقارنة ببقية المحافظات.

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