۳۰ درصد تخفیف نوروزی ویژه کارگاه‌ها و فیلم‌های آموزشی

اصول تنظیم قراردادها

پروپوزال نویسی

آموزش مهارت های کاربردی در تدوین و چاپ مقاله

بش
Factors Correlated With Hepatitis C and B Virus Infections Among Injecting Drug Users in Tehran, IR Iran

Masoumeh Amin-Esmaeili 1, Afarin Rahimi-Movaghar 1*, Emran M. Razaghi 2, Ahmad Reza Baghestani 1, Siavash Jafari 4

1 Iranian Research Center for HIV/AIDS, Tehran University of Medical Sciences, Tehran, IR Iran
2 Psychiatry Department, Tehran University of Medical Sciences, Tehran, IR Iran
3 Islamic Azad University, South Tehran Branch, Tehran, IR Iran
4 Faculty of Medicine, School of Population and Public Health, The University of British Columbia, Vancouver, Canada

THEIMPACT OF COVID-19 ON INFLUENZA VACCINATION IN A COMMUNITY-ORIENTED PRIMARY CARE CLINIC

ARTICLE INFO

Article type:
Original Article

Article history:
Received: 09 Oct 2011
Revised: 07 Dec 2011
Accepted: 03 Jan 2012

Keywords:
Hepatitis Viruses
Prevalence
Risk Factors
Risk Behavior
Iran

ABSTRACT

Background: In Iran, the number of injecting drug users (IDUs) has increased in recent years. The rates of hepatitis C virus (HCV) and hepatitis B virus (HBV) infections among IDUs are reportedly high.

Objectives: The purpose of this study was to assess factors correlated with HCV and HBV infections among IDUs in Tehran.

Patients and Methods: A cross-sectional study included 899 IDUs recruited from the community, drug treatment centers, and drop-in-centers. The study involved interviews conducted using an adapted version of the WHO Drug Injection Study Phase II (Version 2b) questionnaire and blood testing for the HCV antibody, hepatitis B surface antigen, and hepatitis B core antibody. A logistic regression model was used to identify independent factors correlated with HCV and HBV infections.

Results: HCV infection was found to be primarily associated with female gender [odds ratio (OR) 5.0, 95% confidence interval (CI) 2.0–10.0], unmarried status (OR 2.9, 95% CI 1.9–4.4), drug use for more than 10 years (OR 2.7, 95% CI 1.8–3.9), drug injection frequency of more than once per day (OR 2.6, 95% CI 1.6–4.2), history of imprisonment (OR 2.5, 95% CI 1.6–4.0), and a history of shared injection needles in prison (OR 2.3, 95% CI 1.5–3.6). HBV infection was mainly correlated with a history of imprisonment (OR 1.9, 95% CI 1.4–2.7) and drug use for more than 10 years (OR 1.4, 95% CI 1.1–1.9).

Conclusions: Because a considerable number of IDUs in Iran are receiving reduction services, tailoring services for prevention of hepatitis infection are necessary.

Implication for health policy/practice/research/medical education:
This article presents that IDUs are highly at risk of hepatitis B and C virus infections. This has an important implication for those who are involved in planning for providing harm reduction services, especially in prison settings.

Please cite this paper as:
Amin-Esmaeili M, Rahimi-Movaghar A, Razaghi EM, Baghestani AR, Jafari S. Factors Correlated With Hepatitis C and B Virus Infections Among Injecting Drug Users in Tehran, IR Iran. Hepat Mon. 2012; 23-31. DOI: 10.5812/kowsar.1735143X.806

Copyright © 2012 Kowsar M. P. Co. All rights reserved.

1. Background

For decades, Iran was facing a high rate of opium use, as a producer country. Thirty years after total eradication of opium poppy cultivation, Iran is experiencing a rapid shift towards more severe patterns of drug use. In 1999, it was estimated that 166,000 injecting drug users (IDUs) live in Iran (1). Currently, it is estimated that there are more than 260,000 IDUs in the country (2). To address
this sharp increase in injection drug use and its health-related consequences, harm-reduction initiatives were started in 2002 and have expanded since 2005. Hepatitis C virus (HCV) is a major cause of chronic liver disease worldwide and a potential contributor to morbidity and mortality (3). In Iran, the prevalence of HCV infection in the general population has been estimated to be less than 1% (4); this is significantly less than the estimated prevalence in the world population (3%) (5). Since initiation of routine screening for HCV in donated blood, transfusions have virtually been eliminated as a source of HCV transmission. Therefore, most newly acquired cases of hepatitis C are related to injecting drug use, mainly due to unsafe injection practices (6-8). The prevalence of hepatitis B virus (HBV) infection in the general population of Iran ranges from 1.7% to 5% (9), which is in an intermediate range of endemicity (10). In a review, Custer et al. found that the prevalence of chronic HBV infection in the general population was highly variable, ranging from greater than 10% in some Asian and Western Pacific countries to less than 0.5% in the United States and northern European countries (11). Additionally, injecting drug use was identified as a risk factor for hepatitis B in many countries (11).

2. Objectives

High rates of HCV and HBV infections among IDUs have been reported in Iran (12-14). Few studies have evaluated the risk factors related to these rates. This study is a part of a larger study examining the characteristics, risk behaviors, and risk factors of hepatitis C, hepatitis B, and human immunodeficiency virus (HIV) infections among IDUs in Tehran, the capital city of Iran. This paper presents the results related to the prevalence of HCV and HBV infections and the correlating factors in this population.

3. Patients and Methods

3.1. Population and Field Work

This cross-sectional study was conducted between June 2006 and March 2007 and involved 904 current IDUs selected from drug treatment centers and the community. Drug users were included in the study if they had a history of injecting drug use over the 2-month period prior to the study and consented to participate in the interviews. Using purposive sampling with ethnographic observations in public places, peer referrals, and assessments of snowballing effects, a community sample population was selected from five areas of Tehran with high rates of drug use. Another sample population was selected from three drug-treatment centers and two drop-in-centers (DICs) located in different, well-known areas of Tehran with high rates of drug use. Treatment centers provide methadone maintenance treatment (MMT), and DICs mainly provide other types of harm-reduction interventions, including needle and syringe programs (NSP) and harm-reduction education. Cases were selected based on consecutive admissions to the centers during the study time period. We used the questionnaire of the “WHO Drug Injection Study Phase II (Version 2b)” for data collection. Three psychiatrists adapted the questionnaire according to the situation in Iran, which was followed by a pretest assessment on a sample of IDUs. The questionnaire included assessments of socio-demographic characteristics, drug use and injecting drug use practices, sexual risk behaviors, knowledge regarding hepatitis infection, and service use.

Fieldwork, including interviews and blood sampling, was carried out by experienced drug therapists and outreach workers after a short training course that included questionnaire training and instructions on transferring blood samples to the laboratory. There was no monetary incentive for participation in this study. However, the use of free-of-charge health services, including drug treatment, was offered as an incentive.

3.2. Blood Sample

Blood samples were tested for the HCV antibody (anti-HCV ELISA, DRG Co., Germany), hepatitis B surface antigen (HBsAg IEMA WELL, Radim, Italy), and hepatitis B core antibody (anti-HBc EIA WELL, Radim, Italy). A positive result either for HBsAg or anti-HBc was considered to indicate “past or current HBV infection.” All positive and borderline-positive samples for HBsAg, anti-HBc, and anti-HCV were retested using the same method. We excluded samples that repeatedly showed borderline-positive results. All tests were conducted at the Keyvan Laboratory.

3.3. Statistical Analysis

Statistical analyses were performed using SPSS for Windows (version 16.0, 2007; SPSS Inc., Chicago, IL, USA). Univariate analysis was conducted using chi-square test for binomial variables. All variables were included in the multivariable analysis. A multivariate logistic regression model using a forward conditional method was used to identify independent correlates of HCV and HBV infections. Associations were assessed using the odds ratios and 95% confidence intervals, and adjusted odds ratios were determined through multivariate analysis.

3.4. Ethical Considerations

The research protocol was approved by the ethics committee of Tehran University of Medical Sciences in Iran. Participation in the study was on a voluntary basis, and informed consent was obtained for the interview as well as for collecting blood samples. All efforts were made to guarantee privacy and confidentiality during the interviews. A de-linked method for testing was carried out to ensure confidentiality of the results. An identification code, which was used for laboratory results as well, was included on each questionnaire. Participants were ensured that non-participation in the study would not affect their treatment or harm-reduction service utilization.
4. Results

A total of 904 IDUs were enrolled in the study. Most of the participants (95.8%) were male. Participant ages ranged from 16 to 65 years, with a mean age [standard deviation (SD)] of 33.9 (9.4) years. The mean (SD) years of education was 7.7 (3.5) years. Most subjects were unmarried (70.8%) and unemployed (64.1%). Socio-demographic profiles of participants recruited from drug treatment centers, DICs, and the community are presented in Table 1. The mean (SD) age at first drug use was 19.7 (4.0) years. The main injected drug used within the last 6 months was heroin (81.3%), and the mean (SD) duration of drug injection was 8.4 (7.6) years. Most participants (76.6%) reported injecting with used injection equipment, including needles and syringes, or sharing other injection paraphernalia within the last six months. Among the participants, 70.9% had a history of imprisonment, and 21.5% of these had a history of sharing injection equipment in prison.

With regard to sexual behavior, 36.4% of the participants reported an extramarital relationship (either heterosexual or homosexual) within the last 6 months, and of these, 80% had a history of intercourse without protection during the same period. An extramarital relationship without protection was defined as "high-risk sexual behavior." Five of the interviewees refused to participate in blood testing. In the HCV antibody testing, four samples showed repeated borderline results. Of the remaining 895 participants, 34.5% (CI 31.4–37.7%) tested positive for HCV. In univariate analysis, several variables were identified as factors correlated with transmission of hepatitis C among the participants. Recruitment from DICs and the community, older age, unmarried status, homelessness and living alone, history of imprisonment and unsafe sharing practices in prison, initiation of drug use at a young age, longer duration of drug use and duration of injecting drug use, more frequent injecting drug use, history of overdose, and recent use of harm-reduction services were associated with a higher prevalence of HCV infection (Table 2).

Multivariate logistic regression analysis revealed that the following independent factors were associated with HCV infection: recruitment from DICs and the community, female gender, unmarried status, longer duration of drug use, injection frequency of more than once per day, history of imprisonment and history of shared injection in prison, and use of a harm-reduction service during the past six months. The analysis also showed that sharing injection paraphernalia during the past six months was reversely associated with HCV infection (Table 2). Further analysis showed that among participants who had used harm-reduction services in the past six months, the rate of recent sharing behavior was less than those who had not used the services (73.2% vs. 79.9%, P < 0.02). HBV testing showed borderline results or insufficient samples in 35 (3.5%) cases, which were excluded from the analysis. Of the 864 remaining subjects, 40 cases showing a weak positive result for HBsAg and negative results for anti-HBc were regarded as negative cases. HbsAg was detected in 24.7% and anti-HBc in 29.1% of the 864 cases. Overall, 46.1% of cases showed either past or current HBV infection. Multivariate analysis revealed older age, history of imprisonment, longer duration and more frequent drug use, history of drug overdose, and recent drug-treatment service use as risk factors for HBV infection among IDUs. Multivariate logistic regression analysis showed that history of imprisonment and a longer duration of drug use were independently correlated with HBV infection (Table 2).

5. Discussion

In this study, we investigated the factors correlated with the transmission of HCV and HBV among IDUs in Tehran, the capital city of Iran. This is the largest study evaluating HCV and HBV infections and their correlated factors among IDUs in Iran. Only one study, which was conducted in 2004, has assessed the factors correlated with HCV infection among 202 non-incarcerated male IDUs in Tehran (13).

5.1. Prevalence of Hepatitis C in IDUs

We found that the prevalence of HCV was 34.5% in the sample IDU population. Among studies with a minimum sample size of 100, there have been three studies examin-

## Table 1. Socio-Demographic Profile of the Study Sample in Three Different Settings

| Gender                        | Drug Treatment Center (n = 158) | DICs * (n = 290) | Community (n = 446) |
|-------------------------------|--------------------------------|-----------------|--------------------|
| Female                        | 1                              | 1               | 1                  |
| Male                          | 20                             | 20              | 25                 |
| Age, y, mean ± SD             | 34.2 ± 9.4                     | 34.2 ± 9.8      | 33.5 ± 9.2         |
| Full-time education, y, mean ± SD | 8.0 ± 3.7               | 8.2 ± 3.3       | 7.3 ± 1.5          |
| Single; widowed; or separated, % | 47.8                          | 71.2            | 78.7               |
| Homeless, %                   | 5.8                            | 30.1            | 56.4               |
| Living alone, %               | 14.5                           | 34.7            | 56.2               |
| Unemployed, %                 | 26.9                           | 67.2            | 75.6               |
| History of imprisonment, %    | 38.6                           | 75.9            | 78.8               |

* Abbreviation: DICs, drop-in centers
|                          | HCV Infection |                  |                  | HBV Infection |                  |                  |
|--------------------------|---------------|------------------|------------------|---------------|------------------|------------------|
| Patients, No.            | 158           | 17(10.8)         | 1                | 152           | 74(48.7)         | 1                |
| HCV (+), No. (%)         | 17            | (10.8)           |                  | 152           | 74(48.7)         | 1                |
| OR (95% CI)              | 1             |                  |                  | 1             |                  |                  |
| AOR (95% CI)             | 1             |                  |                  | 1             |                  |                  |
| Gender                   |               |                  |                  |               |                  |                  |
| Female                   | 36            | 16(44.4)         | 1                | 37            | 13(35.1)         | 1                |
| Male                     | 859           | 293(34.1)        | 0.6(0.3-13)      | 827           | 385(46.6)        | 1.6(0.8-3.2)     |
| Age, y                   |               |                  |                  |               |                  |                  |
| ≤ 35                     | 561           | 161(28.7)        | 1                | 545           | 234(42.9)        | 1                |
| > 35                     | 332           | 146(44)          | 2.0(1.5-2.6)     | 317           | 163(51.4)        | 1.4(1.1-2.0)     |
| Education                |               |                  |                  |               |                  |                  |
| ≤ Grade 8                | 475           | 168(35.4)        | 1                | 456           | 224(49.1)        | 1                |
| > Grade 8                | 414           | 138(33.3)        | 0.9(0.7-12)      | 402           | 173(43.0)        | 0.8(0.6-1.03)    |
| Marital status           |               |                  |                  |               |                  |                  |
| Married and living with a partner | 264       | 62(32.5)         | 1                | 252           | 111(44.0)        | 1                |
| Single, widowed, or separated | 631      | 247(39.1)        | 2.1(1.5-2.9)     | 612           | 287(46.9)        | 1.1(0.8-1.5)     |
| Main place of residence during last 6 months |               |                  |                  |               |                  |                  |
| Have a place to live     | 514           | 174(32.2)        | 1                | 521           | 247(47.4)        | 1                |
| Homeless                 | 343           | 138(38.8)        | 1.3(1.01-1.8)    | 334           | 149(44.6)        | 0.9(0.7-1.2)     |
| Living alone             |               |                  |                  |               |                  |                  |
| No                       | 520           | 166(31.9)        | 1                | 501           | 244(48.7)        | 1                |
| Yes                      | 368           | 141(38.3)        | 1.3(1.0-1.8)     | 356           | 152(42.7)        | 0.8(0.6-1.03)    |
| Current employment status|               |                  |                  |               |                  |                  |
| Employed                 | 37            | 97(30.6)         | 1                | 305           | 153(50.2)        | 1                |
| Unemployed               | 566           | 207(36.6)        | 1.3(0.98-1.8)    | 547           | 241(44.1)        | 0.8(0.6-1.04)    |
| History of imprisonment  |               |                  |                  |               |                  |                  |
| No                       | 259           | 38(14.7)         | 1                | 252           | 94(37.3)         | 1                |
| Yes                      | 631           | 268(42.5)        | 4.3(2.9-6.3)     | 607           | 302(49.8)        | 1.7(1.2-2.2)     |
| Age of first drug use, y |               |                  |                  |               |                  |                  |
| ≤ 20                     | 583           | 217(37.2)        | 1                | 560           | 269(48.0)        | 1                |
| > 20                     | 311           | 92(29.6)         | 0.7(0.5-0.95)    | 303           | 128(42.2)        | 0.8(0.6-1.05)    |
| Duration of drug use, y  |               |                  |                  |               |                  |                  |
| ≤ 10                     | 344           | 75(21.8)         | 1                | 331           | 128(38.7)        | 1                |
| > 10                     | 542           | 231(42.6)        | 2.7(1.96-3.6)    | 525           | 265(50.5)        | 1.6(1.2-2.1)     |
### Duration of injecting drug use, y

|          | ≤ 2 | > 2 |
|----------|-----|-----|
|          | 223 | 660 |
|          | 41 (18.4) | 264 (40) |
|          | 1 (0.44) | 2.96 (2.04-4.3) |
|          | - | 635 |
|          | 218 | 304 (47.9) |
|          | 1 (0.99-19) | - |

### Frequency of injection during last 6 months

|          | ≤ once daily | > once daily |
|----------|-------------|--------------|
|          | 210         | 684          |
|          | 42 (20)     | 266 (38.9)   |
|          | 1 (0.51-1.7) | 2.6 (1.6-4.2) |
|          | 209         | 654          |
|          | 80 (45.5)   | 307 (48.5)   |
|          | 1 (1.1-2.1) | -            |

### Sharing needle/syringes during last 6 months

|          | No | Yes |
|----------|----|-----|
|          | 325 | 566  |
|          | 104 (32) | 204 (36) |
|          | 1 (0.54-1.2) | 1.2 (0.9-1.6) |
|          | 315 | 545  |
|          | 137 (43.5) | 261 (47.9) |
|          | 1 (0.9-1.6) | -          |

### Any sharing behavior during last 6 months

|          | No | Yes |
|----------|----|-----|
|          | 212 | 683  |
|          | 64 (30.2) | 245 (35.9) |
|          | 1 (0.9-1.6) | 1.3 (0.9-1.8) |
|          | 208 | 656  |
|          | 87 (41.8) | 311 (47.4) |
|          | 1 (0.9-1.7) | -          |

### History of sharing injection in the prison

|          | No | Yes |
|----------|----|-----|
|          | 759 | 136  |
|          | 236 (31.1) | 73 (53.7) |
|          | 1 (0.8-1.4) | 2.57 (1.8-3.7) |
|          | 735 | 129  |
|          | 330 (44.9) | 68 (52.7) |
|          | 1 (0.9-2.0) | -          |

### Injection with pre-filled syringe during last 6 months

|          | No | Yes |
|----------|----|-----|
|          | 693 | 200  |
|          | 241 (34.8) | 68 (34) |
|          | 1 (0.7-1.4) | 0.97 (0.7-1.4) |
|          | 665 | 197  |
|          | 300 (45.1) | 98 (49.7) |
|          | 1 (0.9-1.7) | -          |

### High risk sexual behavior during last 6 months

|          | No | Yes |
|----------|----|-----|
|          | 634 | 261  |
|          | 217 (34.2) | 92 (35.2) |
|          | 1 (0.8-1.4) | 1.1 (0.8-1.4) |
|          | 609 | 255  |
|          | 285 (46.8) | 103 (44.3) |
|          | 1 (0.7-1.2) | 0.9 (0.7-1.2) |

### History of drug overdose

|          | Yes | No |
|----------|-----|----|
|          | 394 | 493  |
|          | 163 (41.4) | 141 (28.6) |
|          | 1 (1.3-2.3) | 1.8 (1.3-2.3) |
|          | 480 | 376  |
|          | 199 (41.5) | 195 (51.9) |
|          | 1 (1.2-2.0) | 1.5 (1.2-2.0) |

### Naming hepatitis C

|          | Yes | No |
|----------|-----|----|
|          | 475 | 413  |
|          | 174 (36.6) | 134 (32.4) |
|          | 1.2 (0.9-1.6) | 1 (0.8-1.4) |
|          | 540 | 318  |
|          | 247 (45.7) | 149 (46.9) |
|          | 0.9 (0.7-1.3) | 1 (0.7-1.3) |

### Used any harm reduction service during last 6 months

|          | No | Yes |
|----------|----|-----|
|          | 432 | 463  |
|          | 129 (29.9) | 180 (38.9) |
|          | 1 (1.1-2.0) | 1.5 (1.02-2.1) |
|          | 414 | 449  |
|          | 195 (47.1) | 203 (45.2) |
|          | 1 (0.9-1.2) | 0.9 (0.7-1.2) |

### Used any drug treatment service during last 6 months

|          | No | Yes |
|----------|----|-----|
|          | 204 | 691  |
|          | 60 (29.4) | 249 (36) |
|          | 1 (1.4-0.96-1.9) | -          |
|          | 200 | 663  |
|          | 73 (36.5) | 325 (48.9) |
|          | 1 (1.2-2.3) | -          |

---

Abbreviations: AOR; adjusted odds ratio, CI; confidence interval, OR; odds ratio
ing non-incarcerated IDUs in Iran; in these studies, the prevalence of HCV infections was 11.2% (12), 30.5% (14), and 52% (13). Among incarcerated IDUs, reported HCV prevalence rates are higher, ranging from 31.5% to 81.8% (14-18). HCV prevalence among non-incarcerated IDUs has also been reported in neighboring countries. In Afghanistan, the prevalence of HCV is reportedly 36.6% in the capital city of Kabul (19); Pakistan reported higher rates, ranging from 88% to 94.3% (20-22). In a recent report, the HCV prevalence among IDUs in South and Southeast Asia ranged from 10 to 100% (23). Our study showed a medium HCV prevalence rate among non-incarcerated IDUs.

5.2. Variables Correlated With Hepatitis C

Our findings indicate that HCV infection is associated with female gender, a history of imprisonment and shared injection in prison, drug injection frequency of more than once per day, drug use for more than 10 years, and unmarried status. A key finding of this study is the association between gender and the risk of hepatitis C transmission. A similar finding has been reported in England, in which female gender was identified as a risk factor for HCV infection (24). Other studies have not identified such a relationship (25, 26). Several social and demographic factors may predispose female drug users to acquiring blood-borne infections. A lack of gender-specific services in communities, stigma, financial dependence on a partner, and partner pressure (27, 28) have been identified in other studies in Iran as limiting factors for female drug users' access to and utilization of treatment and prevention resources. Involvement in high-risk behaviors such as sex-for-money and sex-for-drugs have been reported as well. Similar to our study, other studies have reported imprisonment as a major risk factor for hepatitis C transmission in Iran and around the world. In Iran, the duration of incarceration (> 1 year) was previously identified as a risk factor (13). These findings are consistent with studies conducted in Western countries that identified history of imprisonment, including duration and/or number of incarcerations, as factors associated with HCV seroconversion (29-31). Our study indicated that approximately 70% of participants had a history of imprisonment, of which more than one-fifth shared needles while in prison. Since 2005, harm-reduction interventions inside Iranian prisons have been expanded; however, only one qualitative study has reported a significant decrease in injection drug use in one prison (32).

We found that drug injection frequency of more than once per day and drug use duration of more than 10 years were associated with high rates of HCV infection. Duration of injection drug use (> 10 years) has been reported as a risk factor in another study in Iran (13). These findings are consistent with the results reported in other countries (22, 25, 29, 33, 34). However, we found an HCV seroprevalence of 18.2% among IDUs who had been injecting drugs for less than two years. This finding indicates a more rapid rate of infection and suggests that infection occurs shortly after the initiation of injection practices. Other reports have also reported a rapid increase in HCV infection upon initiation of drug injection (35-38). The high prevalence of hepatitis C infection among IDUs participating in high-risk behaviors such as needle sharing make unsafe injection the primary cause of hepatitis C transmission in developed countries (5, 34). Studies conducted in countries in this region, such as Pakistan (39) and Georgia (40), have reported unsafe injection to be the main cause of hepatitis C transmission among their populations. However, a meta-analysis of the factors correlated with HCV in China showed no significant difference between needle-sharing IDUs and non-needle-sharing IDUs (25). In our study, sharing behavior during the last six months was reversely associated with HCV infection. This result, along with the finding of no relationship between HCV infection and knowledge of hepatitis C infection, suggests that the knowledge and behavior of IDUs with a long history of drug use and injecting drug use have improved. This also correlates with the finding that HCV infection is more prevalent among IDUs who used harm-reduction services during the last six months than among those who had not used the services.

In this study, no association was identified between recent high-risk sexual behavior and hepatitis C infection. Other studies also found HCV infection to be unrelated to sexual practices (26, 33, 35, 40, 41), confirming that hepatitis C among IDUs appears to be a consequence of repeated exposure to contaminated injection equipment.

5.3. Prevalence of Hepatitis B Among IDUs

The prevalence of past or current HBV infection was 46.1% in the study population. In another study examining incarcerated IDUs in Tehran, HBsAg was detected in 61.2% of the participants (42). Among studies with a minimum sample size of 100, only one study examining non-incarcerated IDUs was conducted in Iran, which reported a positive HBsAg result in 6% of the cases (12). The reported rates of IDUs in Kabul (6.5%) (19) and Karachi (7.5%) (20) are also relatively low. Injecting drug use is reportedly the primary risk behavior in new cases of hepatitis B in males in Egypt (43). There are also reports of a greater than 50% rate of HBV infection among IDUs in other countries (40, 44, 45). However, the high rate of HBV infection found in our study requires further investigation. Notably, in Iran, a national program for hepatitis B vaccination in newborns was begun in 1992; however, no specific vaccination plan for drug users has been established.

5.4. Variables Correlated With Hepatitis B

This is the second study that has explored factors correlated with HBV infection among IDUs in Iran. In our study, HBV infection was mainly correlated with a history of imprisonment and drug use for more than 10 years. These results are consistent with a report from Iran (46)
and reports from other countries regarding risk factors of HBV infection in IDUs that have identified imprisonment (45, 47) and the frequency (48) and duration of drug injection (45, 49) as risk factors of HBV infection.

5.5. Limitations of the Study

Drug use is often a hidden behavior, and drug users are considered a hard-to-reach population. Therefore, selecting a representative sample of drug users in a geographical area is difficult. However, methods that are more representative are recommended, such as respondent-driven sampling or a hybrid sampling plan using several methods (50,51), as was used in our study. Additionally, sampling was conducted such that a higher number of IDUs in Tehran were involved in the study, and the results may not be generalized to the entire Iranian IDU population. Another limitation is that study participants were interviewed regarding their past circumstances and recall bias may be an issue. Additionally, respondents may have been under influence of drugs at the time of interview and may not have provided precise data. This study had a cross-sectional design, and the temporal relationship between correlated factors and HCV and HBV seropositivity cannot be proven.

Blood-borne infections pose a serious threat to the health of injecting drug users. Factors related to hepatitis B and C virus infections appear to be similar among IDUs. The findings explain the reasons behind the high rate of co-infections found in our study and explained elsewhere (52). Since 2005, there have been continuous efforts to increase coverage of harm-reduction interventions in Iran. The intermediate prevalence of hepatitis C infection and the high rate of hepatitis B infection observed in our study highlight the importance of additional studies on the long-term effectiveness of harm-reduction interventions. Reports from other countries have also demonstrated that HIV preventive measures for IDUs are not always effective in controlling viral hepatitis (53). Additionally, prison is a known predisposing environment for HIV transmission in Iran. Our study revealed the importance of prisoners in acquiring HCV and HBV infection, as well. However, as a considerable number of IDUs in Iran are covered under harm-reduction programs, either in the community or in prison (54), these results present a good opportunity to tailor services for hepatitis patients to decrease exposure to contaminated blood as well as risk reduction in sexual behaviors. We also suggest primary prevention of initiating injection drug use in addition to a provision for hepatitis B vaccination and HCV and HBV infection testing for IDUs.

Acknowledgements

The authors gratefully acknowledge the technical support of the WHO phase II Drug Injection Collaborative Study Group in the study design. Dr. Elaheh Sahimi-Izadian managed the field work. Tests were conducted at the Keyvan Laboratory, directed by Dr. Hossein Keyvani with the assistance of Ms. Maryam Llabaf. We also appreciate the cooperation of the directors and staff of the non-profit drug treatment and harm reduction centers, particularly Yaft Abad, Azadi, Bou-Ali, Behrouzan, and Rahajou, as well as all of the IDUs who participated in this study.

Authors’ Contribution

ARM and EMR designed the study and were responsible for the overall study management. ARB and MAE did the analysis. MAE, ARM and SJ prepared the manuscript. All authors contributed to the final version of the manuscript.

Financial Disclosure

The authors have no financial disclosures to report.

Funding/Support

This research was supported by the Research Deputy of Tehran University of Medical Sciences and the World Health Organization (WHO), grant numbers 132/9064 and HO/08/71771, respectively.

References

1. Razzaghi EM, Rahimi-Movaghar A, Hosseini M, Madani S, Chatteeree R. Rapid Situation Assessment of Drug Abuse in Iran Tehran: Iranian Welfare Organization and UNDCP 1999; Available From: www.who.int/cs/disease/hepatitis/hepc.pdf.
2. Rahimi-Movaghar A, Amin-Esmaeili M, Haghdoot AA, Sadeghirad B, Mohraz M. HIV prevalence amongst injecting drug users in Iran: A systematic review of studies conducted during the decade 1998-2007. Int J Drug Policy. 2011 [Epub ahead of print].
3. Shepard CW, Finelli L, Alter MJ. Global epidemiology of hepatitis C virus infection. Lancet Infect Dis. 2005;5(9):558-67.
4. Alavian SM, Adibi P, Zali MR. Hepatitis C virus in Iran: Epidemiology of an emerging infection. Arch Iranian Med. 2005;8(2):84-90.
5. World Health Organization. Hepatitis C. 2002; Available From: www.who.int/cs/disease/hepatitis/hepc.pdf.
6. Dore GJ, Law M, MacDonald M, Kaldor JM. Epidemiology of hepatitis C virus infection in Australia. J Clin Virol. 2003;26(2):137-44.
7. Ontario: Public Health Agency of Canada. Epidemiology of Acute Hepatitis C Infection in Canada Results from the Enhanced Hepatitis Strain Surveillance System (EHSSS), Ottawa, Ontario: 2004 [updated 2010 April 29]; Available From: http://wwphac-aspc.gc.ca/csi/surveillance/hcv-epi-eng.php.
8. Alter MJ. Prevention of spread of hepatitis C. Hepatology. 2002;36(5 Suppl 1):S93-8.
9. Forouzanlar MH, Mohammad K, Majdzaadeh R, Malekzadeh R, Abolhasani F, Mohammadnejad M. [Effectiveness of adolescents' immunization against hepatitis B on burden of the disease in Iran]. Jokim Research J. 2009;9(2):131.
10. World Health Organization. Hepatitis B. WHO. 2002 [updated February 2002]; Available From: www.who.int/cs/disease/hepatitis/whohepcdsscrly20022/en/.
11. Custer B, Sullivan SD, Hazzel TK, Iloeje U, Veenstra DL, Kowdle KV. Global epidemiology of hepatitis B virus. J Clin Gastroenterol. 2004;38(10 Suppl 3):S56-68.
12. Karimi A. Seroprevalence of HBV, HCV and HIV among intravenous drug users in Iran. J Clin Virol. 2006;36(Supplement 2):S210-St.
13. Zamani S, Ichikawa S, Nasiriimaneshe B, Vazirian M, Ichikawa K, Gouya MM, et al. Prevalence and correlates of hepatitis C virus infection among injecting drug users in Tehran. Int J Drug Policy. 2007;18(5):359-63.
14. Mir-Nasser MM, Poustchi H, Nasser-Moghadam S, Nouraie SM,
Correlates of HCV & HBV Infections in IDUs

15. Kheirandish P, Seyedi-Almegh R, Jafari K, Shirzad H, Seyedi Ahmadian M, Majidi A, et al. Prevalence and correlates of hepatitis C infection among male injection drug users in detention, Tehran, Iran. J Urban Health. 2009;86(6):1005-8.

16. Mohammad Alizadeh AH, Alavian SM, Jafari K, Yazdi N. Prevalence of hepatitis C virus infection and its related risk factors in drug abuser prisoners in Hamedan, Iran. World J Gastroenterol. 2005;11(26):4085-9.

17. Rahbar AR, Rooholamini S, Khoshnood K. Prevalence of HIV infection and other blood-borne infections in incarcerated and non-incarcerated injection drug users (IDUs) in Mashhad, Iran. Int J Drug Policy. 2004;15(3):251-5.

18. Zali MR, Aghazadeh R, Nowroozi A, Amir-Rasouly H. Anti-HCV antibody among Iranian IV drug users: is it a serious problem. Arch Iran Med. 2009;12(7):433-5.

19. Todd CS, Abed AM, Strathdee SA, Scott PT, Botros BA, Safi N, et al. Prevalence of antibodies to hepatitis B, hepatitis C, and HIV infection among entrants to Irish prisons: a national cross sectional survey. J Infect Dis. 2007;195(9):1327-31.

20. Araf A, Shah SA, Zaidi NA, Memon A, Nadeem ur R, Wray N. High risk behaviors of injection drug users registered with harm reduction programme in Karachi, Pakistan. Harm Reduct J. 2007;4:7.

21. United Nations Programme on HIV/AIDS (UNAIDS). United Nations Development Programme (UNDP). Baseline study of the relationship between IDU, HIV and Hepatitis C among male IDUs in Lahore. [updated 1999 December]; Available From: http://aidsdatahub.org/en/reference-library/c02/item/1947.

22. Kuo I, al-Hasan S, Galani N, Thomas DL, Zafar T, Ahmed MA, et al. Hepatitis C seroprevalence and HIV drug use risk behaviors among injection drug users in Pakistan. Harm Reduct J. 2006;3:26.

23. Acejas C, Rhodes T. Global estimates of prevalence of HCV infection among drug using groups. Int J Drug Policy. 2007;18(8):352-8.

24. Sweeting MJ, Hope VD, Hickman M, Parry JV, Ncube F, Ramsay ME, et al. Factors Associated with the Initiation of Opium Use in Darab, Iran. Int J Drug Policy. 2006;17(1):35-45.

25. Xia X, Luo J, Bai J, Yu R. Epidemiology of hepatitis C virus infection among injection drug users in China: systematic review and meta-analysis. Public Health. 2008;122(1):190-1032.

26. Wylie J, Shah L, Jolly AM. Demographic, risk behaviour and personal network variables associated with prevalent hepatitis C, hepatitis B, and HIV infection in injection drug users in Winnipeg, Canada. BMC Public Health. 2006;6:239.

27. Razzaghí EM, Movahgar AR, Green TC, Khoshnood K. Profiles of risk: a qualitative study of injecting drug users in Tehran, Iran. Harm Reduct J. 2008;5:32.

28. Jafari S, Movahhagi A, Aghaei K, Barabadi S, Mathias R. Socio-cultural Factors Associated with the Initiation of Opium Use in Darab, Iran. Int J Ment Health Addict. (2009);7:276-88.

29. Long J, Allwright S, Barry J, Reynolds SR, Thornton L, Bradley F, et al. Prevalence of antibodies to hepatitis B, hepatitis C, and HIV and risk factors in entrants to Irish prisons: a national cross sectional survey. BMJ. 2001;323(7292):1209-13.

30. Anon C, del Olmo JA, Lloret F, Serra MA, Gilabert S, Rodríguez F, et al. [The hepatitis C virus among the prison population of Valencian Province]. Rev Esp EnfermDep. 1995;37(7):505-8.

31. Butler TG, Dolan KA, Perton MJ, McGuinness LM, Brown PR, Robertson PW. Hepatitis B and C in New South Wales prisons: prevalence and risk factors. Med Aust. 1997;166(5):127-30.

32. Zamani S, Farma J, Tavakol S, Gholizadeh M, Nazari M, Seddighi AA, et al. A qualitative inquiry into methadone maintenance treatment for opioid-dependent prisoners in Tehran, Iran. Int J Drug Policy. 2010;21(3):167-72.

33. Oliveira MF, Bastos FI, Felles PR, Yoshida CF, Schatzmayr HG, Paetzold U, et al. Prevalence and risk factors for HIV, HCV and HBV in injection drug users from Rio de Janeiro, Brazil. Braz J Med Biol Res. 1999;32(9):1077-84.

34. Villano SA, Vlahov D, Nelson KE, Lyles CM, Cohn S, Thomas DL. Incidence and risk factors for hepatitis C among injection drug users in Baltimore, Maryland. J Clin Microbiol. 1997;35(2):3274-7.

35. Reyes JC, Colon HM, Robles RR, Rios E, Matos TD, Negron J, et al. Prevalence and correlates of hepatitis C virus infection among street-recruited injection drug users in San Juan, Puerto Rico. J Urban Health. 2006;83(6):1005-13.

36. Garten RJ, Lai S, Zhang J, Liu W, Chen J, Vlahv D, et al. Rapid transmission of hepatitis C virus among young injecting heroin lice in Southern China. Int Epidemiol. 2004;33(3):282-8.

37. Thorpe LE, Ouellet LJ, Hershow R, Bailey SI, Williams IT, Williamson J, et al. Risk of hepatitis C virus infection among young adult injection drug users who share injection equipment. Am J Epidemiol. 2002;155(7):545-53.

38. Hahn JA, Page-Shaffer K, Lunn PJ, Bourgeois P, Stein E, Evans JL, et al. Hepatitis C virus seroconversion among young injection drug users: relationships and risks. J Infect Dis. 2002;186(1):558-64.

39. Raja NS, Janjua KA. Epidemiology of hepatitis C virus infection in Pakistan. J Glob Infect Dis. 2010;2(4):1-4.

40. Shapatawa E, Nelson KE, Tettswadze T, del Río C. Risk behaviors and HIV, hepatitis B, and hepatitis C seroprevalence among injection drug users in Georgia. Drug Alcohol Depend. 2006;82(Suppl 1):S35-8.

41. Segurado AC, Braga P, Elzito A, Cardoso MR. Hepatitis C virus coinfection in a cohort of HIV-infected individuals from Santos, Brazil: seroprevalence and associated factors. AIDS Patient Care STDs. 2004;18(11):321-6.

42. Paez Jimenez A, El-Din NS, El-Hoseiny M, El-Daly M, Abdel-Hamid M, El Aidi S, et al. Community transmission of hepatitis B virus in Egypt: results from a case-control study in Greater Cairo. Int J Epidmiol. 2009;38(3):757-65.

43. Tavakoli H, Mir-Nasseri MM, Poustchi H, Afshar P, Motalebis MN, Mohammadkhani A. Prevalence and risk factors of hepatitis B infection in injection drug users, Tehran [2000-2002]. Hepat Mon. 2008;8(1):29-33.

44. Vassilev ZP, Hagan H, Lyubenenova A, Tomov N, Vasiliev G, Krasteva D, et al. Needle exchange use, sexual risk behaviour, and the prevalence of HIV, hepatitis B virus, and hepatitis C virus infections among Bulgarian injection drug users. Int J STD AIDS. 2006;17(9):626-9.

45. Mir-Nasravi MM, Mohammadhkani A, Tavakoli H, Ansari E, Poustchi H. Incarceration is a major risk factor for blood-borne infection among intravenous drug users: Incarceration and blood borne infection among intravenous drug users. Hepat Mon. 2010;6(1):19-22.

46. Mansson AS, Moestrup T, Nordenfelt E, Widell A. Continued transmission of hepatitis B and C viruses, but no transmission of human immunodeficiency virus among intravenous drug users participating in a syringe/needle exchange program. Scand J Infect Dis. 2010;42(2):162-6.

47. Backmund M, Meyer K, Schuetz C, Reimer J. Factors associated with exposure to hepatitis B virus in injection drug users. Drug Alcohol Depend. 2006;84(1):21-9.

48. Mir-Nasravi MM, Mohammadkhani A, Tavakoli H, Ansari E, Poustchi H. Incarceration is a major risk factor for blood-borne infection among intravenous drug users: Incarceration and blood borne infection among intravenous drug users. Hepat Mon. 2010;6(1):19-22.

49. Miller ER, Hellard ME, Bowden S, Bharadwaj M, Aitken CK. Markers and risk factors for HCV, HBV and HIV in a network of injecting drug users in Melbourne, Australia. J Infect Dis. 2009;5(3):375-82.

50. United Nations Programme on HIV/AIDS (UNAIDS). United Nations Development Programme (UNDP). Joint United Nations Programme on HIV/AIDS. UNAIDS report on the global AIDS epidemic. Geneva. [updated 2010 November 23]; Available From: www.unaids.org/documents/20101212_PR_GlobalReport_en.pdf.

51. Kral AH, Malekinejad M, Vaudrey J, Martinez AM, Lorvick J, McFarland W, et al. Comparing respondent-driven sampling and targeted sampling methods of recruiting injection drug users in San Francisco. J Urban Health. 2010;87(5):539-50.

52. Rahimi-Movaghar A, Razaghi EM, Sahimi-Izadi E, Amin-Esmaili M, HIV, hepatitis C virus, and hepatitis B virus co-infections among injecting drug users in Tehran, Iran. Int J Infect Dis. 2010;14(1):e228-33.

53. Hernandez-Aguado I, Ramos-Rincon M, Aminov MJ, Gonzalez-
54. Aracil J, Perez-Hoyos S, de la Hera MG. Measures to reduce HIV infection have not been successful to reduce the prevalence of HCV in intravenous drug users. Eur J Epidemiol. 2001;17(6):539-44.

54. Center for Disease Management; Ministry of Health. Islamic Republic of Iran country report on monitoring of the United Nations General Assembly Special Session (UNGASS) on HIV and AIDS, year 2009. Tehran: 2010 [updated 2010 February]. Available From: http://www.unaids.org/en/dataanalysis/monitoring/countryprogress/2010progressreportssubmittedbycountries/iran_2010_country_progress_report_en.pdf.
30 درصد تخفیف نوروزی ویژه کارگاه‌ها و فیلم‌های آموزشی

اصول تنظیم قراردادها
برویوزال نویسی
آموزش مهارت های کاربردی در تدوین و چاپ مقاله