

## Prevalence and Risk Factors of Hepatitis B Infection in Injection Drug Users, Tehran (2001-2002)

Hamid Tavakkoli <sup>1\*</sup>, Mohammad Mahdi Mir-Nasseri <sup>2</sup>, Hossein Poustchi <sup>2</sup>, Parviz Afshar <sup>3</sup>,  
Mohammad Nabi Motalebi <sup>2</sup>, Ashraf Mohammadkhani <sup>2</sup>, Reza Malekzadeh <sup>2</sup>

<sup>1</sup> Al-Zahra University Hospital, Department of Gastroenterology, Isfahan University of Medical Sciences, Isfahan, Iran

<sup>2</sup> Digestive Disease Research Center, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran

<sup>3</sup> Deputy for Health Correction and Rehabilitation of Iran Prisons, Tehran, Iran

**Background and Aims:** Hepatitis B virus (HBV) infection has a high incidence among injection drug users (IDUs). Several important behavioral risk factors influence transmission of HBV in this group. However, consensus has not been achieved on many of them. The aim of this investigation was to assess the prevalence and risk factors for HBV in IDUs.

**Methods:** This cross-sectional study was carried out between 2001 and 2002 in Tehran. IDUs included people who were being treated for drug abuse and those in the prison. Physician-completed risk factor questionnaires and blood samples (5 ml) for serologic HBV markers (ELISA) were used. Risk factors were evaluated in binary logistic regression (LR) model (forward) procedure for possible association with odds of past or current HBV infection. The evaluated risk factors were age, gender, sexual behavior, shared syringe use, duration of addiction, imprisonment, tattooing, past history of surgery, dental procedures, blood transfusion, jaundice, type of illicit drug use and level of education.

**Results:** This study sample was comprised of 518 IDUs (89.6% males), including 386 (74.5%) prisoners. Antibody against HBV core antigen (HBcAb) was detected in 61.2% (n=317). The prevalence of hepatitis B surface antigen (HBsAg) was 3.7% (n=19). Among HBsAg positive patients, HBeAg was positive in 12 individuals (63.2%). In comparison with seronegative IDUs for HBcAb and/or HBsAg, the odds of using shared syringes, male sex and past history of bisexual relationship were 1.5 (P<0.05), 1.9 (P<0.05) and 2.4 (P<0.01), respectively.

**Conclusions:** These results suggest that seroprevalence of hepatitis B is high but chronic carrier state is not frequent in IDUs. Imprisonment, male sex and having past history of bisexual relationship are independent risk factors for past or current hepatitis B infection.

**Keywords:** Injection Drug User, Hepatitis B, Risk Factor

### Introduction

Hepatitis B virus (HBV) is a serious public health problem worldwide and a major cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma (HCC) (1-3). Prevalence of HBsAg in developed countries is around 0.1% to 0.5%. In endemic areas, it may rise to 3% to 5% and in hyperendemic areas up to 30%. Studies showed that the prevalence of HBsAg in Iran is intermediate endemic between 2% and 7% in

#### \* Correspondence:

Hamid Tavakkoli, M.D., Assistant Professor of Gastroenterology, Al-Zahra University Hospital, Department of Gastroenterology, Isfahan University of Medical Sciences, Isfahan, Iran.

Tel/Fax: +98 311 6255555

E-mail: h\_tavakoli@med.mui.ac.ir

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different areas of the country<sup>(4-6)</sup>, about 5.9% in large vehicle drivers<sup>(7)</sup>, 2.49% in Hamadan Province<sup>(8)</sup> and 1.7% in blood donors<sup>(9)</sup>.

Currently, three modes of HBV transmission have been recognized: perinatal, sexual and parenteral/percutaneous transmission<sup>(5, 10)</sup>. The most viable modes of HBV transmission are through unprotected sex, blood transfusions, and sharing injection paraphernalia<sup>(11, 12)</sup>. One important biologic factor conducive to the transmission of HIV, HBV, and HCV is behaviors that increase the probability of viral transmission among injection drug users (IDUs). These factors include the length of time one has injected drugs, injection frequency, drug procurement practices, the setting where injection occurs (streets, "shooting galleries," parks), direct sharing of syringes and indirect sharing of drug-injection paraphernalia, such as rinse water, cookers, mixers, cotton, and filters<sup>(13, 14)</sup>. Regarding the lack of condom use and the sharing of injection paraphernalia among IDUs, it is clear that IDUs are at high risk for acquiring HBV through either transmission route<sup>(12, 15-17)</sup> IDUs are important transmission links for HIV/AIDS, HBV, HCV, and TB among their sexual partners, their future children, and other IDUs<sup>(12)</sup>.

Given the association between injecting drug use and infection with HBV, HCV, HIV<sup>(18, 19)</sup> and also, the consistent and specific causal association between HBV infection and HCC<sup>(18-20)</sup>, it is important to know both the prevalence of hepatitis B infection and the pattern of risk factors in IDUs. Due to lack of data in this subject in Iran, the aim of this study was to assess the prevalence and risk factors of HBV infection in IDUs in Iran.

## Materials and Methods

This cross-sectional survey was carried out between 2001 and 2002 in Tehran. We collected data on 518 injecting drug users. The survey was explained, and IDUs were advised that the survey was voluntary, and confidential. The survey consisted of two parts: a questionnaire and collection of blood samples.

### The Questionnaire

The questionnaire consisted of questions related to demography, level of education, marital status, sexual behaviors, and injection risk behaviors. Sexual behavior questions included the kind of relationship the subject has ever had: bisexual, homosexual or heterosexual. Injection risk behavior

questions determined whether the subject has ever been in prison, use of shared syringe, duration of injection addiction, frequency of drug injection, type of drug and history of blood transfusion, surgery, dental procedure, cupping and jaundice. Standardized, face-to face interviews were conducted by physicians.

### Laboratory tests

Blood samples were analyzed for HBsAg and hepatitis B core antibodies with ELISA method. All positive samples for HBsAg were retested for HBeAg and aminotransferase as well.

### Statistical analysis

Data and statistical analyses were carried out with SPSS 11.5. Variables were entered into forward stepwise logistic regression to identify predictors of hepatitis B. Analysis results were expressed as odds ratios (OR) with 95% confidence interval (CI). Ethical committee of Digestive Disease Research Center of Tehran University of Medical Sciences approved the study.

## Results

From 518 IDUs, 132 were non-prisoners who were being treated for drug abuse and 386 were prisoners. In the end, 464 males and 54 females completed the questionnaire. All the participants reported drug injection for more than one year. The prevalence of antibodies against hepatitis B core antigen was 317/518 (61.2%). Hepatitis B surface antigen was detected in 19 (3.7%) individuals and among them, 12 (63.2%) subjects were positive for HBeAg. AST and ALT elevation of between 1 to 2 times higher than normal upper limit was detected in three HBsAg positive patients. Demographic characteristics of participants are presented in Table 1.

A total of 386 (74.5%) IDUs had the history of incarceration. 91.9% were born in urban areas and 8.1% in rural areas. Similarly, 95.9% were living in urban areas and 4.1% in rural areas. 67.2% of IDUs used heroin and 26.6% heroin and opioid. Duration of injection addiction differed from 1 to 34 years (mean=4.5 years). About 54.4% of them had injection frequency of 2 or 3 times per day. Drug use behaviors and sexual behaviors that put injection drug users at a high risk of becoming infected are shown in Table 2. Four variables were identified as significantly associated with HBV infection in IDUs: age, male gender, use of shared syringe and having bisexual relationship (Table 3).

**Table 1.** Selected demographic characteristics of IDUs.

Characteristics	Frequency in HBsAg (+)	Frequency in HBsAg (-)	Frequency in HbCAb (+)	Frequency in HbCAb (-)
<b>Sex</b>				
Male	17	447	294	167
Female	2	52	23	28
<b>Age</b>				
15-29	3	126	64	60
30-44	14	304	207	110
≥ 45	2	69	46	25
<b>Educational level</b>				
Illiterate	2	30	21	10
Primary school	3	116	84	34
Unfinished high school	6	169	115	58
High school diploma	6	139	77	66
Higher than diploma	2	45	20	27
<b>Marital status</b>				
Single	4	165	92	76
Married	11	244	168	84
Divorced	2	67	44	23
Separated	2	15	8	9
Widow/widower	0	8	5	3
<b>Job</b>				
Unemployed	2	53	30	24
Laborer	1	67	44	23
Employee	2	26	16	11
Student	0	4	2	2
Farmer	0	2	2	0
Medical personnel	0	4	1	3
Housekeeper	1	28	15	13
Other	13	315	207	119
<b>Residence</b>				
Urban	18	479	304	188
Rural	1	20	13	7

**Table 2.** Injecting and sexual risk behaviors in injecting drug users in Tehran.

Characteristics	Frequency in HBsAg (+)	Frequency in HBsAg (-)	Frequency in HbCAb (+)	Frequency in HbCAb (-)
<b>Use of shared syringe</b>				
Yes	10	311	210	107
No	9	188	107	88
<b>Pattern of using common syringe</b>				
Daily	3	97	74	24
Weekly	1	51	36	15
Monthly	0	40	33	7
Occasional	6	122	67	60
<b>Sexual relationship</b>				
Heterosexual	8	264	161	108
Homosexual	0	53	25	26
Bisexual	0	49	22	25
<b>History of hepatitis B vaccination</b>				
Positive	0	14	7	6
Negative	19	485	310	189
<b>Prevalence of other risk factors</b>				
Cupping	4	118	71	51
Surgery	6	207	133	78
Dental procedure	16	408	264	154
Tattooing	9	263	186	82
Blood transfusion	3	68	42	28
Pierced ear	2	28	18	10
Jaundice	4	88	65	25

**Table 3.** Logistic regression analysis to identify predictors of hepatitis B infection in IDUs.

Variables	Odds ratio	95% confidence intervals	P
Age	0.98	0.95-0.999	<0.05
Gender	1.91	1.04-3.5	<0.05
Shared syringe	1.56	1.07-2.3	<0.05
Bisexual relationship	2.4	1.3-4.5	<0.01

## Discussion

While the prevalence of antibodies against hepatitis B core antigen was 61% in our study, Dhopes and colleagues found that 80% of IDUs in an addiction treatment unit had antibodies against HBV (21). Des Jarlais and colleagues also found very high seroprevalence rates of HBV and HCV in a cohort of IDUs in New York City (22). We also found that IDUs who had started injection at the age of 30 to 45 were more likely to be at risk which explains why seroprevalence of hepatitis B was high but chronic carrier state was not frequent in our samples. Shirin et al. showed that the prevalence of positive HBsAg and HbCAb was 6.2% and 31.8% in IDUs in Bangladesh, respectively (23) while HBsAg was positive in 16.3% of drug-dependent patients in Saudi Arabia (24). Anti-HBc was positive in 55% of injection drug users in Spain (25), HBsAg or anti-HBc was positive in 55.2% of IDUs in Georgia (26), antibody positivity for HBV was 61.1% among IDUs in New Mexico (27), and 28% were exposed to HBV among IDUs in south-western Sydney, Australia (28).

One important risk factor according to our study was the use of shared syringe. In a similar study, Craine et al. reported direct sharing of syringes and syringes in 44% of IDUs (29) and Wylie et al showed that injecting drug by a previously used syringe was a variable positively associated with serostatus for HBV (30). In places where access to sterile injection equipment is limited, the likelihood of engaging in high-risk injection practices rises. Harm-reduction strategies, such as syringe-distribution programs, behavioral interventions, HIV-testing programs, methadone-maintenance programs and vaccination against HBV, hold promise for reducing risk behaviors of HBV (11, 12, 15). One study showed that a short hepatitis B vaccination schedule among imprisoned IDUs has a significantly higher compliance and seroprotection rate than the standard six month schedule, and should therefore be recommended

for use in this population (1).

The results of our study also revealed another risky behavior that increases HBV transmission among IDUs is bisexual behaviors. According to other studies, heterosexual transmission is important as shown by the 40% transmission rate to non-immune partners of patients with acute or chronic hepatitis B. Ghanaat et al. study confirmed that in our country in which hepatitis B is endemic, sexual exposure to this virus plays an important role in seroconversion (4). Future interventions should consider targeting drug users' sexual relationships as agents of risk management and behavior change (31). Based upon our findings, male injecting drug users are twice at risk compared to females but Evan's study states that the risk is higher in females (32) while Wylie study showed no difference among them (30).

Due to difficulties in recruiting drug users who are not in contact with rehabilitation centers, studies are often restricted to those who are benefiting from treatment services. Therefore, these estimations can not be necessarily meaningfully extrapolated to the general population of injecting drug users (16) and measuring the true extent of hepatitis B infection requires empirical data not just on drug users in contact with health care services. Study limitations included recall bias on some of the risk factors and volunteer bias because not all prisoners took part in the study.

In conclusion, since using shared syringes and having bisexual relationship has significant association with HBV infection in IDUs, harm-reduction strategies, such as syringe-distribution programs, behavioral interventions and vaccinating against HBV specially among male prisoners can help reduce risk behaviors associated with HBV in our country.

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