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HCV, HBV, and HIV seroprevalence, co-infections, and related behaviors among male injection drug users in Arak, Iran

Amitis Ramezani¹, Reihaneh Amirmoezi², Jonathan E. Volk³, Arezoo Aghakhani¹, Nader Zarinfar⁴, Willi McFarland⁵, Mohammad Banifazl⁶, Ehsan Mostafavi⁷, Ali Eslamifar¹, and Masoomeh Sofian⁴

¹Clinical Research Department, Pasteur Institute of Iran, Tehran, Iran

²Arak University of Medical Sciences, Arak, Iran

³Center for AIDS Prevention Studies, University of California, San Francisco, CA, US

⁴Tuberculosis and Pediatric Infectious Research Center, Arak University of Medical Sciences, Arak, Iran

⁵Center for Public Health Research, San Francisco Department of Public Health, San Francisco, USA

⁶Iranian Society for Support of Patients with Infectious Diseases, Tehran, Iran

⁷Epidemiology Department, Pasteur Institute of Iran, Tehran, Iran

Abstract

This study explored the prevalence and related risk behaviors for hepatitis C (HCV), hepatitis B (HBV), and human immunodeficiency virus (HIV) among a sample of male injection drug users (IDU) in Arak, Iran. One hundred male IDU attending methadone maintenance clinics between April and September, 2012 were enrolled and evaluated for HCV, HBV, and HIV infection. The majority of study participants (56%) had evidence of HCV exposure, 6% had evidence of HBV,

Corresponding author: Masoomeh Sofian, Valiasr hospital, Valiasr Square, Arak, 3814653618, Iran, telephone: +988612241411, Fax: +988612241411, dr.sofian@arakmu.ac.ir.

Author Contact Information

Amitis Ramezani: Clinical Research Dept. Pasteur Institute of Iran; 13164, Pasteur Ave., Tehran, Iran, Tel: +982166968852, Fax: +982166465147, amitisramezani@hotmail.com

Reihaneh Amirmoezi: Valiasr hospital, Valiasr Square, Arak, 3814653618, Iran, Telephone: +988612241411, a.reihane@rocketmail.com

Jonathan E. Volk: San Francisco Department of Public Health, Bridge HIV, 25 Van Ness Avenue, Suite 200, San Francisco, CA 94102-6033, USA, 1-415-730-2764, jvolk@stanfordalumni.org

Arezoo Aghakhani: Clinical Research Dept. Pasteur Institute of Iran; 13164, Pasteur Ave., Tehran, Iran, Tel: +982166465147, araghakhani@hotmail.com

Nader Zarinfar: Valiasr hospital, Valiasr Square, Arak, 3814653618, Iran, Telephone: +988612241411, dr.zarinfar@arakmu.ac.ir

Willi McFarland: San Francisco Department of Public Health, 25 Van Ness Avenue, Suite 500, San Francisco, CA, 94102-6033, USA; phone: +1 415 437-6251, willi_mcfarland@hotmail.com

Mohammad Banifazl: Iranian society for support of patients with infectious disease, No 28, Darabad St., Niavaran Ave., Tehran, 1956953595, Iran, Telephone: +982126105987, mohammadbanifazl@aol.com

Ehsan Mostafavi: Epidemiology Dept. Pasteur Institute of Iran; 13164, Pasteur Ave., Tehran, Iran, Tel: +982166953311, mostafavi.ehsan@gmail.com

Ali Eslamifar: Clinical Research Dept. Pasteur Institute of Iran; 13164, Pasteur Ave., Tehran, Iran, Tel: +982166968852, shafaghlab@yahoo.com

Conflicts of Interest Declaration

The authors have no conflicts of interest to declare.

and 19% were HIV-infected. Co-infections were frequent; 15% had evidence of HIV and HCV, 6% had evidence of HBV and HCV, and 5% had serologic markers for all three infections. Most (84%) were susceptible to HBV infection. A history of any syringe sharing (54%) and syringe sharing in prison (25%) were common. In bivariate analyses, a history of any syringe sharing and syringe sharing in prison were both associated with all three viral infections. The high prevalence of HCV, HBV, HIV, and co-infections among IDU in Arak is concerning and indicates rapid disease spread outside of Iran's main urban centers. Prevention efforts should expand vaccination for IDU who are non-immune to HBV and continue to target syringe sharing with efforts such as needle exchange programs, including inside prisons.

Keywords

Human immunodeficiency virus (HIV); hepatitis B virus (HBV); hepatitis C virus (HCV); injection drug users (IDU); Iran; syringe sharing; prison

INTRODUCTION

Injection drug users (IDU) are at increased risk for acquiring blood borne viruses including hepatitis C (HCV), hepatitis B (HBV), and human immunodeficiency virus (HIV) through unsafe drug injection (Mir-Nasseri, Mohammadkhani, Tavakkoli, Ansari, & Poustchi, 2011; Degenhardt & Hall, 2012; Nelson et al., 2011; Mathers et al., 2008). In Iran, the HIV epidemic is concentrated among IDU, with as many as 70% of all HIV infections attributed to unsafe injection drug use (MoH, 2011). Notably, a recent study of IDU in Tehran, by far the nation's largest city, showed an HCV, HIV, and HBV prevalence of 70%, 16%, and 4%, respectively (Mir-Nasseri, Mohammadkhani, Tavakkoli, Ansari, & Poustchi, 2011). Other estimates of HCV infection among IDU in other urban areas of Iran have ranged from 59–90% (Kheirandish et al., 2009; Mohtasham Amiri, Rezvani, Jafari Shakib, & Jafari Shakib, 2007; Rowhani-Rahbar, Rooholamini, & Khoshnood, 2004).

Less information is available on the epidemiology of these infections and related behaviors among IDU outside of Iran's principal urban centers. This study aimed to determine the prevalence of HCV, HBV, and HIV infection among IDU in Arak, a moderate sized city in a central province (Markazi) of Iran. As all three of these infections are preventable, we also sought to better characterize the behaviors that have been associated with these infections in order to guide the ongoing development and implementation of appropriate preventive strategies for this at-risk population.

METHODS

We enrolled a total of 100 IDU attending methadone maintenance clinics in Arak, Iran between April and September, 2012. This site was selected because it is outside Iran's major population centers, has a well-established substance abuse clinic, and is affiliated with a research university. IDU were eligible for participation if they reported a history of injecting drugs in the preceding three months and were willing and able to provide informed consent. In Iran, individuals aged 15 or older have reached the legal age of consent for research based

on the national ethical codes. The study protocol was approved by the ethical review committee at Arak University of Medical Sciences. No incentives were given.

After informed consent, participants completed a questionnaire during a face-to-face interview conducted by a trained physician. The questionnaire assessed demographic characteristics and related risk behaviors for HCV, HBV, and HIV transmission. Participants were tested for HCV antibody (anti-HCV), and for HBV surface antigen (HBsAg), surface antibody (anti-HBs), and core antibody (anti-HBc) using enzyme-linked immunosorbent assays (ELISA) by Enzygnost (Dade Behring, Marburg GmbH, Germany). HIV infection was diagnosed by ELISA (MP Biomedicals, Illkirch, France) with confirmatory Western blot (Diaplus, San Francisco, USA). For the purpose of our analyses, all participants with anti-HCV were considered collectively as having been exposed; we did not distinguish between chronic HCV infection and those with prior HCV exposure who had cleared the virus. Participants positive for HBsAg were classified as HBV-infected; participants negative for HBsAg, anti-HBs, and anti-HBc were classified as non-immune. All IDU who were susceptible to HBV were referred for vaccination; HIV-infected individuals were referred to free clinics if not already in care.

Associations between HCV, HBV, and HIV infections and related risk factors were assessed in bivariate analyses using the Chi-square or the Mann-Whitney U tests. Statistical analyses were performed using SPSS, version 16 (SPSS, 2007).

RESULTS

Baseline demographic and risk behavior characteristics of the 100 men enrolled are described in Table 1, with the participants further stratified by HCV, HBV, and HIV infection. The participants ranged in age from 17–58 (median 33.3 years). Heroin (93%), and “crack” or “kerack” (49%) – a local, highly potent opioid injectable drug – were the most commonly injected drugs; a substantial majority (59%) reported a history of smoking opium. “Kerack” use was especially common among those with HIV (79%). A history of incarceration (73%), any syringe sharing (54%), and syringe sharing in prison (25%) were common. Among those with HCV, HBV, and HIV, a history of incarceration (82%, 100%, and 89%, respectively), any syringe sharing (75%, 100%, 89%, respectively), and syringe sharing in prison (38%, 83%, and 68%, respectively) were frequently reported.

In our sample, 56% of the IDU were anti-HCV positive, while 6% had evidence of HBV infection (HBsAg-positive), and 19% were HIV-infected. Viral co-infections were common in our sample, with HIV/HCV at 15%, followed by HCV/HBV at 6% and HIV/HCV/HBV (5%). Only 10% were anti-HBs positive. The majority (84%) of the IDU were both anti-HBs and anti-HBc negative, and therefore, potentially susceptible to HBV infection and candidates for vaccination.

In bivariate analyses, a history of sharing syringes was associated with HCV (OR 9.77, 95% CI 3.90–24.49), HBV (OR 9.38, 95% CI 0.94–93.27), and HIV (OR 9.70, 95% CI 3.90–24.40). Furthermore, a history of sharing syringes specifically in prison was also associated with HCV (OR 6.17, 95% CI 1.93–19.60), HBV (OR 17.85, 95% CI 1.98–166.66), and HIV

(OR 14.92, 95% CI 4.50–49.62). IDU who reported sharing containers for storing injection equipment were more likely to be HCV-exposed (OR 3.67, 95% CI 1.60–8.42). Infection with HCV, HBV, or HIV was associated with co-infection with the other two viruses in bivariate analyses (HCV & HBV, OR 1.89, 95% CI 1.56–2.30; HCV & HIV, OR 3.65, 95% CI 1.11–11.97; and HBV & HIV, OR 28.21, 95% CI 3.06–260.03). In addition, participants who reported longer durations of imprisonment (OR 1.01 per month, 95% CI 1.00–1.03), “kerack” use (OR 5.18, 95% CI 1.58–17.01), and dental procedures (OR 3.50, 95% CI 1.15–10.63) were more likely to be HIV-infected.

DISCUSSION

In this study of male IDU in Arak, an urban area in central Iran, we found very high prevalence of HCV exposure (56%), hepatitis B (6%), and HIV infection (19%). A history of syringe sharing and syringe sharing specifically in prison were commonly reported, and these risk behaviors were associated with all three viral infections in bivariate analyses. Our results are consistent with several prior studies that found sharing blood-contaminated injection equipment to be the most important risk factor associated with HCV infection (Stark, Bienzle, Vonk, & Guggenmoos-Holzmann, 1997; Samuel, Doherty, Bulterys, & Jenison, 2001; Alter & Moyer, 1998; Alter et al., 1999). These findings emphasize the need to expand availability of clean needles through needle exchange programs, including inside Iranian prisons, to minimize ongoing disease transmission.

Also consistent with prior studies, we found that infection with each of these three blood born viruses significantly increased the probability of being exposed to the other two viruses (Xia, Luo, Bai, & Yu, 2008), a finding that reflects their shared underlying transmission routes. Given that 84% in our study were HBV non-immune, many IDU in Iran may acquire HBV sexually or through blood exposure rather than through vertical transmission. Adult vaccination for HBV non-immune IDU will be beneficial for this very high-risk population.

In Iran, previously identified risk factors for HCV include frequency and duration of injection use, initiation of drug use at a young age, sharing needles in prison, a history of incarceration, certain sexual practices, and a history of tattooing (Kheirandish et al., 2009; Sofian et al., 2012; Skoretz, Zaniewski, & Goedhuis, 2004; Amin-Esmaeli, Rahimi-Movaghar, Razaghi, Baghestani, & Jafari, 2012; Kassaian et al., 2012). Duration of drug use and a history of incarceration have also been associated with HBV infection (Amin-Esmaeli, Rahimi-Movaghar, Razaghi, Baghestani, & Jafari, 2012). In our analyses, we found very high prevalence of “kerack” use among participants with HIV. Prior research suggests that differing syringe and equipment sharing patterns between various drugs may explain this finding (Mahanta, Borkakoty, Das, & Challeng, 2009).

The primary limitation of our study is the small sample size, especially for IDU with HIV or HBV. A second limitation of our study is that we only included participants attending methadone maintenance clinics, and these IDU may not be representative of IDU in Arak more generally. Third, although we made an effort to elicit all behavioral data non-judgmentally and confidentially, social desirability bias and fear of lack of confidentiality may have lead to an underreporting of certain risk behaviors. In addition, HCV infection

clears without treatment in 15% to 40% of those exposed (Rockstroh & Spengler, 2004), and consequently, our study may overestimate the percentage of IDU at risk for HCV-related chronic liver disease. Finally, we did not collect data on frequency and duration for risk behaviors such as syringe sharing, and these data may have offered a more nuanced understanding of these risk behaviors.

Nonetheless, our data clearly document an alarming prevalence of HCV, HBV, and HIV, as well as co-infections among IDU in Arak. The large number of men who reported unsafe injection practices in this study highlights an ongoing risk for HCV, HBV, and HIV transmission and emphasizes the need for expansion of public health interventions for this at-risk population. In order to reduce future morbidity and mortality from HCV, HBV, and HIV infection, harm reduction interventions for IDU in secondary urban centers and more rural areas should remain a public health priority in Iran, and these interventions must address the practice of syringe sharing both inside and outside of prison.

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Table 1

Participant characteristics among male injection drug users with HCV (n=56), HBV (n=6), and HIV (n=19) in Arak, Iran, 2012.*

Variable	Overall Participant Characteristics N=100 N (%)	HCV antibody positive N=56 N (%)	HBV surface antigen positive N=6 N (%)	HIV antibody positive N=19 N (%)
Age category (years)				
<25	12 (12%)	4 (7%)	0	1 (5%)
26–35	53 (53%)	28 (50%)	4 (67%)	9 (47%)
36–45	28 (28%)	21 (38%)	2 (33%)	9 (47%)
>46	7 (7%)	3 (5%)	0	0
median (years)	33.3	32.5	32.5	34
Rural resident	9 (9%)	3 (5%)	0	1 (5%)
Urban resident	91 (91%)	53 (95%)	6 (100%)	18 (95%)
Marital status				
Married	33 (33%)	16 (29%)	0	1 (5%)
Never married	51 (51%)	29 (52%)	3 (50%)	10 (53%)
Divorced	14 (14%)	10 (18%)	3 (50%)	7 (37%)
Widowed	2 (2%)	1 (2%)	0	1 (5%)
Education				
Illiterate	1 (1%)	0	0	0
Attended secondary	24 (24%)	14 (25%)	2 (33%)	7 (37%)
Graduated secondary	45 (45%)	23 (41%)	3 (50%)	7 (37%)
Diploma	28 (28%)	18 (32%)	1 (17%)	4 (21%)
Academic degree	2 (2%)	1 (2%)	0	1 (5%)
Currently employed	83 (83%)	48 (86%)	6 (100%)	18 (95%)
History of imprisonment	73 (73%)	46 (82%)	6 (100%)	17 (89%)
Duration of imprisonment				
None	27 (27%)	10 (18%)	0 (0%)	2 (11%)
<1 year	44 (44%)	28 (50%)	2 (33%)	7 (37%)
>1 year	29 (29%)	18 (32%)	4 (67%)	10 (53%)
Reported Drug Use:				
Heroin	93 (93%)	54 (96%)	6 (100%)	18 (95%)
Opium	59 (59%)	38 (68%)	5 (83%)	13 (68%)
Kerack	49 (49%)	32 (57%)	5 (83%)	15 (79%)
Methamphetamines	25 (25%)	15 (27%)	3 (50%)	8 (42%)
Cannabis	22 (22%)	15 (27%)	2 (33%)	4 (21%)
Norgesic – aspirin, caffeine, orphenadrin	9 (9%)	7 (13%)	0	2 (11%)

Variable	Overall Participant Characteristics N=100 N (%)	HCV antibody positive N=56 N (%)	HBV surface antigen positive N=6 N (%)	HIV antibody positive N=19 N (%)
Buprenorphin	5 (5%)	1 (2%)	0	5 (26%)
Age at first injection (years)				
<18	24 (24%)	20 (36%)	5 (83%)	10 (53%)
18–40	75 (75%)	30 (54%)	1 (17%)	6 (32%)
>40	1 (1%)	6 (11%)	0 (0%)	3 (16%)
Any history of syringe sharing	54 (54%)	42 (75%)	6 (100%)	17 (89%)
Syringe sharing in prison	25 (25%)	21 (38%)	5 (83%)	13 (68%)
Sexual behavior				
None	27 (27%)	10 (18%)	0 (0%)	3 (16%)
Sex with women	64 (64%)	39 (70%)	5 (83%)	12 (63%)
Sex with men	1 (1%)	1 (2%)	0 (0%)	1 (5%)
Sex with men and women	8 (8%)	6 (11%)	1 (17%)	3 (16%)
Sex with partner believed to have hepatitis	9 (9%)	8 (14%)	2 (33%)	4 (21%)
Sex with IDU partners	14 (14%)	11 (20%)	3 (50%)	4 (21%)
History of tattooing	78 (78%)	45 (80%)	6 (100%)	15 (79%)
History of surgery	42 (42%)	24 (43%)	4 (67%)	10 (53%)
History of blood transfusion	11 (11%)	4 (7%)	0 (0%)	3 (16%)
Dentistry procedure	50 (50%)	33 (59%)	3 (50%)	14 (74%)
Alcohol consumption	68 (68%)	39 (70%)	6 (100%)	17 (89%)

* Participants with HCV, HBV, and HIV co-infection are included in multiple columns.