

Full Length Research Paper

The prevalence and risk factor of hepatitis B and D in Shiraz blood donors

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The estimation of prevalence rate of hepatitis B (HBV) in blood donors and hepatitis D (HDV) infection in HBV carriers is important in estimating the prognosis of hepatitis due to more severe rate of liver disease in HDV/HBV co-infected patients. The aim of the study was to analyze the prevalence of HBV in blood donors and HDV among hepatitis B surface antigen (HBsAg) positive-blood donors in Shiraz, Fars, Iran. This cross-sectional study was performed between 21 March, 2009 and 21 March, 2010 on Shiraz blood donors. The prevalence of HBV was surveyed. Then demographic characteristics, route of transmission and prevalence of HDV were surveyed on a random sample of donors who had positive result of confirmatory HBsAg in screening tests. The prevalence rate of HBV in all donors was 263/96646 (0.27%). The prevalence of HDV in random sample of HBV patients was 4/185 (2.2%). The most common route of transmission was positive family history 41/185 (22.3%), unsafe sexual contact 11/185 (5.9%), history of tattooing 9/185 (4.86%), intravenous drug abuse 5/185 (2.7%) and history of receiving blood or blood products 5/185 (2.7%) and there was no data about transmission route of the 147/185 (79.5%). There was no difference between route of transmission, level of aspartate aminotransferase (AST), alanine transaminase (ALT), hepatitis B envelope antigen (HBeAg), hepatitis B envelope antibody (HBeAb) and prothrombin time (PT) between positive and negative groups ($P>0.05$). The prevalence of HBV in our province decreased from 0.89% in 1998 to 0.27% in 2009 due to improvement in recruitment of low-risk donors and better donor selection. The prevalence of HDV in our blood donors was low and same as other studies on blood donors or asymptomatic carrier.

Key words: Hepatitis D, blood donor, hepatitis B, epidemiology, Iran.

INTRODUCTION

Hepatitis B and D (HBV and HDV) infections are a major health problem. HBV virus is an DNA virus from hepadnaviridae family. Infected person or asymptomatic carriers with viral HBV are only reservoir of infection (Fejza and Telaku, 2009). Researches show us that world prevalence of hepatitis B surface antigen (HBsAg)

carriers is from 0.1-20% with high percentage in tropical countries (Fejza and Telaku, 2009). The risk of transmission of HBV via blood and blood product is much higher than hepatitis C (HCV) and HIV. HBV may induce chronic hepatitis that could progress to cirrhosis and hepato cellular carcinoma (Kafi-abad et al., 2009).

Delta virus or HDV is an incomplete defective RNA virus requiring concomitant presence of HBV for its survival and replication (Rizzetto and Verme, 1985; Taylor, 2006; Alavian and Alavian, 2005; Esmaeili et al., 2009). Thus, HDV can replicate only in people who are

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also infected with HBV. HDV was described by Rizzetto et al. (1977) and after its discovery, the role of HDV infection in the exacerbation of HBV infection was clarified (Abbas et al., 2010).

HDV infection was found all around the world (Rizzetto and Verme, 1985). The epidemiology of HDV infection is similar to HBV with some exception (Alavian and Alavian, 2005; Abbas et al., 2010). It is estimated that approximately 5% of the HBV carrier are co-infected with HDV infection worldwide (Farci, 2003). However, the prevalence of HDV in HBV carriers varies around the world (Alavian, 2010). Due to inaccurate reporting and delayed detection of HDV, the incidence and prevalence rate of HDV infection (Alavian, 2008a; 2008b) is endemic in the Mediterranean basin, Middle East and some parts of African (Navascués et al., 1995; Sagnelli et al., 1993; 1997). In spite of declining in the global prevalence of HBV due to HBV vaccination, improved prevention strategies and better socioeconomic status, the prevalence rate of HDV did not decrease (Abbas et al., 2010; Mumtaz et al., 2005). HDV is an important public health problem in Iran (Alavian, 2010).

The prevalence of HDV varies in different area of the country (Abbas et al., 2010). The prevalence of HDV in Tehran blood donors was 1.3% (Karimi et al., 2000) and in Tabriz blood donors was 2.4% (Torabi et al., 2003). Recently in 2010, higher rate was reported from Tabriz with 6% which may be due to better diagnosis of HDV positive cases in that region (Jedary and Sabouri, 2010). The highest prevalence of anti-HDV antibody (Ab) positive was reported by Hajiani et al. (2009) from Khuzestan (South-west of Iran) about 11.5% recently. The recognition of HDV infection in HBV carriers is important for estimating the prognosis of hepatitis patients. The risks of developing severe or fulminate hepatitis is more in acute HDV infection and to cirrhosis and liver failure in chronic HDV infection. The response rate of HBV patients with HDV co-infection to antiviral therapy and the dosage of treatment are varies from patients with chronic HBV alone (Abbas et al., 2010). We aimed in this study to investigate the prevalence rate of HBV and HDV in Shiraz blood donors.

MATERIALS AND METHODS

This retrospective study was performed from 21 March, 2009 to 21 March, 2010 at Shiraz Blood Transfusion Center, one of the main transfusion centers in Fars, Iran. All donors were volunteers. All donors were interviewed by physicians confidentially, and donor eligibility was determined by standard operating procedures based on national guidelines were used for donor selection and deferral. All blood units were examined for HIV Antigen (Ag)-Ab (Bio-meriux, Marcy l Etiole, France) HCV antibody (Ortho, New Jersey, USA) and hepatitis B surface (HBS) Antigen (Behring, Marburg, Germany) by enzyme-linked immunosorbent assay (ELISA). All positive results were confirmed by western blot for HIV (Bio-meriux, Marcy l Etiole, France), by recombinant immunoblot assay (RIBA) for HCV (Ortho, New Jersey, USA) and the neutralization test (Siemens, Marburg, Germany) for HBV.

The participants who enrolled in this survey were randomly sample of blood donors aged 17-65 years who donated blood in our center and had positive result of confirmatory HBsAg in screening tests. The donors were invited for participating in this study by phone. A written consent was obtained from each participant and they were assured about the confidentiality of the provided information. The Institutional Ethics Review Committee of Blood Transfusion organization approved the study protocol. A well-designed questionnaire containing information on demographic characteristics, donation status, (first-time, regular donor), family history of hepatitis in their family and risk factor of getting disease was filled out. Then a sample was collected for hepatitis B envelope antigen (HBeAg), hepatitis B envelope antibody (HBeAb), Liver function test (LFT), protrombin time (PT) and HDV Ab (total IgG.IgM) was detected by Elisa (DIA.PRO, Milano, Italy).

After the interviews, a brief counseling session was held with each individual and they were referred to a gastroenterologist for further advice. The sample size with assuming of 3% prevalence rate of HDV (Torabi et al., 2003) and precision of 2% and $\alpha=0.05$ and adjusting of population size was determined 190. The prevalence rate of HDV in blood donors was defined. The data were analyzed with the chi-squared test and independent sample T test. P-values less than 0.05 were considered significant.

RESULTS

During the study period, 96646 donors gave blood at our center. The prevalence rate of HBV in all donors was 263/96646 (0.27%). From 190 patients who were invited 185 persons were participated in this study. Of whom 159/185 (85.9%) were male, 156/185 (84.3%) were married, 69/185 (37.3%) were first-time donors, 46/185 (24.9%) were educated past secondary school and 90/185 (48.9%) were lived in rural area. The mean age of all was 43.35 ± 1.16 . 41/185 total 22.3% of patients had positive history of HBV, 5/185 total 2.7% history of hepatocellular carcinoma and 3 /185 total 1.6% cirrhosis in their family. The most common route of transmission was unknown routes 147 /185 (79.5%), positive family history 41/185 (22.3%), unsafe sexual contact 11/185 (5.9%), history of tattooing 9/185 (4.86%), intravenous drug abuse 5/185 (2.7%) history of receiving blood or blood products 5/185 (2.7%), history of icterus 5/185 (2.7%), history of diabetes mellitus 5/185 (2.7%). The prevalence rate of HDV was 4/185 total numbers 2.2%. Characteristics of HDV positive in comparison with HDV negative was expressed in Table 1.

The most common route of transmission in HDV positive group was unknown routes 4/4 (100%) and in HDV negative group was unknown routes 102/181 (56.4%), positive family history of HBV in their family 41/181 (22.6%), unsafe sexual contact 11/181(6.1%), history of tattooing 8/181 (4.4%), intravenous drug abuse 5/181 (2.8%) history of receiving blood or blood products 5/181 (2.8%). The level of aspartate aminotransferase (AST), alanine transaminase (ALT) and PT were not different between positive and negative groups ($P>0.05$). Patients were also tested for HIV and HCV and all were negative. 183/185 (98.9%) of HBV patients in this study were not aware of the infection before donation.

Table 1. Characteristics of HDV positive in comparison with HDV negative.

| Variable | HDV positive | HDV negative | P value |
|-----------------------------------|--------------|-----------------|---------|
| Age/Year | 51.25±9.43 | 43.18±11.62 | P=0.17 |
| Sex/Male | 2/4 (50%) | 157/181 (86.7%) | P=0.09 |
| Positive history of hepatitis B | 0/4 (0%) | 41/181 (22.8%) | P=0.36 |
| Unsafe sexual contact | 0/4 (0%) | 11/181 (6.1%) | P=0.78 |
| History of tattooing | 0/4 (0%) | 8/181 (4.4%) | P=0.83 |
| Intravenous drug abuse | 0/4 (0%) | 5/181 (2.8%) | P=0.89 |
| Receiving blood or blood products | 0/4 (0%) | 5/181 (2.8%) | P=0.89 |
| Mean AST | 35.6±4.2 | 35.26±40.2 | P=0.56 |
| Mean ALT | 29.9±2.9 | 29.58±2.88 | P=0.6 |
| Mean PT | 13.09±3.1 | 13.2±3.54 | P=0.86 |

DISCUSSION

The prevalence of HBV in our study was 0.27%. The prevalence of HBV in our province decreased from 0.89% in 1998 to 0.27% in 2009 (Kafi-abad et al., 2009). The frequency of HBV infection in blood donors decreased over this period. It was due to improvement recruitment of low-risk donors and better donor selection, usage of software in transfusion service that prevent register of blood donors with a history positive results in screening tests, implementation of confidential unit exclusion from 2002 so that high risk donors can exclude their blood from transfusion (Kasraian and Tavasoli, 2010) and possible decreasing in prevalence of HBV infection in general population as a result of vaccination against HBV among selected group health care workers, pregnant women, multi-transfused patients, presence of HBV patients in their family and all newborn since 1993 (Kafi-abad et al., 2009). The prevalence of HBV infection in Shiraz blood donors was 0.38% in 2006 and 0.37% in 2007 (Kasraian and Tavasoli, 2010). The prevalence of HBV infection in general population in Iran is ranging from over 5% in S and B province to 1.7% in Fars province (Malekzadeh et al., 1997). Difference in prevalence rate of HBS prevalence among different provinces in Iran may show the difference in sociodemographic characteristics and geographic status. In this study, the prevalence rate of HDV was 2.2%. There are several reports on HDV prevalence in Iran. According to Alavian et al. (2005), 5.7% of HBV patients in Tehran were also infected with HDV. Gholamreza et al. (2007) reported a prevalence of 5.8% for anti-HDV in HBsAg positive cases in northeastern Iran. In Hamadan Province, west of Iran, anti-HDV was present in 2.4% of HBsAg carriers (Amini et al., 1993). In a study by Rezvan et al. (1990), anti-HDV positivity was 2.5% in asymptomatic chronic HBsAg carriers, but as high as 49.2% in HBsAg positive patients with chronic active hepatitis and cirrhosis. The prevalence of HDV in our blood donors was low and same as other studies on blood donors or asymptomatic carrier. It is due to this

issue most of HBS patients (98.9%) were not aware of the infection before donation. Most of them (97.3%) did not have any sign or symptom of hepatitis so we surveyed prevalence of HDV on asymptomatic carriers. The overall incidence of HBV in our province is also the lowest in the country, which may indicate less high-risk behavior in this region. Studies in other countries have reported a wide range of prevalence.

We found that in the HDV-positive group, the AST level and the ALT level were not significantly differences between HDV positive and negative groups. Similarly with a study by Zuberi et al. (2006), which reported no significant difference between frequency and severity (stage) of fibrosis between the two groups, although mean ALT was significantly different in the same study? That opposite results are also reported in literature like a study in China on HBV patients showed that the incidence and mortality of serious chronic hepatitis, severe hepatitis and liver cirrhosis were all higher in the HBV patients with positive HDV compared to those with negative serology. Level of ALT was also higher in the positive group (Gu et al., 2001).

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