Original Article

Prevalence and Correlates of Co-infection with Human Immunodeficiency Virus and Hepatitis C Virus in Male Injection Drug Users in Iran

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Abstract:

Objective: Aim of the study was to evaluate the HIV and hepatitis C virus (HCV) coinfection and associated risk behaviors among Injection Drug Users in Detention, Tehran, Iran.

Methods: A cross-sectional survey included 499 male Injection Drug Users arrested by police during a predetermined police sweep in Tehran (February, 2006). At the temporary detention center, they were screened using a urine test and a physical examination for injection marks. Those who were identified as injectors were sent to the rehabilitation center for 3 months. A questionnaire was filled out for each individual by interview. Blood specimens were collected for HIV and HCV testing.

The variables associated with HIV/HCV coinfection at a significance level of $P<0.10$ were considered in multivariate analysis.

Results: Of the 417 participants, 100 (24.0%) had HIV/HCV coinfection (95%CI 19.9 – 28.4). Factors independently associated with HIV/HCV coinfection included history of using opioid in jail, and age ($P<0.05$).

There were not any association between other demographic characteristics (marital status, birthplace, residence, and education), type and years of drug abuse, age of first injection, years of injection, sharing needles inside and outside of jail, injection in jail, history of tattooing, any sexual behavior, and history of sexually transmitted diseases with HIV/HCV coinfection ($P>0.05$).

Conclusions: This study supports that incarceration is contributing to the increased spread of HIV/HCV coinfection. So, there is urgent need for effective harm reduction programs, particularly among incarcerated Injection Drug Users.

Keywords: coinfection, HIV, HCV, injection drug users, risk factors

Introduction

Hepatitis C virus (HCV) infection has emerged as an important cofactor in the clinical and immunological progression and treatment of HIV infection. Coinfected individuals may have an altered response to antiretroviral treatment (ART) and are at increased risk of ART-related hepatotoxicity. Likewise, response rates to HCV therapy in coinfected individuals are generally 10% to 15% lower than with HCV monoinfection, and therapy may also be complicated by ART drug interactions and significant toxicity.[1,2] In addition, HIV infection appears to increase the persistence of HCV, the level of HCV RNA, the progression of HCV-related liver disease, and end-stage liver disease.[1,3–5] In the post-ART era, HCV is becoming a leading cause of premature death among persons living with HIV/AIDS.[1–3,6–8]

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Due to shared routes of transmission, HIV/HCV coinfection is common, with highest rates of HIV/HCV coinfection being found in regions where injection drug users predominate in the HIV epidemic.[3,9] Of the 33 million people living with HIV/AIDS worldwide, four to five million are co-infected with HCV.[6] A relation between incarceration and transmission of HIV and HCV among IDU in prison has been described.[10–19] Other risk factors that identify HIV and HCV in prisoners are prior imprisonment, tattooing, and sexual behaviors.[11,20, 21]

To date, there are limited data on the prevalence and correlates of HIV/HCV coinfection among IDU in Iran. We therefore conducted a survey of IDU upon detention in Tehran, Iran to measure the prevalence of coinfection and characterize risk factors associated with HIV/HCV. Results will provide public-health information necessary to address this emerging problem and prepare for the resulting future burden of disease.

Materials and Methods

We conducted a cross-sectional survey of male IDU, who were approached consecutively upon detention in Tehran, Iran, to estimate the prevalence of HIV/HCV coinfection and associated risk factors during February, 2006. Participants included men who were arrested by police during a predetermined police sweep in Tehran. Police check points were geographically distributed throughout the city at major intersections in areas of known drug dealing, previous drug-related arrests, and petty crime. Individuals were identified by police based on a drug addiction profile, screened via questioning, and if suspicious, were sent to a temporary detention center. At the temporary detention center they were screened for illegal drugs using a urine test and for injection drug use through physical examination for injection marks by an experienced physician. Those who were identified as injectors were sent to a rehabilitation center for three months for mandatory detoxification.

Upon entry to the rehabilitation center, detainees were offered the option of participating in our study. After providing consent, a questionnaire was completed for each individual via a face-to-face interview by a physician. The questionnaire covered demographic characteristics, imprisonment history, injecting drug practices, and sexual behaviors.

After completion of the interview, blood specimens were collected by a professional phlebotomist for HIV and HCV antibody testing for those who agreed to participate in the blood test. Serological specimens were screened with an enzyme-linked immunosorbent assay for HIV antibodies (Biotest AG, Germany) and confirmed by Western blot (Diagnostic, Germany). Specimens were tested for HCV antibodies (DiaSorin, Spain). We did not conduct HCV RNA testing due to cost constraints. While we recognize HCV antibody seropositivity may not denote current infection, we use the term HIV/HCV coinfection here for simplicity.

The data were entered and analyzed using STATA (version 8.0). Baseline point prevalence estimates and 95% confidence intervals (CI) for HIV/HCV coinfection were calculated as the number of confirmed HIV/HCV coinfected individuals divided by the number with confirmed negative or positive test results within each group. Bivariate logistic regression analysis was used to identify potential correlates of coinfection. Variables associated with coinfection at the $P<0.10$ level were included as candidates in multivariate logistic regression analysis and retained in the final model if $P<0.05$.

Recognizing the special vulnerability of incarcerated persons, participation was voluntary and no incentives or special privileges were given. Information was kept confidential and separate from jail health and criminal justice records, and referrals to care were done through the Tehran University Medical Sciences Clinical Services. Informed consent was obtained and the Institutional Review Board of Tehran University of Medical Sciences reviewed and approved the study protocol.

Results

A total of 499 male IDU were detained by the police. Of these, 417 (83.6%) agreed to participate in the study, and completed the questionnaire and HIV/HCV blood tests. HIV and HCV prevalence were 24.4% (95%CI 20.5 – 28.6), and 80% (95%CI 76.2 – 83.6), respectively. Of the 417 participants, 100 (24.0%, 95%CI 19.9 – 28.4) tested positive for HIV and HCV antibodies. The figure translates to 89.3% of HIV-positive IDU in the survey (100 out of 112 HIV-positives). Demographic characteristics and

Table 1. Characteristics, behaviors, and co-infection prevalence among injection drug users upon detention, Tehran, Iran, 2006

Variable	*n*[1](%)	Coinfection (*n*)	Co-infection prevalence % (95%CI)
Total	417 (100)	100	24.0 (19.9–28.4)
Age group[2]			
17 – 24 yrs	58 (14.3)	5	8.6 (2.9–19.0)
25 – 34 yrs	213 (52.6)	52	24.4 (18.8–30.7)
35 – 44 yrs	93 (23.0)	25	26.9 (18.2–37.1)
≥45 yrs	41 (10.1)	15	36.6 (22.1–53.1)
Marital status[3]			
Single	154 (38.0)	28	18.2 (12.4–25.2)
Married	159 (39.3)	42	26.4 (19.7–34.0)
Divorced	89 (22.0)	27	30.3 (21.0–41.0)
Widowed	3 (0.7)	0	0.0 (0.0–70.8)[4]
Education level			
Illiterate	28 (7.0)	8	28.6 (13.2–48.7)
Did not complete high school	300 (74.6)	76	25.3 (20.5–30.6)
Completed high school or higher	74 (18.4)	12	16.2 (7.6–24.8)
Drugs reported having ever used (local name)			
Opium (taryak)	331 (79.4)	81	24.5 (19.9–29.5)
Boiled opium resin (shireh)	92 (22.1)	24	26.1 (17.5–36.3)
Opium resin (sookhteh)	75 (18.0)	18	24.0 (14.9–35.2)
Heroin	311 (74.6)	78	25.1 (20.4–30.3)
"Crack" (purer form of heroin)	66 (15.8)	13	19.7 (10.9–31.3)
Hashish	121 (29.0)	25	20.7 (13.8–29.0)
Bupenorphine (norgeezak)	404 (96.9)	96	23.8 (19.7–28.2)
Bupenorphine + steroids (afzoor)	9 (2.2)	1	11.1 (0.3–48.2)
Methamphetamine (crystal)	17 (4.1)	3	17.6 (3.8–43.4)
Morphine	10 (2.4)	3	30.0 (6.7–65.2)
Other drug	58 (13.9)	11	19.0 (9.9–31.4)
Reported ever sharing needles	51 (12.2)	14	27.4 (15.9–41.7)
Reported ever sharing equipment	110 (26.4)	30	27.3 (19.2–36.6)
Reported ever sharing needles or equipment	113 (27.1)	30	26.5 (18.7–35.7)
History of tattooing[3]	111 (26.6)	34	17.6 (3.8–43.4)
Reported past history of incarceration[5]	311 (74.6)	83	26.7 (21.8–32.0)
Reported history of using an opioid in jail[2]	80 (19.2)	32	40.0 (29.2–51.6)
Reported history of injection in jail	27 (6.5)	10	37.0 (19.4–57.6)
Reported past access to new syringes in jail	284 (68.1)	66	23.2 (18.4–28.6)
Reported ever having sex[3]	318 (76.3)	84	26.4 (21.6–31.6)
Reported sex only with wife	305 (73.1)	77	25.2 (20.5–30.5)
Reported sex with commercial sex worker	101 (24.2)	26	25.7 (17.6–35.4)
Reported history of male-male sex	22 (5.3)	7	31.8 (13.9–54.9)
Reported history of male-male sex in jail	24 (5.8)	8	33.3 (15.6–55.3)
Reported history of sex in jail	21 (5.0)	8	38.1 (18.1–61.6)
Reported history of genital discharge	34 (8.1)	9	26.5 (12.9–44.4)
Reported history of STD	31 (7.4)	7	22.6 (9.6–41.1)

[1]Subgroups do not always add up to total due to missing data. [2]$P<0.01$, [3]$P<0.10$, [4]One-sided 97.5%CI, [5]$P=0.03$.

Table 2. Independent associations of prevalent coinfection among injection drug users upon detention, Tehran, Iran, 2006

Model	Adjusted OR (95%CI)	*P*-value
Reported history of using opioid in jail	2.66 (1.56–4.54)	0.001
Age group		
17–24 yr	—	referent
25–34 yr	3.60 (1.35–9.60)	0.010
35–44 yr	3.89 (1.38–10.96)	0.010
≥45 yr	5.94 (1.92–18.42)	0.002

risk behaviors of detained IDU are described in Table 1 along with corresponding prevalence of HIV/HCV co-infection. At the $P<0.10$ level, HIV/HCV coinfection was associated with older age, being divorced, tattoos, past incarceration, opioid use in jail, and ever having sex. We did not detect associations between HIV/HCV coinfection and other demographic characteristics, type of drugs used, injection practices, history of sexually transmitted disease, or other sexual behaviors. In multivariate logistic regression analysis (Table 2), history of opioid use in jail and age remained significant, independent predictors of HIV/HCV coinfection.

Discussion

We document that approximately nine out of ten HIV-positive IDU and one in four of all IDU in Tehran may be coinfected with HCV. These estimates are much higher than observed in other developing and middle-income countries and comparable to levels in developed nations with mature HIV epidemics among IDU. For example, in a study among IDUs in Shiraz, southern Iran, 80.1%, and 1.2% were positive for anti-HCV, and HIV, respectively.[22] In another study among IDU at Loghman Hakim Hospital, Tehran, 36% and 30% were positive for anti-HCV, anti-HIV, respectively.[23] Our level of HCV/HIV coinfection is higher than that measured in Kenya (1%),[24] Brazil (10%),[25] Argentina (12%),[16] and Mozambique (16%),[25] while comparable to those among HIV-positive IDU measured in ten European cities (80%), Italy (90%), and India (86%).[9,14,26] The increasing prevalence by age in our survey also suggests that the numbers of coinfections will accumulate over time as the currently very young population of Iran ages.

In this study, the history of opioid use while in jail was strongly associated with co-infection. As described in other studies, incarceration can lead to increased sharing of injection equipment due to the scarcity of clean needles and syringes.[27,28] Added to this situation, the incarceration of non-injecting opioid users can precipitate their change to injection as smoking opium in jails is difficult to conceal. Thus, incarceration may accelerate HCV transmission among IDU and among previously non-injecting drug users. The lack of finding an association of co-infection with specific practices of sharing equipment may be the result of under-reporting due to social desirability response bias. Acknowledging opioid use while in jail may be a more easily admitted behavior than the sharing of equipment. While HCV transmission through sex is possible,[29] a lack of observed associations in our study may be due to lower transmission efficiency through sex or to lower admission to the highly stigmatized and illegal behaviors of male-male sex and sex outside of marriage.[30]

In addition to potential under-reporting of illegal behaviors in the jail setting, we acknowledge other potential biases and limitations. Without RNA testing for HCV, we are likely over-estimating the prevalence of current coinfection. Other limitations include not knowing the timing of infection in relation to the reported risk behaviors and to incarceration, and the representativeness of our sample to the wider IDU population of Tehran. It may be the case, for example, that IDU from a higher socioeconomic status are under-represented due to the locations and nature of the police sweeps. Finally, a major limitation is that our sample did not include female IDU, a population very difficult to sample in the Middle East.

Despite these potential limitations, our data connect the final points of a worrisome emerging public health problem. Iran has the highest per capita opioid use in the world, increasing numbers of injectors,[28] increasing prevalence of HIV among IDU,[31] high rates of incarceration of IDU,[32] and, within our study, incarceration associated with HIV/HCV coinfection, with one in four incarcerated IDU already coinfected and increasing prevalence with age. These ingredients predict an enormous morbidity and mortality in the near to intermediate term unless met with rapid scale-up of harm reduction, treatment programs outside and inside detention, and, with the consensus among Iranian health officials, assent of policy makers and society, as well as less incarceration of drug users.

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