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Analysis of Hepatitis B Transmission Risk Factors in HIV Patients

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ABSTRACT

Co-infection with Hepatitis B (HBV) virus and HIV is common due to similarity of their transmission methods. However, the prevalence of concurrent infection in different societies, shows the crucial role of various risk factors in different populations. Therefore, the present study was performed to examine risk factors of transmission of HBV in patients with HIV in a care center for AIDS patients in Rasht City. This case-control study was carried out on 60 HIV positive patients, who visited the Infectious Diseases Center of Razi Hospital of Rasht from November, 2015 to March, 2016. Participants were assigned to two 30-member experiment and control groups. They were adjusted in terms of age group (18-30, 30-40, 40-50, and 50-60), gender (male and female), and marital status (married, single, divorced, and widowed) and visited by an infectious diseases specialist according to routine examinations. Data was recorded in a questionnaire for each subject. The mean age for the experimental group was 35±6.1, and for control group was 36.6± 5.7 years. Both univariate and multivariate analyses of development of HBV infection and variables including Illegitimate sexual intercourse, use of intravenous injection drugs, positive history of imprisonment, and tattooing (p value < 0.05) showed existence of significant relationships. Injection of illegal intravenous drugs, history of imprisonment, illegitimate sexual intercourse, and tattooing are four important risk factors for transmission of HBV infection to HIV patients. In addition, the master risk reduction program may include provision of clean disposable tools for intravenous injection of drugs and tattooing.

Keywords: Hepatitis B, HIV, Transmission, Hormozgan, Iran

INTRODUCTION

Infection with Hepatitis B (HBV) virus and HIV is among the substantial health problems of societies. Due to similarity of methods of transmission of HBV and HIV concurrent development of these two infections is very prevalent[1]. Based on previous research, more than 4-7 million people in the world are suffering from HBV and HIV, simultaneously[2-4].

Concurrent development of these infections reduces HBV clearance and severely disrupts cellular immune response to the HBV antigen. It also accelerates the process of chronic development of the disease and liver fibrosis and increases complications of infections drastically[5]. On the other hand, HBV infection is an important cofactor in progress of the disease and treatment of patients with HIV. In other words, it drastically adds to problems associated

with liver toxicity after treatment with antiretroviral drugs[6, 7]. As a result, these cases demonstrate much lower survival rates than patients infected with HIV or HBV virus[4].

The difference between rates of prevalence of concurrent infection in different studies reflects the determining role of predisposing risk factors in different countries or even different parts of a single country[8]. Hence, identification of major risk factors in each geographical region is significantly important to prevention of concurrent development of these two infections[9]. Some of the factors involved in concurrent development of these two infections include intake of intravenous injection drugs, study area/district, frequency of each of the infections, tattooing, piercing, sharing hygiene tools, sexual intercourse, history of imprisonment, marital status, etc.[10, 11]. Marital status and its interaction with age, gender, and relationships of these high-risk individuals inside and outside of their families is highly complicated and are considered important cofactors in diversity of estimates of other risk factors. Therefore, it is necessary to control these factors properly[12].

However, based on previous research, other than intake of intravenous injection drugs, which was reported as a risk factor in almost all studies and geographical regions, there is no consensus on other variables and different studies have reported different risk factors[13]. Hence, the present study was carried out to examine risk factors of transmission of HBV in patients with HIV in a care center for AIDS patients in Rasht City.

MATERIALS AND METHODS

Study procedure

This case-control study was conducted on 60 HIV positive patients (in two 30-member experiment and control groups), who visited the Infectious Diseases Center of Razi Hospital of Rashtfrom November, 2015 to March, 2016.Enrolled patients were informed about the aim and procedure of this study and provided written informed consent, and those who did not consent to participate were excluded. All procedures of present survey were approved by the Research Ethics Committee of Guilan University of Medical Sciences and relevant organizations.

Study population

Group members were randomly selected using the simple random sampling method from HIV patients who aged over 18 years and who had been diagnosed with HBV infection. Members of the control group were selected from the HIV patients who were synchronized with the experiment group patients in terms of age group (18-30, 30-40, 40-50, and 50-60), gender (male and female), and marital status (married, single, divorced, and widowed).Exclusion criteria were active opportunistic infection within 6 weeks of entry, serum alanine aminotransferase (ALT) level > 1,000 IU/L, concurrent malignancy requiring cytotoxic chemotherapy, other causes of chronic liver disease, alpha-fetoprotein more than three times the upper limit of normal (ULN), and Child-Pugh class C or decompensated cirrhosis.

Data collection

Patients and individuals who used to visit the center regularly for medical examinations were assessed by fully trained interviewers using a national standard questionnaire employed in behavioral counseling health centers. The questionnaire provided information on demographic properties (age, gender, race, education, and residence), moral properties (history of imprisonment or detention for more than one week, shared hygiene tools, and tattoos), medical history such as history of blood transfusion, dialysis and thalassemia, use of banned intravenous drugs, and illegitimate sexual intercourse.

Participants in this research were visited at least twice by an infectious diseases specialist, and one of the visits had occurred in the last 6 months. In this center, routine examinations include social status details and precise medical details, hematology and biochemical tests, physical examination, chest radiography, HIV viral load, CD4 measurement, HBsAg and Anti HVC tests using the ELISA assay method, and toxoplasmosis and PPD tests for patients suspected of tuberculosis (TB).

Statistical analysis

To examine the relationship of HBV infection with research variables in the univariate state and multivariate state (simultaneous analysis of research variables) the McNemar's test and the conditional logistic regression test were used, respectively. A two sided $\alpha = 0.05$ was considered statistically significant.

RESULTS AND DISCUSSION

No participants were excluded from the study during the research period. The mean age for the experimental group was 35±6.1, and for control group was 36.6± 5.7 years. The age range for both groups was 18 to 60 days. Twenty-three men (76.67%) and 7 women (23.33%) in experimental group and 20 men (66.67%) and 10 women (33.33%) in control group were investigated. As seen in Table (1), patients of the experiment and control groups were synchronized in terms of age, marital status, and gender. The majority of the study population was formed by single men aged between 30 and 40 years.

Table 1. Demographic and baseline characteristics of the study population

Variables	Experimental group	Control group	P value
	N (%)	N (%)	
Age			
18-30	8 (26.67%)	7 (23.33%)	>0.05
30-40	11 (36.66%)	12 (40%)	
40-50	6 (20%)	6 (20%)	
50-60	5 (16.67%)	5 (16.67%)	
Gender			
Male	23 (76.67%)	20 (66.67%)	>0.05
Female	7 (23.33%)	10 (33.33%)	
Marital status			
Married	6 (20%)	8 (26.67%)	>0.05
Single	16 (53.34%)	17 (56.67%)	
Divorced	4 (13.33%)	2 (6.66%)	
Widowed	4 (13.33%)	3 (10%)	

The univariate analysis of development of HBV infection and variables including Illegitimate sexual intercourse (p value = 0.0410),use of intravenous injection drugs (p value = 0.0287), positive history of imprisonment (p value = 0.0020), and tattooing (p value = 0.0213) showed existence of significant relationships. Chances of development of HBV in patients using intravenous injection drugs, Illegitimate sexual intercourse, patients with a history of imprisonment, and tattooed patients were 3.8235 (95%CI: 1.1500 - 12.7129), 3.0000 (95%CI: 1.0462 - 8.6027), 7.4286 (95%CI: 2.0782 - 26.5537), and 5.2105 (95%CI: 1.2784 - 21.2373) times more than normal participants, respectively (table 2).

On the other hand, the multivariate analysis indicated that intravenous drug injection, history of imprisonment, Illegitimate sexual intercourse, and tattooing (as potential predictors) increase the chances of development of HBV,3.1005 (95%CI: 1.1996 - 6.5228), 3.5213 (95%CI: 2.1304-12.0453), 2.6018 (95%CI: 1.0915 - 4.3200), and 3.9073 (95%CI: 1.4355 - 11.6012) times, respectively (table 3).

Our results revealed that use of intravenous injection drugs, tattooing, illegitimate sexual intercourse, and history of imprisonment are independently related to high risks of concurrent infections. Many previous studies have also stressed use of intravenous injection drugs as an important risk factor involved in transmission of HBV[14]. Although use of intravenous injection drugs is introduced as a risk factor of concurrent infection, few studies have not introduced this factor as a risk factor. Based on literature, this factor is especially common among gay men[15]. On the other side, concurrent transmission of these infections, bleeding during sexual intercourse, and accompanying infections are reported as major risk factors. Therefore, this finding reflects necessity of examining gay men for this concurrent infection regardless of use of illegal intravenous drugs[16].

Undoubtedly, sharing contaminated needles and syringes plays a significant role in spread of this infection in populations with high prevalence of HBV infection and imprisonment, though our results denied it[17].Because prison is a place where contaminated syringes are commonly used and prevalence of different infections such as HBV and HIV is very high[18]. In addition, non-injective addicts entering the prison mainly turn into injective addicts due to difficulty of inhalation of drugs. Therefore, prison is a very important factor in transmission of HBV in injective and non-injective addicts[19]. Studies suggest that in addition to imprisonment, duration of imprisonment is also directly related to an increase in the risk of transmission of HBV infection[20].

In line with results of this research, previous research also indicated that getting tattooed is a well-known means of transmission of HBV. Although some studies did not introduce tattooing as a risk factor, in accordance to our

findings, several investigations revealed that there is a direct relationship between the tattooed area and number of tattoos with HBV infection[4, 21]. In other words, risk of transmission increases with an increase in the tattooed area and number of tattoos. In addition, the risk of transmission of HBV through tattooing depends on prevalence in the population, because studies indicated that the risk is much higher among prisons[22].

Table 2. The univariate analysis of HBV-HIV coinfection and study variables

Variables	Control group (N)	Experimental group (N)	Adjusted OR	95% CI	P value
Educational level					
Academic	2	1	2.0714	0.1777 to 24.1495	0.5611
Non-academic	28	29			
Sharing needles					
Positive	12	10	0.7500	0.2615 to 2.1507	0.5925
Negative	18	20			
Economic situation					
Pleasant	1	0	3.1017	0.1214 to 79.2326	0.4936
Unpleasant	29	30			
Habitat					
Countryside	11	8	1.1515	0.3600 to 3.6830	0.8120
Urban	19	22			
History of imprisonment					
Positive	14	26	7.4286	2.0782 to 26.5537	0.0020
Negative	16	4			
Illegitimate sexual intercourse					
Positive	10	18	3.0000	1.0462 to 8.6027	0.0410
Negative	20	12			
Tattooes					
Positive	19	27	5.2105	1.2784 to 21.2373	0.0213
Negative	11	3			
Intravenous drugs					
Positive	17	25	3.8235	1.1500 to 12.7129	0.0287
Negative	13	5			
History of blood transfusion					
Positive	7	9	1.4082	0.4453 to 4.4533	0.5601
Negative	23	21			
History of dialysis					
Positive	5	3	0.5556	0.1201 to 2.5689	0.4518
Negative	25	27			
Thalassemia					
Positive	2	1	0.4828	0.0414 to 5.6282	0.5611
Negative	28	29			
Anti HCV test					
Positive	6	4	0.6154	0.1546 to 2.4497	0.4909
Negative	24	26			
Tuberculosis (TB)					
Positive	5	7	1.5217	0.4232 to 5.4719	0.5202
Negative	25	23			
AIDS					
Positive	17	14	0.6691	0.2418 to 1.8516	0.4391
Negative	13	16			

Table 3. The multivariate analysis of HBV-HIV coinfection and potential predictors

Variables	Adjusted OR	95% CI	P value
History of imprisonment			
Positive	3.5213	2.1304 to 12.0453	0.0027
Negative			
Illegitimate sexual intercourse			
Positive	2.6018	1.0915 to 4.3200	0.0480
Negative			
Tattooes			
Positive	3.9073	1.4355 to 11.6012	0.0279
Negative			
Intravenous drugs			
Positive	3.1005	1.1996 to 6.5228	0.0311
Negative			

Transmission of HBV through sexual intercourse was reported as a well-known means in previous studies, but transmission of HBV in HIV patients has been investigated slightly. In this study, in the univariate and multivariate analysis states, this factor was known as a risk factor in transmission of HBV[23]. In line with results of the present research, some researchers suggested that transmission of HBV virus was higher in HIV patients. They attributed the relationship to the weakening of the immune system and higher secretion of HBV virus in blood and semen[23, 24]. Limitations were also imposed in this research. Hence, due to lack of information on the time of development of HBV and HIV infections, it is impossible to conclude whether these risk factors make an HIV patient vulnerable to HBV or whether these factors make a HBV patient vulnerable to HIV. Evidently, prospective cohort studies are required to answer this question.

Considering results of this research, the master risk reduction program may include provision of clean disposable tools for intravenous injection of drugs and tattooing as well as maintenance treatment with methadone (to rehabilitate and prevent transformation of non-injective addicts to injective addicts) in centers such as prisons. Injection of illegal intravenous drugs, history of imprisonment, illegitimate sexual intercourse, and tattooing are four important risk factors for transmission of HBV infection to HIV patients. Results of this research stress the HBV, HIV, and imprisonment triad, because intravenous injection of illegal drugs, illegitimate sexual intercourse, and tattooing in prison clearly show the role of prison as a risk factor in transmission of this virus.

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