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Research Article

Frequencies of HBV, HCV, HIV, and Syphilis Markers Among Blood Donors: A Hospital-Based Study in Hodeidah, Yemen

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Abstract

Purpose: This study aimed to determine the frequency rates of human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and syphilis among blood donors.

Methods: Physically fit persons aged 18 – 48 years who came for blood donation at the blood bank unit of the military hospital in Hodeidah, Yemen (MHH) from November 2008 to October 2010 were screened using standard diagnostic (SD) reagents. Based on the results, donors with clinical anemia and with history of jaundice were excluded.

Results: A total of 1,483 male donors (96 % semi-voluntary and 4 % replacement donors) with a mean age of 24.3 years were enrolled in this study. The frequencies of HBV, HCV, HIV and syphilis in the samples were 2.35, 0.79, 0.14, and 0.34 %, respectively. Compared with the first year, the decrease in HBV and HCV positive cases and the increase in HIV and syphilis positive cases in the second year were not statistically significant ($p = 0.91$, $p = 0.74$, $p = 0.72$, and $p = 0.92$, respectively).

Conclusion: While the frequency rate of transfusion-transmitted infections (TTIs) is low, it remains a major problem in blood transfusion. Proper protocol should be applied in selecting and screening donors to safeguard the health of people receiving blood transfusions.

Keywords: Transfusion-transmitted infections, Blood donors, Human immunodeficiency virus, Hepatitis B, Hepatitis C, Syphilis

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INTRODUCTION

Transfusion-transmitted infections (TTIs) acquired through the therapeutic blood transfusion process is a major universal health problem in transfusion medicine that should be addressed. Therefore, minimizing this complication should be encouraged [1].

Hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV) and syphilis are the most serious infections transmitted during blood transfusion. Complications associated with TTI include long-term morbidity and mortality, delayed viraemia, and hidden states make TTIs an important issue in transfusion medicine [2]. HBV and HCV are major causes of chronic liver diseases worldwide, especially cirrhosis and hepatocellular carcinoma [3]. They are transmitted through the blood, vertically from mothers to offspring and horizontally through blood products and body secretions [4]. On the other hand, HIV and syphilis could be transmitted horizontally through sexual intercourse and organ transplantation, and vertically from mother to children [5].

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 [6]. 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 [7].

Scott *et al* reported that the carrier rate of an HBV surface antigen (HBsAg) among the general population in Yemen was 12.7 %, while the prevalence of HCV was 2.6 % [8]. Al-Harbi and Al-Robasi reported that the prevalence of HBsAg in blood donors was 9 % [9]. Blood safety in transfusion medicine is important, particularly in Yemen, due to the lack of blood transfusion services and

financial support, as well as failure to implement policies. These concerns are aggravated by inappropriate training of employees in transfusion centers, outdated communication facilities, the absence of a systematic approach in implementing blood transfusion services, and the dearth of research in Hodeidah City on transfusion medicine. These are possible reasons for the increased prevalence of TTIs. This study aims to address these concerns by determining the frequency rates and trends of serological markers of HBV, HCV, HIV, and syphilis in the blood donors at the blood bank unit in the Military Hospital in Hodeidah (MHH), Yemen.

METHODS

This study was conducted from November 1, 2008 to October 30, 2010 at the blood bank unit of the military hospital in Hodeidah (MHH), Yemen. The subjects were male blood donors at a blood bank unit at MHH. Blood donation in Yemen is semi-voluntary in that friends and relatives of patients donate blood. Thus physical examination and full history were performed and taken on all volunteer blood donors to review their eligibility for donation. This study was approved by the Ethics and Research Committee of the Ministry of Public Health and Population, Yemen.

Inclusion criteria

Physically fit people aged 18 – 48 years who donated blood at MHH were included.

Exclusion criteria

Potential donors were excluded if they were below 18 years old, weighed less than 50 kg, had anemia and a history of jaundice within the past six months, engaged in high-risk behavior (i.e., unsafe intercourse, drug use,

and so on), and donated blood within the past three months.

Procedure

Over two-year period, 1,483 blood donors were reviewed in the blood bank unit of MHH. Blood samples (8 ml each) were tested for anti-HCV, HBsAg, HIV, and syphilis. Standard diagnostic (SD) reagents for immunochromatographic rapid test were used to detect viral markers. Repeatedly reactive specimens in two separate tests were considered positive.

Statistical analysis

Data were analyzed using SPSS version 16. Chi-Square test was used to compare infection rates in two consecutive years and p -value ≤ 0.05 was considered statistically significant.

RESULTS

A total of 1483 male donors (96 % semi-voluntary and 4 % replacement donors) with a mean age of 24.3 years were involved in this study. Thirty five of 1483 (2.40 %) were positive for HBsAg and 12 (0.79 %) positive for anti-HCV. Five (0.34 %) and 2 (0.14 %) tested positive for syphilis and HIV, respectively.

Table 1: Frequency rates of HBV, HCV, HIV, and syphilis among blood donors for two years at MHH, Yemen

Type	Year	Blood donors	Positive {no., (%)}	Total 2-year positive {no., (%)}	Statistical significance RR (95 %CI)	Difference (p -value)
HBsAg	Year 1	919	22 (2.40)	35 (2.35)	1.03 (0.54 – 1.97)	0.91
	Year 2	564	13 (2.30)			
Anti-HCV	Year 1	919	8 (0.87)	12 (0.79)	0.81 (0.24 – 2.66)	0.74
	Year 2	564	4 (0.71)			
Anti-HIV	Year 1	919	1 (0.10)	2 (0.14)	1.63 (0.10 – 26.2)	0.72
	Year 2	564	1 (0.18)			
Syphilis	Year 1	919	3 (0.33)	5 (0.34)	1.08 (0.18 – 6.45)	0.92
	Year 2	564	2 (0.35)			

During the first year, 22 (2.40 %) were positive for HBV and 8 (0.87 %) for HCV, while in the second year 13 (2.30 %) and 4 (0.71 %) were positive for HBV and HCV, respectively. The positivity of syphilis and HIV, in the first year was 3 (0.33 %) and 1 (0.1 %) respectively. In the second year, 2 (0.35 %) were positive for syphilis and 1 (0.18 %) was positive for HIV. One donor showed double positivity for syphilis and HIV.

The overall frequencies of HBsAg, HCV, HIV, and syphilis were 2.35, 0.79, 0.14, and 0.34 %, respectively. The frequency rates of HBV and HCV declined slightly in the second year (2.30 %, 0.71 %) compared with the first year (2.40 %, 0.87 %). However, syphilis and HIV rates increased slightly in the second year (0.35 % and 0.18 %) compared with the first year (0.33 %, 0.10 %). However, as Table 1 shows, these changes in frequency rates were not statistically significant ($p > 0.05$).

DISCUSSION

In general, the diagnosis of HBV, HCV, HIV and syphilis is based on the presence of the corresponding antigens or antibodies in blood serum [7,15]. This study used serological methods to evaluate the seroprevalence of HBV, HCV, HIV, and syphilis infections among blood donors in the blood bank unit of MHH in 2009 and 2010.

HBV frequency in this study was different from that reported for Yemen by Alrobasi *et al* and Scott *et al*, which were 9 and 12.7 %, respectively [8,9]. Similar frequency rates of HBV have been reported, such as those in Nahavand, Iran (2.3 %) [10] and Rawalpindi, Pakistan (2.45 %) [11], while a significantly lower rate of HBV has been reported in Mexico (0.16 %) [12]. HCV in the blood donors in the study was 0.79 %, which is lower than the 2.6 % overall rate in Yemen [8], 5.1 % in India, and 6 % in Africa [13]. However, it is considerably higher than the 0.4 % in Saudi Arabia [3]. The frequency rates of HBV and HCV decreased from 2.40 % to 2.30 % and from 0.87 % to 0.71 %, respectively. However, this decrease was not statistically significant ($p = 0.91$, $p = 0.74$, respectively).

HIV-positive cases in this study accounted for 0.14 % of the sample, which is lower than the 0.80 % in East Delhi, India [11] and 0.96 % in Nigeria [1]. However, it is higher than the 0 % in Islamabad and Bahawalpur in Pakistan [11]. Positive cases of syphilis accounted for 0.34 % of the sample, which is lower than the 0.75 % in Pakistan [11], but higher than the 0.1 % in Port Harcourt, South-South, Nigeria [14]. On the other hand, syphilis and HIV showed a slight increase in frequency rates in the second year (0.35 and 0.18 %) when compared to the frequency rates of the first year (0.32 and 0.10 %). However, this increase was not statistically significant ($p = 0.92$ % and $p = 72$ %, respectively).

The differences in frequency rates across geographic regions may be caused by differences in geography, socio-economic status, and subject selection in the studies cited.

Based on the results as well as the limitations of the current study, namely, insufficiency of sample size and lack of specificity of some diagnostic tests, we recognize that proper strategies to detect TTIs early among blood donors in Yemen need to be implemented. The screening process should include anti-

HBc testing to detect occult HBV carriers as well as donors with HBV escape mutants. This will facilitate adoption of preventive procedures, which can safeguard the health of individuals as well as workers in hospitals and medical centers. Highly specific and sensitive systems, and improved worker efficiency may help manage the hazards related to infectious diseases.

CONCLUSION

Based on the findings of the current study and other studies which have been done in Yemen, the results of these studies are different. Furthermore, there are no specific strategies for the screening of blood donors that is followed in the blood bank centers in Yemen. Therefore, the current study will help to establish an accurate framework for the screening process of blood donors.

The blood donors in Yemen can be classified as having low-risk behavior. The data reflects lower rate of positivity for TTIs compared with the prevalence of these infections in other regions of Yemen.

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