Original Article

Prevalence of hepatitis C virus, hepatitis B virus, human immunodeficiency virus and related risk factors among hemophilia and thalassemia patients In Iran

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Abstract

Objectives: This study was conducted to assess the prevalence of Hepatitis C virus (HCV), Hepatitis B virus (HBV) and Human immunodeficiency virus (HIV) among hemophilia and thalassemia patients.

Patients and Methods: Present study was conducted from October 2008 to December 2010 in Isfahan, Iran. One thousand one hundred and sixty adult multi-transfused patients (822 males, 338 females, mean age 22.7±11.5 years) suffering from beta-thalassemia (n = 545) and hemophilia (n=615) were enrolled in the study. Blood samples were obtained from the patients and were tested for HBs Ag, Anti-HCV Ag and Anti- HIV Ab. HCV positive patients underwent genotype determination.

Results: Of 545 thalassemia patients, 312(57.2%) were male and 233 (42.8%) were female. From 615 hemophilia patients, 511(83%) were male and 104 (17%) were female. Chronic hepatitis was detected in 505(82.1%) hemophilia patients of which 495 (98%) were HCV Ab positive and 10 (2%) had HBsAg positive. The prevalence of HCV Ab positive and HBsAg positive in 56 (11%) thalassemia patients with chronic hepatitis was 50 (89.2%) and 6 (10.8%) respectively. None of the thalassemia and hemophilia patients were positive for HIV Ab. History of hepatitis in family is the major risk factors and HCV genotype 1 was the major genotype in our patients.

Conclusion: HCV is the major virus of concern in multi-transfused patients. The strategies for prevention of HCV, HBV and HIV and safety of blood products in this respect have indeed been successful.

Keywords: Transfusion, Blood-borne pathogens, Chronic hepatitis, Thalassemia, Hemophilia.

Introduction

Hepatitis B and C and HIV virus are worldwide healthcare problems, especially in developing countries. It is estimated that approximately one third and 3% of the global population has been infected with HBV and HCV, respectively. Transmission through Sexual intercourse and transfusion are major routes for these infections (1-3). Initially, progression of blood-borne infections led the scientists to design method of prevention. Characterization of transfusion-transmitted pathogens, development of strategies to measure infection rates in blood donors as well as in recipient populations, characterization of the early viremia, and implementation of more restrictive donor eligibility criteria and increasingly sensitive laboratory techniques for donor screening have made blood supplies be safe in developed countries(1,4,5). The underlying factors comprise many factors such as infrastructure, behavioral and cultural circumstances, political structure and economy (1). In developing countries, the prevention and determination of blood-borne infections have not been well improved yet. So, transfusion as a main way for blood-borne infections continues to cause serious problems in developing countries and less serious in developed countries. Moreover, multi-transfused patients such as individuals with thalassemia and hemophilia are at a particularly increased risk of transfusion-transmitted infections (6,7).

In Iran, however, target individuals of HBV vaccination protocol organized in 1990s and patients with thalassemia and hemophilia were the first groups forthe national vaccination program after over 2 decades from introduction of HBV vaccine (1) and it is necessary to confirm the impact of these programs on epidemiology of infection in the country. Furthermore, epidemiological surveillance for HCV and HIV is essential since no vaccine available to them. Therefore, identification of patients with thalassemia and hemophilia who have HCV and HIV infections concomitantly is required to assess the risks for HCV and HIV transmission. In this regard, this study was designed to evaluate the prevalence of HIV, HCV and HBV and related risk factors among patients with thalassemia and hemophilia.

Patients and Methods

This descriptive study was conducted from October 2008 to December 2010 in the Department of Internal Medicine at Sayed-Al-Shohada Hospital, Isfahan, Iran. One thousand one hundred and sixty adult multi-transfused patients suffering from beta-thalassemia (n=545) and hemophilia (n=615) were enrolled in the study. This investigation was carried out in accordance with the

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ethical standards of the 1964 declaration of Helsinki as revised in 2000. Moreover, the Ethics Committee of Isfahan University of Medical Sciences approved the study protocol and written and informed consent was obtained from all patients as well.

At first visit, a questionnaire was used to collect data on age, sex, history of intravenous drug injection, tattooing, history of high risk sexual activity, history of hepatitis in family, type of thalassemia and type of hemophilia.

Afterwards, blood samples were obtained and centrifuged and separated plasma was stored at -20 and -70˚C for further processing. Anti-HIV Ab was detected by immunochromatographic test kits (Abbott, USA), Hepatitis B surface antigen (HBsAg) by commercially available enzyme immunoassays [OrganonTeknika, Boxtel, Holland] and the presence of anti-HCV Ab by a third-generation enzyme immunoassay (ORTHO HCV 3.0 ELISA; Ortho-Clinical Diagnostics, Raritan, NJ, USA). Besides, HCV RNA was detected in anti-HCV positive sera by reverse transcriptase polymerase chain reaction (RT-PCR) (Hepatitis C virus test-version 3.0, CobasAmplicor, Roche Diagnostics, Branchburg, NJ, USA).

Furthermore, HCV genotyping was performed by VERSANT HCV Genotype Assay (LiPA) (Bayer Corporation, Tarrytown, NY, USA) which was performed under highly stringent conditions. The hybrids formed with one or more lines on the strip were recognized by color reaction. The genotype or subtype was determined by comparing the probe reactivity pattern on the strips with the special interpretation chart provided by the company.

The collected data was analyzed using SPSS version 16 for windows and presented as mean ± SD or number (percent) as appropriate. P-value of less than 0.05 was considered statistically significant.

Results

As shown in table 1, the mean age of study population was 22.7±11.5 years (range 1-76 years) and of total number of 1160 patients, 823 (70.9%) were male and 337 (29.1%) were female. Patients with hemophilia were significantly older than patients with thalassemia (P-value < 0.0001) and moreover, numbers of male patients with hemophilia were significantly higher than male patients with thalassemia (P-value < 0.0001). The mean age at first transfusion and duration of transfusion history were 2.5±1.9 and 28.6±6.5 years, respectively. Splenectomy, was observed in 280 (40%) individuals.

Within the study population, chronic hepatitis was detected in 505 patients with hemophilia and 56 with thalassemia. Table 2 demonstrates the distribution of hepatitis C and B Ab and HCV RNA among thalassemia and hemophilia patients with chronic hepatitis. Numbers of hemophilia patients with positive HCV Ab were significantly higher than thalassemia patients with positive HCV Ab (P-value < 0.0001), however, frequency of positive HBV Ab results between hemophilia and thalassemia patients was not significant (P-value = 0.31). None of the thalassemia and hemophilia patients were positive for HIV Ab.

Distribution of HCV genotypes among thalassemia and hemophilia patients is summarized in table3. In addition, of 9 thalassemia patients with history of tattoos, 8 patients had positive HCV RNA, 5 patients had HCV genotype 1, 2 patients had HCV genotype 1+3 and one had HCV genotype 2. Moreover, of the 6 thalassemia patients with history of intravenous drug injection, all had positive HCV RNA, 5 patients were with HCV genotype 1 and 1 with HCV genotype 2. Family history of hepatitis was detected in 12 thalassemia patients of whom 4 patients had positive HCV RNA, 3 patients had HCV genotype 1 and 1 had genotype 1+2.

Apart from patients with thalassemia, there were 3 hemophilia patients with history of tattoos from whom 1 had positive HCV RNA and HCV genotype 1. Additionally, there was only 1 hemophilia patient with history of intravenous drug injection who had positive HCV RNA with genotype 2. And last but not least, of 9 hemophilia patients with family history of hepatitis, 4 patients had positive HCV RNA, 2 patients had HCV genotype 1 and 2 had genotype 1+3.

Table1. Characteristics of patients with thalassemia and hemophilia

	Thalassemia(545)	Hemophilia(615)	P-value	Total(1160)
Age (Year)	18±7.6	27.1±12.8	< 0.0001	22.7±11.5
Sex				
Male	312 (57.2)	511 (83)	< 0.0001	823 (70.9)
Female	233 (42.8)	104 (17)		337 (29.1)
History of tattoos	9 (1.6)	3 (0.48)	0.09	12 (1.03)
History of intravenous drug addiction	6 (1.1)	1 (0.16)	0.09	7 (0.6)
History of hepatitis in family	12 (2.2)	9 (1.4)	0.47	21 (1.8)
History of intercourse	0	0	-	0

Data are presented as Mean ± SD and number (%). P-values calculated with t-test and Chi square test

Table2. Distribution of hepatitis C and B antibody and HCV RNA among thalassemia and hemophilia patients

	Hemophilia (615)	Thalassemia (545)	P-value
HCV Antibody Positive	495 (80.5)	50 (9.1)	< 0.0001
HCV RNA +	347 (70.1)	31 (62)	
HCV RNA -	148 (29.9)	19 (38)	
HBV Antibody Positive	10 (1.6)	6 (1.1)	0.31

Data are presented as number (%), HCV; Hepatitis C virus, HBV; Hepatitis B virus
P-values calculated with Chi square test

Table3. Distribution of hepatitis C virus genotypes among thalassemia and hemophilia patients

	Hemophilia (347)	Thalassemia (31)
HCV genotype 1	191 (55)	12 (38.7)
HCV genotype 2	18 (5.1)	5 (16.1)
HCV genotype 3	70 (20.1)	6 (19.3)
HCV genotype 1 + 2	28 (8)	4 (6.4)
HCV genotype 1 + 3	20 (5.7)	4 (6.4)
HCV genotype 1 + 4	16 (4.6)	0
HCV genotype 2 + 3	4 (1.1)	0

Data are presented as number (%), HCV; Hepatitis C virus

Discussion

Blood products in Iran are produced entirely by the Iranian Blood Transfusion Organization and the major multi-consumers of these products are thalassemia, hemophiliacs and hemodialysis patients. This study showed the prevalence of blood-borne infections in multi-transfused patients. HCV genotype1 was the major genotype among the patients. The prevalence of positive HCV Ab in thalassemia patients is 50 out of 615 (9.1%) in our study. This result is similar with Rezvan and colleagues (1) result that showed in their review article the prevalence range of 9.4–27% (average 22.4%) in the thalassemia population from various geographical regions. The prevalence of positive HCV Ab in hemophilia patients in Isfahan is estimated to be 80.5% in 2010. In another study on 530 cases of hemophilia in Indonesia, the prevalence of anti-HCV Ab is estimated at about 57% (8). Wharf and colleagues in Jamaica reported 41% of 90 hemophilia patients are seropositive for HCV (9) while the rate of positive HCV among Brazilian hemophiliacs vary from 39% to 64.3% (10, 11). Studies in European countries, however, e.g. Croatia and Slovenia showed 15% of 120 Croatian and 15% of 166 Slovenian anti-HIV positive hemophiliac patients are positive for anti-HCV as well (12). Other Iranian studies reported prevalence of positive HCV Ab in hemophilia patients as follows: Tehran (2001) 60.2%, Shiraz (2002) 16%, Azerbaijan (2006) 51%, Yazd (2006) 48.6%, Gilan (2002) 71.3% and Bushehr (1999) 41.9% (1). These results demonstrate that rate of positive HCV Ab in Isfahan is higher than other cities in Iran, which can be due to lab error. However, it is not clear that the source of infection is from coagulation concentrates, cryoprecipitate or whole blood. Treatments with unscreened or not efficiently inactivated blood components in the past are the main cause of the majority of positive cases among hemophiliacs.

In our study, the prevalence of HBs Ag was 1.1% and 1.6% in thalassemia and hemophilia patients, respectively. This rate was in Bushehr (1999) 0.8%, Ghazvin (2002) 1.1%, Yazd (2006) 0%, Kerman (2006) 6%, Ghazvin (2006) 1.1%, Tehran (2006) 1%, Semnan and Zanjan (2006) 0%. It seems ongoing vaccination programs to decrease the prevalence of HBV infection were successful. According to our findings, family history of hepatitis is the major risk factor among patients, which have not been reported in previous studies.

Apart from that, positive anti-HIV Ab in hemophiliac patients varies from 0.9 to 2.3% in our cities however, there were no thalassemia patients with anti-HIV positive (1). In contrast, we have not found any positive HIV Ab in thalassemia and hemophilia patients while the impact of high risk sexual contact has not been assessed thoroughly because of special ethical conditions and stigma of AIDS in our society.

Conclusion

HCV is a major infection of concern in multi-transfused patients. The strategies for prevention of HCV, HBV and HIV and safety of blood products in this respect have indeed been successful. Furthermore, the preventive programs for HBV infection should continue and the vaccination programs in high-risk groups should be highly prioritized.

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Conflict of interest

None declared.

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