

Investigation of Relative Risk Factors of Hepatitis B Virus Core Antibody Positivity among Intravenous Drug Users in Tehran, 2013

Tahmineh Kandelouei¹, Maryam Vaezjalali^{2,3*}

¹Department of Microbiology, Faculty of Biological Sciences, Shahid Beheshti University, Tehran, Iran

²Infectious Diseases and Tropical Medicine Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

³Department of Microbiology, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Received: 06 May, 2016; Accepted: 29 January, 2017

Abstract

Background: Hepatitis B virus (HBV) still continues to infect many people worldwide despite the availability of an effective vaccine for more than three decades. The high prevalence of HBV may exist in high risk groups, particularly among intravenous drug users (IDUs). This group is among groups with a higher risk of infection due to their hazardous behaviors such as sharing needles for drug injection. This cross sectional study included 229 intravenous drug users in Tehran, in 2013 to investigate the prevalence of HBc Ab positivity and its associated risk factors among IDUs.

Materials and Methods: Socio-demographic characteristics and associated risk factors were recorded during sample collection. Their serum samples were tested for the presence of total hepatitis B virus core antibody (HBc Ab) by Enzyme-linked Immunosorbent Assay (ELISA).

Results: HBc Ab was detected in 64 of 229 participants, giving an overall prevalence of 28%. History of imprisonment, injecting drugs and age has a significant correlation with HBc Ab positivity.

Conclusion: Expansion of new preventive strategies through the national health system could be beneficial for decreasing the risk of acquiring HBV among high risk groups such as IDUs.

Keywords: Hepatitis B virus; drug user; antibody; infection control

***Corresponding Author:** Maryam Vaezjalali, PhD, Velenjak St., Department of Microbiology, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Email: maryam.vaezjalali@sbmu.ac.ir

Please cite this article as: Kandelouei T, Vaezjalali M. Investigation of Relative Risk Factors of Hepatitis B Virus Core Antibody Positivity among Intravenous Drug Users in Tehran, 2013. *Novel Biomed.* 2017;5(2):65-70.

Introduction

The risk of acquiring blood-borne infectious diseases are particularly high among intravenous drug users (IDUs). Hazardous behaviors of these addicts such as sharing syringes, using the same syringe several times, or using infected syringes are the main routes to be infected with HIV, Hepatitis B, and C viruses and various lung and cerebral abscesses¹. There is a direct relationship between the level of cases infected by these viruses and duration of injection drug use².

The greater likelihood of transmission can occur by a longer duration of drug use that may lead to more sharing of needles and other equipment. It has been reported in other studies that being in prison for a long time and having a drug injection behavior are independently associated with HBV infection³. According to reports of the Iranian Welfare Organization, there are 1.8 million drug users in Iran and 9 to 16 percent of them are IDUs. It is interesting to note that half of them shared needles. It could be estimated that the IDU population in Iran ranges

between 200000 and 300000 IDUs. The increasing number of intravenous drug users in Iran could be a potential danger to the national health system⁴. Injection drug usage has been the most growing route of drug abuse in Iran in the past decade⁵. The high rates of HCV and HBV infection among IDUs have been reported in Iran^{3,6,7}. This study examined the characteristics, risk behaviors and risk factors associated with the prevalence of hepatitis B virus core antibody (HBc Ab) among IDUs in Tehran.

Methods

Sample selection and study population: A cross sectional study was conducted on 229 Tehranian intravenous drug users in 2013. Details of participant selection have been presented in our previous report⁸. The study involved face-to-face interviews using questionnaires that elicited personal data containing demographic data such as age, gender, employment status, marital status, the history and duration of addiction, the history of imprisonment, the kind and route of drug use, hepatitis B vaccination, and some high risk behaviors like sharing syringes, sexual behaviors, and tattooing. 5ml peripheral blood sample was taken from each individual, transported to the laboratory, and storage in -20°C . IDUs were able to receive the results of their tests based on their own code number. This study was approved by the ethics committee of Shahid Beheshti University of Medical Sciences (approval number 6-2015/9/6) and was in accordance with the Helsinki Declaration of 1964.

Detection of serology markers: The serum samples were tested for the presence of total HBc Ab by Enzyme-linked Immunosorbent Assay (ELISA) with commercial kits for HBc Ab detection (Diapro, Milan, Italy). The assay is based on the principle of competition where the antibodies in the sample compete with a monoclonal antibody for a fixed amount of antigen on the solid phase. A purified recombinant HBc Ag is coated to the microwells. The patient's serum/plasma is added to the microwell together with an additive able to block interferences present in the sample. In the second incubation after washing, a monoclonal antibody, conjugated with Horseradish Peroxidase (HRP) and specific for HBc Ag is added and binds to the free rec-HBc Ag coated on the plate. After incubation, microwells are washed

to remove any unbound conjugate and then the chromogen/substrate is added. In the presence of peroxidase enzyme the colorless substrate is hydrolyzed to a colored end-product. The color intensity is inversely proportional to the amount of antibodies to HBc Ag present in the sample.

Statistical analysis: Data were extracted from questionnaires and summarized. The standard Chi-square test was used to assess the correlation of demographic and behavioral variables and HBc Ab positivity. All analyses were performed using statistical package for social sciences (SPSS) software version 20. The results were regarded as significant when $p < 0.05$. To avoid interruptions in statistical analysis, the injecting drug users who did not answer the questions were excluded from the data analysis.

Results

HBc Ab was detected in 64 of 229 subjects, giving an overall prevalence of 28%. Of 229 IDUs, 17.8% of subjects were between 20-30 years old, 37.3% were between 30-40 years, 26% were between 40-50, and the rest were above 50 years old. Socio-demographic profiles of participants, by regarding the number of subjects who answered each question, are presented in (Table 1).

Chi-square analysis revealed that there is significant association between HBc Ab positivity and injection behavior ($p = 0.000$), history of imprisonment ($p = 0.013$) and age of participants ($p = 0.012$) (Table 2). No statistically significant association was observed between HBc Ab positivity and sharing needle equipment, duration of drug use, frequency of injection in a day, type of drug, tattooing, history of surgery and high risk sexual behaviors ($p > 0.05$) (Table 2).

Discussion

In this study, of 229 IDUs, 64 (28%) subjects were HBc Ab positive and a significant correlation was observed between HBc Ab positivity and injection behavior, history of imprisonment, and age of participants. Although in our previous study, no

Table 1: Socio-demographic characteristics of the studied injecting drug users.

Characteristics	N**	Injecting drug users (%)
Age n*=169		
20-30	30	17.3
30-40	63	37.3
40-50	44	26
>50	32	18.9
Employment status n=173		
Unemployed	126	72.8
Employed	46	26.6
Marital status n=170		
Married and living with a partner	49	28.8
Single or separated	121	71.2
Duration of drug usage n=147		
<1 year	4	2.7
1-5 years	20	13.6
5-10 years	30	20.4
>10 years	93	63.3
History of imprisonment n=162		
	99	61.1
Frequency of injection in a day n=84		
1-3	55	65.5
3-6	21	25
>6	8	9.5
History of sharing needle equipment n=82		
	18	22
Type of drug n=170		
Heroin	39	22.9
Other***	50	29.4
Heroin + Other	81	47.6
History of tattoo n=159		
	60	37.7
History of blood transfusion n=85		
	24	28.2
History of surgery n=154		
	61	39.6
History of sexual behavior n=99		
	44	44.4
History of dentistry n=106		
	69	65.1
HBV Vaccination n=129		
	61	47.3

*n= number of injection drug user of total 129 cases who answered each question.

**N= Frequency of each cases

***Other including drugs such as opium, crack, crystal and etc.

Table 1: Risk Factors Associated With HBcAb seropositivity in IDUs.

Risk factor	HBcAb positive	HBcAb negative	Total	P value
Age				
20-30	5(16.7%)	25	30	0.012
30-40	20(31.7%)	43	63	0.012
40-50	11(25.6%)	32	43	0.012
>50	14(43.8%)	18	32	0.012
Sharing syringes				
Yes	9(50%)	9	18	0.150
No	25(39.1%)	39	64	0.150
Duration of drug use				
<1 year				
1-5 years	1(25%)	3	4	.083
5-10 years	7(35%)	13	20	.083
>10 years	7(23.3%)	23	30	.083
	30(32.6%)	62	92	.083
History of imprisonment				
Yes	35(35.4%)	64	99	.013
No	12(19.4%)	50	62	.013
Injection				
Yes	45(39.5%)	69	114	.000
No	5(9.6%)	47	52	.000
Frequency of injection				
1-3	22(40%)	33	55	.108
>3	15(51.7%)	14	29	.108
Type of drug				
Heroin	10(26.3%)	28	38	.059
Other*	14(28%)	36	50	.059
Heroin + Other	27(33.3%)	54	81	.059
Tattooing				
Yes	17(27.9%)	44	61	0.138
No	29(29.9%)	68	97	0.138
History of surgery				
Yes	17(27.9%)	44	61	0.128
No	29(31.5%)	63	92	0.128

High risk sexual behaviors				
Yes				
No	12(27.3%)	32	44	0.123
	19(35.2%)	35	54	0.123

significant relationship was seen between HBs Ag positivity and associated risk factors⁹. In a study by Merat and colleagues the prevalence HBe Ab in Iran was 16.4% in the general population, which was lower than our results¹⁰. In another study on 153 Iranian injecting drug users by Ramezani and colleagues, there was 7.2% HBe Ab prevalence among them¹¹. Daneshmand *et al*, study concluded that the longer duration of being incarcerated is associated with higher prevalence of HBV infection¹². Another descriptive, analytical study on 133 IDUs, 8 (6.2%) of them were HBV positive, and there was a strong correlation between the use of shared needles and HBV infection¹³. Also in a conclusion made by Nokhodian *et al*, results for female prisoners in Isfahan showed that there was no association between the number of arrests and serological HBV markers¹⁴. A study by Nokhodian *et al*, which was conducted on incarcerated intravenous drug users, of 970 participants 45 (4.64%) were found positive for isolated HBe Ab and 67 (6.9%) for both HBs Ab and HBe Ab. History of sharing needle showed to have a significant association with HBs Ag positivity¹⁵. Another study on females with illegal social behaviors in Isfahan, showed the same result that demonstrated no association was between having a prison history and HBV infection¹⁶. In Amin-Esmaili *et al*, study on IDUs, in Tehran, the prevalence of past or current HBV infection was high rate (46.1%), that was mainly correlated with a history of imprisonment and drug use more than 10 years¹⁷. Some reports from Iran¹⁸ and from other countries regarding imprisonment^{19,20} and the frequency²¹ and duration of drug injection^{19,22} was demonstrated as risk factors for HBV infection.

Conclusion

Undoubtedly, IDUs are one of the likeliest groups to be exposed to infection and this group would benefit from a very high priority in preventive and educational programs. Screening and prevention

programs like modifying behaviors, expanding the HBV vaccination coverage, have been instrumental in reducing the rate of HBV infection among IDUs.

Acknowledgment

This study has been supported by infectious disease Research Center, Shahid Beheshti University of Medical Sciences.

References

- Lugoboni F, Quaglio G, Civitelli P, Mezzelani P. Bloodborne viral hepatitis infections among drug users: the role of vaccination. *International journal of environmental research and public health*. 2009;6(1):400-13.
- Schleicher S, Schieffer M, Jürgens S, Wehner H, Flehmig B. Evidence of multiple hepatitis virus infections in autopsied materials of intravenous drug addicts. *Igiene e sanita pubblica*. 2004;61(5):435-50.
- Karimi A. P. 483 Seroprevalence of HBV, HCV and HIV among intravenous drug users in Iran. *Journal of Clinical Virology*. 2006;36:S210-S1.
- Forouzanfar M, Mohammad K, Majdzadeh R, Malekzadeh R, ABOU AF, Mohammadnejad M, *et al.*. EFFECTIVENESS OF ADOLESCENTS' IMMUNIZATION AGAINST HEPATITIS B ON BURDEN OF THE DISEASE IN IRAN. *Hakim*. 2006;9(2):1-.
- Tofigi H, Ghorbani M, Akhlaghi M, Yaghmaei A, Mostafazadeh B, Farzaneh E, *et al.*. Incidence of Hepatitis B and HIV Virus at Cadaver of IV Drug Abusers in Tehran. *Acta Medica Iranica*. 2011;49(1):59-63.
- Zamani S, Ichikawa S, Nassirimanesh B, Vazirian M, Ichikawa K, Gouya MM, *et al.*. Prevalence and correlates of hepatitis C virus infection among injecting drug users in Tehran. *International Journal of Drug Policy*. 2007;18(5):359-63.
- Mir-Nasseri S, Poustchi H, Nasseri-Moghadam S, Nouraei S, Tahaghoghi S, Afshar P, *et al.*. HCV in intravenous drug users. *Govareh*. 2012;10(2):80-6.
- Asli M, Kandelouei T, Rahimyan K, Davoodbeglou F, Vaezjalali M. Characterization of Occult Hepatitis B Infection Among Injecting Drug Users in Tehran, Iran. *Hepat Mon*. 2016;16:e34763.
- Kandelouei T, Hosseini SM, Gachkar I, Keyvani h, Davoodbeglou f, m v. Reduction in prevalence of hepatitis b surface antigen among intravenous drug users in tehran drop-in-centers *Arch Clin Infect Dis* 2013;8(2):1-8.
- Merat S, Rezvan H, Nouraei M, Jamali J, Assari S, Abolghasemi H, *et al.*. The prevalence of hepatitis B surface antigen and anti-hepatitis B core antibody in Iran: a population-based study. *Archives of Iranian medicine*. 2009;12(3):225-31.
- Ramezani A, Banifazl M, Eslamifar A, Aghakhani A. Serological pattern of anti-HBe alone infers occult hepatitis B virus infection in high-risk individuals in Iran. *The Journal of Infection in Developing Countries*. 2010;4(10):658-61.
- Dana D, Zary N, Peyman A, Behrooz A. Risk Prison and Hepatitis B Virus Infection among Inmates with History of Drug

- Injection in Isfahan, Iran. *The Scientific World Journal*. 2013;2013.
13. Imani R, Karimi A, Kasaeian N. The relevance of related-risk behaviors and seroprevalence of HBV, HCV and HIV infection in intravenous drug users from Shahrekord, Iran, 2004. *Shahrekord University of Medical Sciences Journal*. 2006.
14. Nokhodian Z, Yazdani MR, Yaran M, Shoaie P, Mirian M, Ataei B, *et al.*. Prevalence and risk factors of HIV, syphilis, hepatitis B and C among female prisoners in Isfahan, Iran. *Hepatitis monthly*. 2012;12(7):442.
15. Nokhodian Z, Yaran M, Adibi P, Kassaian N, Meshkati M, Ataei B. Seroprevalence of hepatitis B markers among incarcerated intravenous drug users. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*. 2014;19(Suppl 1):S13.
16. Kassaian N, Ataei B, Yaran M, Babak A, Shoaie P. Hepatitis B and C among women with illegal social behavior in Isfahan, Iran: Seroprevalence and associated factors. *Hepatitis monthly*. 2011;11(5):368.
17. Amin-Esmaili 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. *Hepatitis monthly*. 2012;12(1):23.
18. Mir-Nasseri MM, MohammadKhani A, Tavakkoli 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. *Hepatitis monthly*. 2011;11(1):19.
19. Backmund M, Meyer K, Schuetz C, Reimer J. Factors associated with exposure to hepatitis B virus in injection drug users. *Drug and alcohol dependence*. 2006;84(2):154-9.
20. Månsson A-S, 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. *Scandinavian Journal of Infectious Diseases*. 2000;32(3):253-8.
21. Ruan Y, Qin G, Yin L, Chen K, Qian H-Z, Hao C, *et al.*. Incidence of HIV, hepatitis C and hepatitis B viruses among injection drug users in southwestern China: a 3-year follow-up study. *Aids*. 2007;21:S39-S46.
22. 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. *Journal of infection*. 2009;58(5):375-82.