

Seroprevalence and Risk Factors of Hepatitis C Virus among Juveniles in Correctional Center in Isfahan, Iran

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Date of Submission: Jul 8, 2011

Date of Acceptance: Sep 3, 2011

How to cite this Article: Nokhodian Z, Ataei B, Kassaian N, Yaran M, Hassannejad R, Adibi P. Seroprevalence and Risk Factors of Hepatitis C Virus among Juveniles in Correctional Center in Isfahan, Iran. *Int J Prev Med* 2012; Special issue, S113-17.

ABSTRACT

Objectives: Juveniles in custody are affected by blood borne viruses due to high rates of risk behaviors. Therefore, they have a disproportionate burden of infectious diseases, such as hepatitis C virus (HCV) infection. The purpose of the present study was to determine prevalence and associated characteristics of hepatitis C infection in inmates of a correctional center in Isfahan, Iran.

Methods: We conducted a cross-sectional study of HCV infection in 160 youths, who were admitted to correctional center in Isfahan during 2008-2009. Subjects were asked questions regarding behaviors that might put them at high risk for acquiring HCV and blood was drawn for this test. Sera were analyzed for HCV Ab and RIBA test was performed on antibody-positive HCV. We used Chi-square test and logistic regression model to analyze data and $P < 0.05$ was considered statistically significant.

Results: A total of 160 young prisoners (147 boys and 13 girls) were studied. The mean age of the inmates was 16.59 ± 1.24 year. A history of intravenous drug addiction was reported in 3.8% of them. HCV infection was detected in 7 (4.4%) subjects. This study revealed that history of IDU was the main risk factor for HCV (OR, 134.44; 95% confidence interval [CI], 7.29-2481.03).

Conclusions: To prevent HCV transmission, proper drug prevention educations should be performed in young age prisoners.

Keywords: Correctional center, HCV, Isfahan

INTRODUCTION

Hepatitis C virus (HCV) is a major health problem which is reported in 200 million people of which 3.0% of the world's population (170 million) suffers from chronic HCV.^[1] Three to four million people are newly infected and more than 350,000 people are estimated to die from hepatitis C related liver diseases each year.^[2,3] Chronic HCV can lead to cirrhosis, liver failure, liver cancer and death.^[4] Prevalence of HCV infection in Iran has been estimated about 0.16%, which varies in different parts of the country.^[5]

Compared with the general population, prison inmates have a higher prevalence of HCV infection.^[6] It may be connected to risk factors before capture such as low socioeconomic status, poor access to health care, high-risk sexual behaviors and injection drug use. Factors such as crowded living conditions, sexual harassment, non-professional tattooing, body piercing and poor ventilation systems increase the infection risk after entrance to prison.^[7] Previous data relate more to adult prisons^[8-10] and there are very limited data available for infected young offenders. But high frequencies of injection drug use reported in HCV-positive young offenders.^[11]

Of persons newly infected with HCV, 70.0% to 80.0 % are asymptomatic.^[12] On the other hand, prisoners are in contact with each other, prison staff and visitors in the prison and when they are released into the community, they contact with general population. So the control of infections in the prisons can help to control of HCV in the community. In order to address this, we undertook a study in a correctional center in Isfahan, Iran, to determine the seroprevalence and risk factors for HCV.

METHODS

Case Selection:

The cross sectional study was done in a correctional setting in Isfahan, Iran during 2008-2009. The inmates, who were younger than 18 years of age and more than one month in detention, were enrolled voluntarily by census method after signed a written informed consent form. For each participant a checklist was recorded by researcher and completed through face-to-face interview. Enrollees could skip any question. The checklist included socio-demographic characteristics, sexual and drug history, and duration of incarceration. Intravenous drug use (IDU) was defined having a history of at least one time injection. The research's protocol was approved by the Ethics Committee in Isfahan University of Medical Sciences (IUMS).

Laboratory Analysis

Five ml blood sample was collected from each participant. Serum samples were held at -20°C until analyzing. Sera were tested at the Serology Unit, Isfahan Infectious Disease Research Center. Anti-HCV was assessed by Anti-HCV ELISA Kit (Diapros, Italy). All anti-HCV Ab positive sera were confirmed using recombinant immunoblot assay (RIBA) 3rd generation (INNO-LIA HCV Score; Innogenetics, Belgium) which designed detecting following antigens: \emptyset .Core NS3, NS4, NS5 ENV. Individuals, who had HCV Ab positive by ELISA and confirmed by RIBA, were considered as HCV positive.

Statistical Analysis:

Chi-square and fisher exact tests were used to evaluate bivariate association between demographic features, risk factors and HCV seropositivity. Adjusted odds Ratio and 95% confidence interval were estimated using multiple logistic regressions with forward selection method for selection predictors in model. P -value < 0.05 was considered as statistical significant.

RESULTS

A total number of 160 individuals took part in our study. The mean age of the participants was 16.59 ± 1.24 . The majority of the subject was boys (91.9%) and had low level of education (77.5%). Among 160 juveniles in correctional center, the seroprevalence of HCV infection was estimated 4.4%.

As seen in Table 1, there is not any bivariate association between HCV positivity and demographic features of participants.

Some risk factors of HCV seropositivity were depicted in Table 2. Sixty (37.5%) and 47 (29.4%) of participants have reported history of illegal sex and drug use, respectively. Among male participants, who had history of illegal sex, 73.1% and 59.6% had homosexual and heterosexual contacts, respectively. As shown in Table 2, history of tattooing, history of drug use and number of incarceration had significant

Table 1. Univariate association between demographic characteristics and HCV seropositivity

Variable	No. of Subjects		HCV ⁺		P-value
	N	%	N	%	
Sex					0.45
Male	147	91.9	6	4.1	
Female	13	8.1	1	7.7	
Education					0.93
Illiterate	25	15.6	1	4	
Elementary	39	24.4	1	2.6	
Guidance	60	37.5	4	6.7	
High school	30	18.8	1	3.3	
Diploma	6	3.8	0	0	
Age (Mean ± SD)	16.59 ± 1.24		17.14 ± 0.69		0.21

Table 2. Univariate association between potential risk factors and HCV seropositivity

Variable	No. of Subjects		HCV ⁺		P-value
	N	%	N	%	
History of tattooing					0.01**
Yes	60	37.5	6	10	
No	100	62.5	1	1	
History of cupping					0.53
Yes	16	10	1	6.3	
No	144	90	6	4.2	
History of ear piercing					0.48
Yes	14	8.8	1	7.1	
No	146	91.3	6	4.1	
History of surgery					1
Yes	38	23.8	1	2.6	
No	122	76.3	6	4.9	
History of blood transfusion					0.43
Yes	12	7.5	1	8.3	
No	148	92.5	6	4.1	
Periodontal procedure					0.25
Yes	63	39.4	1	1.6	
No	97	60.6	6	6.2	
History of transplantation					1
Yes	1	0.6	0	0	
No	159	99.4	7	4.4	
History of illegal sex					0.43
Yes	60	37.5	4	6.7	
No	100	62.5	3	3	
History of drug use					<0.001**
No	113	70.6	1	0.9	
IVDU	6	3.8	3	50	
Other types of drug use	41	25.6	3	7.3	
Number of incarceration					0.002**
1	116	72.5	2	1.7	
2-3	37	23.1	3	8.1	
4-5	4	2.5	0	0	
>6	3	1.9	2	66.7	
Duration of being in prison (Mean ± SD)	139.03 ± 184.87		127.14 ± 77.83		0.28

association with HCV seropositivity. Results of multiple logistic regressions displayed that only drug use is significant predictors of risk of HCV among juveniles in correctional centers [Table 3].

Table 3. Multiple logistic regression

Variable	OR	95% CI
History of drug use		
No	1	-
IVDU	134.44	7.29-2481.03**
Other types of drug use	5.7	0.55-58.76
History of tattooing		
No	1	-
Yes	13.23	0.97-179.53

**P-value < 0.01

DISCUSSION

To our knowledge, this study is the first survey that has assessed the seroprevalence of HCV infection among inmates in a correctional center in Iran. The seroprevalence of HCV was detected in 7 subjects (4.4%). Some other studies have reported similar seroprevalence rates of HCV. For example, Murray *et al.*^[13] and Solomon *et al.*^[14] have reported HCV seroprevalence rates of 2% and 7.9%, respectively, among adolescence inmates. Zanetta *et al.*^[15] have reported HCV seroprevalence rates of 4.6% and 5.9% in girls and boys, respectively, among Brazilian correctional setting. A study in Australia juvenile correctional facilities has estimated HCV seroprevalence rates of 9 %.^[16]

The association between HCV positivity and the tattooing was significant by bivariate analysis but not by Multiple logistic regression. Tattoo is one the potential risk factor for HCV transmission. In our study, 34% of the incarcerated juveniles and 10% of HCV-positive subjects had experience of tattooing. Tattooing often is performed in prisons using unsterile equipments and therefore, it is the possible way of transmission of blood borne infections.

Number of incarceration was another factor

that had significant bivariate association with HCV prevalence. Although, this factor is not assessed in youth prisoners in other studies, but this result is in agreement with studies which was done on adult population.^[17,18] According to the fact that multiple incarceration increase exposure to high risk behaviors in prison, it is expected that multiple incarceration increase risk of acquiring infection diseases in prison.

Intravenous drug abusing is a very important risk factor for HCV that was revealed in many studies. The importance of this factor as the main risk factor for HCV transmission is highlighted by our findings that 50% of HCV-positive individuals had used IV drugs.

Meyer *et al.*^[11] reported 8.6% prevalence of HCV in a German Young Offenders' Institution. 94% of anti-HCV-positive individuals in that research were IV drug abuser. In a study in Australia on inmates aged 15–18 years showing an anti-HCV prevalence of 21% of which only one of the Australian HCV-positive inmates had reported IV drug use.^[19] As we know, needle sharing is responsible for transmission of the infections in IVDUs.

It should be noted that there are many various risk factors in a correctional center for transmitting of HCV infection, that some of them may be undercover in our study. But, it should be considered that intravenous drug abusing is the most important risk factor for this infection and effective activities should be focused on this factor to prevent drug use and HCV transmission. On the other hand, these prisoners are very young and high risk behaviors are usual among them. Thus, suitable educational programs and counseling should be performed to inform them about various routes of infection transmission and detrimental impression on them.

In conclusion, to reduce high risk behaviors among youth, we should teach young people to change behaviors through cognitive and emotional instruments and consider their skills, personality traits and social support.

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Source of Support: This paper is extracted from the research project No.185063 research chancellor , Isfahan University of Medical Sciences. **Conflict of Interest:** None declared