

ORIGINAL ARTICLE

ANTI-HCV ANTIBODY AMONG IRANIAN IV DRUG USERS: IS IT A SERIOUS PROBLEM?

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Abstract

Background-Hepatitis C virus (HCV) is transmitted mainly via sexual contacts and blood (or its products') transfusion. Transmission of this virus by contaminated needles used by IV drug users has raised great concern.

Objective-In the present survey, the rate of HCV infection among a group of IV drug users was investigated and some important risk factors of the virus transmission were determined.

Methods-A total of 402 male IV drug users from Ghasr Prison in Tehran, Iran, entered the study (1995). At the stage of blood sampling, a questionnaire including demographic data; history of blood transfusion, tattooing and cupping (or *Hejamat*, the traditional way of phlebotomy in Iran) was also filled for every enrolled prisoner. HCV 3.0 ELISA and RIBA II were used to detect the HCV antibody and antigen in blood sera, respectively. Data were analyzed using Chi-square and Fisher's exact tests.

Results-HCV antibody was found in the sera of 182 of 402 cases (45.3%). Seventy-three of 182 (40.1%) HCV antibody-positive persons had a history of tattooing. All cases with a history of cupping were antibody positive. There was a statistically significant relationship between antibody positivity and having a history of tattooing/cupping ($p < 0.005$). Other risk factors did not seem to have a significant relationship with HCV antibody positivity.

Conclusion-Similar to the findings of many developed and developing countries, a high rate of hepatitis C infection is present among Iranian IV drug users. We believe that tattooing and cupping are two important risk factors associated with HCV infection in IV drug users in Iran.

Keywords • HCV antibody • risk factors • IV drug users • Iran

Introduction

There are at least five different types of viral hepatitis, each produced by a specific agent (A, B, C, D and E). Various kinds of hepatitis present considerable homology in their clinical outcome. It is therefore impossible to differentiate these viral infections only by means of clinical examination or routine laboratory tests. However, since the final outcome of the disease is largely dependent on the type of

the virus, detecting the exact etiologic agent is of paramount importance.

Hepatitis C has a great tendency to become chronic and can finally cause chronic active hepatitis (CAH) or cirrhosis.¹HCV is a blood-borne virus. Epidemiological studies have shown that the most common routes of transmission of this virus are through injection of contaminated blood or blood products, unprotected sexual contacts, the use of common needles by IV drug users and organ transplantation from infected donors. These routes of transmission can be evident in about half of the patients with acute

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hepatitis. In some studies, vertical transmission, familial and/or occupational contacts have also been proposed as routes of transmission, while in others, no definite or identified route has been detected.^{2,3}

Because of sharing contaminated needles, IV drug users constitute one of the most important groups at risk of being infected with HCV. Recent studies have shown that more than two-thirds of these patients had a history of jaundice with more than two years of duration reaching even 8-20 years in some cases.^{4,6} It has been found that hepatitis C is the etiology of chronic hepatitis in IV drug users in 70-85% of cases.⁷ Interestingly, in 50% of patients, concurrent infection with HBV is also evident.⁸ HCV can be transmitted by phlebotomy, tattooing or acupuncture, all by means of contaminated needles.⁹

The current study was performed to determine the rate of hepatitis C infection among the IV drug users of Ghasr Prison, Tehran, as one of the most important at risk groups. Some important risk factors of HCV transmission among this high-risk group were also studied.

Materials and Methods

A total of 402 male IV drug users were chosen randomly during the spring of 1995 from imprisoned population of Ghasr Prison in Tehran, Iran. In this study, an IV drug user was defined as a person who was using any kind of drug (heroin, opium, narcotic preparation, etc.) intravenously. Ten milliliters of blood was taken from each enrolled case while a questionnaire was filled out by a staff of the prison's medical center. Demographic data; history of tattooing, cupping, jaundice, blood transfusion and surgical procedures were taken and recorded in the questionnaire.

The blood samples were transported to

Taleghani Hospital for centrifuge and sera extraction. Prior to performing the necessary laboratory tests, the samples were stored at a temperature of -20° C. The extracted sera were transmitted to Mehrad Laboratory while the temperature of the samples were maintained below 0° C. They were then tested using the HCV 3.0 ELISA test (Ortho Diagnostic System, Germany). In the ELISA 3.0 test, c22-3 and NS5 surface antigens (prepared by a recombinant method) were added to the gathered sera in order to detect the presence of antibodies. This is a qualitative test, which shows the presence of anti-HCV Ab in the human serum or plasma. To insure the accuracy of the results, the first 20 to 30 samples were re-examined two or three times. To examine the accuracy of the ELISA, we chose some of the cases with positive ELISA results randomly and retested them by using recombinant immunosorbant assay II (RIBA II, Chiron, Emeryville, CA, USA). The RIBA II is an *in vitro* qualitative enzyme immunoblot assay which utilizes four recombinant HCV-encoded antigens which are immobilized as individual bands onto test strips.¹⁰ A negative, indeterminate or positive interpretation is based on the reaction pattern present on the strip. For valid runs, the criteria recommended by Chiron were implemented (Table 1).¹⁰ To increase the validity of the laboratory tests, all tests were performed in a single laboratory and by a single immunologist. Using Chi-square and Fisher's exact test, we analyzed the results of the study.

Results

The mean age of the studied population was 34.2 years (range: 16-75). Sixty-nine percent of the cases were married, 2.8% were illiterate, 68.4% had primary school education and 6.9% had high school education. Heroin had been used in 39.2%

Table 1. Negative, indeterminate and positive results of the RIBA II (Chiron, Emeryville, CA, USA).

Antigen band pattern	Interpretation
No bands present having 1+ or greater reactivity Or HSOD band alone having 1+ or greater reactivity	Negative
Any single HCV band having 1+ or greater reactivity Or HSOD band and any HCV band having 1+ or greater reactivity Or Reactivity of 1+ or greater to HCV 5-1-1 <u>and</u> c100-3 bands <u>only</u>	Indeterminate
Reactivity 1+ or greater to at least two HCV bands corresponding to antigens encoded by different parts of the HCV genome	Positive

Table 2. Basic characteristics of the sample prisoners.

Characteristic	Description
Sex	All men (100%)
Age	Under 20 (3.9%), 21-30 (40.8%), 31-40 (33.8%), 41-50 (13.5%), over 50 (8%)
Marital status	Married (60.6%), second marriage (8.2%), single (31.2%)
Education	Illiterate (2.5%), primary school (28.9%), junior high (32.6%), senior high (19.4%), undergraduate and graduate (6.3%), indeterminate (10.3%)
Profession	Entrepreneur (23.9%), labourer (32.6%), white-collar (6.7%), others (31.8%), indeterminate (5%)
Main dug of abuse	Cannabis (5.2%), opium (41%), heroin (27.2%), opium extract (2.2%), morphine (0.2%), psychedelics (0.5%), others (1.5%), indeterminate (22.2%)

of the cases for a mean of five years. Other data are shown in Table 2.

ELISA was positive in 182 cases (45%). RIBA II test was done in 32 randomly chosen samples of ELISA-positives, showing a single antigen in 5 patients (15%) and showed more than one antigen in 28 patients (85%). The C33-c and C100-3 antigens were detected in 100% and 66.7% of cases, respectively. Also, the 5-1-1 antigen was positive in 51% of cases. Thirty-two percent had a history of tattooing, among them anti-HCV antibody was positive in 56.2% of cases. Hepatitis C infection was present in 53.8% of the individuals with a positive history of blood donation (55.8%).

A history of at least one surgical operation was present in 33.5%. A total of 7.1% of cases had received blood, 12.1% had a history of jaundice, 6.0% had a history of jaundice in their family and 2.7% had a history of cupping (Table 3).

Discussion

Hepatitis C virus infection appears to be endemic in most parts of the world with an estimated overall prevalence of 3% and is responsible for a large number of cases of chronic liver disease worldwide. Depending on the prevalence of this virus in different parts of the world, its role in producing liver disease differs.

The prevalence of anti-HCV Ab in the IV drug users was 45.3% in the current study. In Norway, Holsen et al.¹¹ had reported a prevalence of 46% for anti-HCV Ab among IV drug users, while this figure was reported to be 86% in the United States by Fingerhood and his colleagues.¹² The Ministry of Health of France has reported that 500,000-1,000,000 of the general population (1-2%) are carriers of hepatitis C.^{13,14} In the United States, because of a prompt control on blood and blood products, only less than 5% of all transmissions

were due to blood or its products, and the cause of infection in the remaining cases were contaminated needles or sexual contacts.^{12,15} In Australia, tattooing and immigration from high-risk areas (Southeast of Asia) have been proposed as the risk factors.¹⁶

Selection the diagnostic method depends on the study population. For example, in order to diagnose hepatitis C in low-risk groups (e.g. blood donors), each type of ELISA should be

Table 3. Risk factors associated with HCV infection in IV drug users.

History of:	HCV		Total
	Positive (%)	Negative (%)	
Tattooing			
Yes	73 (40.1)	57 (25.9)	130
No	109 (59.9)	163 (74.1)	272
Blood donation			
Yes	98 (53.8)	126 (57.5)	224
No	84 (46.2)	94 (42.5)	42.5
Jaundice			
Yes	22 (12.1)	21 (9.5)	43
No	160 (87.9)	199 (90.5)	359
Jaundice in the family			
Yes	11 (6)	11 (4.9)	22
No	171 (94)	209 (95.1)	380
Cupping			
Yes	5 (2.7)	0	5
No	177 (97.3)	220 (100)	397
Surgery			
Yes	61 (33.5)	85 (38.6)	146
No	121 (66.5)	135 (61.4)	256
Blood transfusion			
Yes	13 (7.1)	27 (12.3)	40
No	169 (92.9)	193 (86.7)	362

accompanied by RIBA II, but in high-risk groups

(e.g. those with a history of liver disease, or blood transfusion or IV drug users), there is no need to use the second-line test.¹ In the present study, in order to gain some expertise with RIBA II (not a well-established test in Iran) and to investigate the accuracy of positive ELISA results, we used RIBA II in some of cases with positive results by ELISA. Eighty-five percent of the ELISA-positive results were confirmed by RIBA II and 15% of them were interpreted as indeterminate.

A previous history of tattooing was present in 32% of the enrolled cases, in which anti-HCV Ab was more frequently positive. It is obvious that tattooing can be seen more commonly among IV drug users and its prevalence is increasing in different countries.

In our study, another important mode of transmission was cupping. In all five persons with a positive history of cupping, the antiHCV Ab was positive. Compared with those who had not undergone this procedure, the rate of positive results were significantly high ($p=0.04$).

A previous history of jaundice in the family members can be important, because it shows viral transmission due to family contacts.

Table 3 shows that 53.8% of anti-HCV Ab-positive patients had a previous history of blood donation. Transfusion of blood or its products is an important route of HCV transmission. In most countries, because of the application of screening methods for hepatitis B and C before selection of blood donors, the risk of post-transfusion hepatitis has been reduced to less than 6%^{5,17,18}, however, a large number of hepatitis C patients with an age of about 50 years had a history of suspicious blood transfusion.^{5,17,18}

In England, the Department of Hygiene estimated that about 6,000 people were infected with the virus via the transfusion of blood or its products, among whom 3,000 were hemophiliacs. This figure is 20,000 in Australia (general population approximately; 18,000,000). In Germany, the number has reached one out of 5,000 individual since screening programs have become mandatory.² In Spain the figure decreased from 1.8% to 0.8% since the beginning of screening programs.¹⁹

One of our unpublished studies shows that the prevalence of HCV in the Iranian general population is lower than one percent. Therefore, the high-risk groups including IV drug users are the main source of the virus transmission in Iran.

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