

Short Communication

Prevalence of HBV/HCV Infections in HIV-Positive Patients in Northern Iran

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Abstract

Introduction: Human immunodeficiency virus (HIV) infection increases the risk of infection with other pathogens, including hepatitis B virus (HBV) and hepatitis C virus (HCV). A crucial aspect of HIV prevention and treatment programs is knowledge of the prevalence of co-infection of HIV and HBV and/or HCV. This study sought to determine HBV and HCV co-infection in HIV-positive patients in northern Iran.

Materials and Methods: Blood samples were collected from 83 HIV-positive patients whose infection was previously confirmed by real-time polymerase chain reaction in the HIV center in the North of Iran. A structured questionnaire was used to obtain socio-demographic data from participants. Samples were screened for hepatitis B surface antigen and anti-HCV antibody. All non-reactive samples were recorded as negative.

Results: The 83 patients comprised 50 (60%) males and 33 (40%) females. Twenty eight (33%) and 15 (18%) subjects were positive for HCV antibody and hepatitis B surface antigen, respectively. Seven (8%) of subjects were co-infected with all three viruses.

Conclusion: Seroprevalence of HCV and HIV co-infection was high and was strongly related to mutual acquisition.

Keywords: AIDS, Co-infection, Hepatitis B, Hepatitis C, HIV infections

1. Introduction

Acquired immune deficiency syndrome (AIDS) is the final clinical stage of infection by human immunodeficiency virus (HIV) [1]. People at high risk of HIV infection are also at risk for other infectious pathogens, including hepatitis B virus (HBV) and hepatitis C virus (HCV) [2]. HBV and HCV infections are the main triggers of liver disease and liver-related mortalities among the HIV-infected patients, potentially because of their

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mutual routes of acquisition [3]. How HBV or HCV interacts with HIV to influence disease development is not well understood. Co-infection of HIV/HBV reportedly simplifies HBV replication and reactivation, resulting in higher HBV DNA levels and reduced spontaneous clearance of the virus [4]. Also, co-infection of HCV with HIV has a negative influence on the natural history of HCV. Higher levels of circulating HCV RNA occur with a reduced response to interferon treatment, leading to a more rapid progression of fibrosis and a 2–3-times increased risk of cirrhosis and its associated complications.

Recently introduced agents that act directly against HCV can interact with antiretroviral agents, complicating the treatment of both diseases [5, 6]. Therefore, even though antiretroviral therapy has reduced the frequency of AIDS-related deaths and has enhanced survival of HIV-positive individuals, liver-related diseases are the major causes of death among those co-infected with HIV and hepatitis virus [7–9]. An estimated 350 million people are infected with HBV and 170 million people are infected with HCV [10, 11]. Among HIV-positive individuals, approximately 2–4 million are chronically co-infected with HBV and 4–5 million with HCV [12]. HBV and HCV infections are the most important factors for infectious diseases [11, 13]. The prevalence of HCV is 72–92% among intravenous drug users, 1–12% in men who have sex with men, and 9–27% in heterosexuals [3]. In Iran, the risk of acquiring HCV infection is high among intravenous drug users (IVDUs) and hemodialysis patients (27.41 and 21–23%, respectively) [14, 15]. Studies conducted in Western Europe and the United States have revealed HBV infection rates of 6–14% overall, 4–6% in heterosexuals, 9–17% in men who have sex with men, and 7–10% in IVDUs [16].

Knowledge of the prevalence of HBV and/or HCV co-infection in HIV-positive patients is important for prevention and treatment plans [17]. HCV and HBV infections are the two most common co-infections with HIV in Iran [18, 19]. The prevalence of HCV co-infection among HIV-positive patients varies markedly from 11.5–94.0% [20]. The objective of this study was to evaluate the prevalence of HIV/HCV, HIV/HBV, and HIV/HBV/HCV co-infection in the North of Iran between 2014 and 2016.

2. Materials and Methods

2.1. Participants' characteristics

This cross-sectional study included one sample each from 83 HIV-positive individuals (50 males and 33 females; birth to 60 years of age). All samples were collected from an HIV center in the North of Iran between 2014 and 2016. HIV infection had been confirmed in all subjects by real-time polymerase chain reaction (PCR). Demographic characteristics included gender, age, region, and year of collection (Table 1).

2.2. Sample collection

This study was approved by the ethical committee of Mazandaran University of Medical Sciences. Written informed consent was obtained from all subjects. Using sterile syringes and needles, 5 mL of venous blood was individually collected in an EDTA

TABLE 1: Demographic and serology characterization of participants.

	HIV	HIV/HBV	HIV/HCV	HIV/HBV/HCV
Age groups, years				
0–10	8	2 (2.4%)	0 (0%)	0 (0%)
10–20	10	2 (2.4%)	2 (2.4%)	0 (0%)
21–30	5	1 (1.2%)	2 (2.4%)	1 (1.2%)
31–40	21	6 (7.2%)	9 (10.84)	4 (4.8%)
41–50	29	4 (4.8%)	15 (18%)	2 (2.4%)
51–60	10	0 (0%)	0 (0%)	0 (0%)
Sex				
Male	50	9	17	3
Female	33	6	11	4
Region				
Sari	21	3	8	1
Neka	2	1	0	0
Babol	9	1	0	0
Galoogah	2	0	0	0
Amol	2	0	0	0
Tonekabon	4	0	1	0
Ghaem shahr	9	1	3	0
Gonbad kavous	1	0	0	0
Behshahr	1	0	0	0
Gorgan	30	8	16	6
Year				
2014	9	0	3	0
2015	25	5	7	0
2016	49	9	18	7
Percentages (%) in columns were calculated by dividing the number of participants with a particular outcome by the total number of participants with that outcome of interest *100. Column totals 100%.				

containing tube, dispensed into sterile test tubes (universal containers), and coded appropriately. The blood was allowed to clot prior to centrifugation at $1000 \times g$ for 10 min at room temperature within 6 h of collection. Each sample was stored at 4°C for no longer than 48 h. Finally, the serum samples were separated into 2 mL cryovial containers and transported to the laboratory in a cold box (4°C), then stored at -20°C for later use.

2.3. Serology

Hepatitis B surface antigen (HBsAg) HBsAg was quantified using an HBsAg enzyme-linked immune sorbent assay (ELISA) (Wantai Bio, Beijing, China). Twenty microliters of specimen diluent was added to each microwell of the ELISA plate, except for the blank

wells. This was followed by 100 μL of sample or control. The plate was incubated at 37°C for 60 min. After adding 50 μL of horseradish peroxidase (HRP)-conjugate, the plate was incubated at 37°C for 30 min, then it was washed five times. In the next step, 50 μL of chromogen solution A (Wantai Bio, Beijing, China) and 50 μL of chromogen solution B (Wantai Bio, Beijing, China) were added and the plate was incubated at 37°C for 30 min. At the penultimate step, 50 μL of stop solution (Wantai Bio, Beijing, China) was added and the absorbance was recorded at 450 nm or a dual wavelength of 450/600~650 nm. All non-reactive samples were recorded as negative. All samples that were reactive were recorded as positive.

Anti-HCV antibody- HCV antibody was detected using the Anti-HCV kit (Wantai Bio). Except for the primary antibody, the assay was done as described above.

3. Results

The results of real-time PCR confirmed the presence of HIV infection in the blood samples of patients (Figure 1). Fifteen (18%) and 28 (33%) of the HIV-positive patients were positive for HBsAg and anti-HCV antibody, respectively. Seven (8%) tested positive for both HBsAg and HCV antibody. Thirty three (40%) of 83 patients were females and 50 (60%) were males. All were screened between 2014 and 2016. Regionally, Gorgan had the highest percentage of those screened ($n=30$, 36%), followed by Sari ($n=21$, 25%). HBsAg was detected in nine (18%) males and six (18%) females were positive. HCV antibody was detected in 17 (34%) men and 11 (33%) women. Co-infection with both HBV and HCV was evident in four (12%) and three (6%) HIV-positive women and men, respectively.

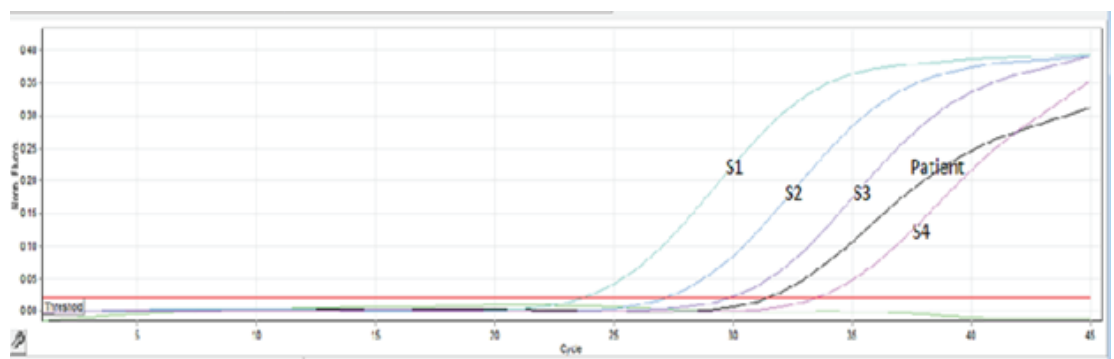


Figure 1: Example of real-time amplification curve of a positive sample. S1-S4 denote standard curves.

4. Discussion

The purpose of this study was to determine the prevalence of HBV and HCV infections in people living with HIV in the North of Iran. This knowledge is important since viral hepatitis co-infection in people positive for HIV can affect the clinical outcomes of HBV or HCV infection by accelerating the progression to advanced liver disease [21, 22].

The reported prevalence rates of HBV/HCV co-infections among HIV-positive cases in Iran and other countries differ. The difference could be explained by the different epidemiology of these viruses in different global regions. The overlapping degree of influence of the different risk factors can determine the prevalence rate of HBV/HCV co-infection among HIV-positive patients [19].

Presently, 18% and 33% of the patients were co-infected with HBV and HCV respectively, and 8% were co-infected with both viruses. The majority of those infected were aged between 31 and 50 years. Similar findings have been reported for HIV patients in southern Brazil, where 31.2% of individuals were co-infected with HCV and most of the patients were men with an average age of 40 years. The similarity between the findings of the two studies could be due to the same age range [23]. Consistent with our results, similar prevalence rates were reported during follow-up at infectious disease clinics in the U.S. (31–36%) and Europe (31%) [24, 25] and also for volunteers of a multicenter trial administered mainly in Europe (31%) [26]. The similar findings between the prior and present studies might reflect the same risk factors. Moreover, in all these studies, the majority of participants were males. However, in a similar study carried out in Ahvaz, south of Iran, the co-infection rates of HBV, HCV, and HBV/HCV in HIV-positive patients were 44%, 74%, and 20%, respectively [27], which were higher rates compared to more northern regions of the country. The main difference between the two studies was the samples, with all the participants in the prior study were IVDUs. The results of a study in Nigeria conducted on 1779 HIV-positive patients revealed that the rates of HBsAg, HCV, and HBV/HCV co-infections in HIV-positive cases were 11.9%, 4.8%, and 1%, respectively, with the majority of individuals being 25–34 years of age (42.6%), followed by 35–44 years of age (30.4%) [28]. The sample size in the prior study was larger than the present study and the mean age was lower. A study from India reported a prevalence rate of HBsAg in HIV-positive patients of 3.4% with an absence of detectable HCV antibody [29]. The main difference between the present study and this prior study is the larger sample size of the prior study, which could be the reason for the difference between the results.

We observed gender differences in infection rates even though most of the participants were males (60%). This finding highlights the need to improve sampling techniques, particularly among women, in subsequent studies. Co-infection with HCV was more prevalent in men, while the percentage of HBV infected men and women were equal. HBV/HCV/HIV co-infections were more prevalent in women. Two other studies reported more prevalence that HBV/HIV and HCV/HIV and HCV/HBV/HIV co-infections in males [12, 30]. Both of these studies included approximately 80% males, which may have influenced the gender prevalence. Another study conducted in Lorestan, Iran, reported a prevalence of HBV, HCV and HBV/HCV co-infection in HIV-positive cases of 14.5%, 72%, and 7.9%, respectively. These results also indicated that the greater prevalence of HBV, HCV, HBV/HCV in HIV-positive men than in women [19]. Although in this study the sample size is relatively large, only 9% of participants were women. A study conducted in Kenya reported that co-infection of HIV/HBV was more prevalent in men and co-infection of HIV/HCV was more prevalent in women. The majority of infected people in their study aged 25 and 40 years old [31]. The present study included

proportionately more women (57%) than the previous studies, which may be the basis of the different findings.

HIV and HCV are transmitted by large or frequented disposals to infected blood and body fluids. The diversity in the prevalence of co-infection among regions or countries might be due to the distribution of risk factors, with injection drug use being an important influence [16]. In countries with no considerable variation on IVDU prevalence across regions, other risk factors like common personal hygiene are the most important cause [32].

The higher prevalence rate of HCV in comparison to HBV in HIV-positive cases could be considered remarkable and could be attributed to different factors, such as lack of a vaccine for HCV, contrary to the existence of HBV vaccines. Also, sexual transmission of HCV is lower in comparison to HBV. HCV is transmitted mostly via injection (especially in drug addicts) and the rate of addiction in Iran is high [33]. Co-infection with HCV, HBV, and HIV increases the risk of cirrhosis, liver deficiency, and mortalities in comparison to infection with only one of these viruses. Therefore, diagnosing HBV and HCV infections in HIV-positive patients is essential to take care of them and to allot resources to health plans. All HIV-positive patients should be tested for HVB and HCV [34, 35].

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Conflicts of Interest

There are no conflicts of interest.

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