

Prevalence of Hepatitis B and C Infections and their Associated Risk Factors among Prisoners in Al-Diwaniya Province, Iraq

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Abstract

Background: Prison inmates are among the high risk population for dangerous infections such as HBV, HCV and other contagious diseases. In spite of many data about the prevalence and risk factors for blood-borne diseases among prisoners in the world, such data are sparse from Iraq. The aim of this study: To determine the prevalence and associated risk factors for HBV and HCV infections among a sample of prison inmates in Iraq. **Methods:** In a cross-sectional study in March 2015–February 2016, 190 prisoners in the central prison of Al-Diwaniya Province in Iraq were selected based on a systematic, stratified random sampling method. Sera were analyzed for HBV and HCV infections by appropriate commercial ELISA kits. An anonymous questionnaire was used to collect the demographic data and information about risk factors. **Results:** Overall, 190 male prisoners (mean age: 34 ± 9 years), participated in this study. The prevalence of HBV and HCV infection was 7.8% and 10.5%, respectively. Drug abuse and history of traditional phlebotomy were associated risk factors for HBV infection ($P < 0.05$), and history of drug injection was associated with HCV infection ($P < 0.05$). **Conclusions:** This study shows a fairly higher prevalence of blood borne infections among prisoners and indicate drug abuse and phlebotomy as the associated risk factor.

Keywords: Hepatitis B, Hepatitis C, Injecting Drug Users, Prison

1. Introduction

Prison populations are considered to be at risk of blood-borne viral infections, such as Human Immunodeficiency Virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV). This is attributed to a high proportion of incarcerated people who engage in risky behaviors, especially Injecting Drugs (IDU)¹.

Up to 40% of all Americans with chronic viral hepatitis were in prison and the prevalence of viral hepatitis among prisoners was significantly higher than general population².

In fact, these infections were transmitted to prisoners while they were in prison³. This could be explained by the higher prevalence of risky behaviors among this population which include, but are not limited to, drug abuse, frequent injections, needle sharing, promiscuity and unprotected sex as well as tattooing⁴.

Early identification and treatment of infected prisoners can decrease the risk of infection transmission, not only inside prisons but also after community re-entry⁵.

The risk of HBV transmission is lower than the risk of HCV transmission. Only 5% of people who acquire HBV

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in their adult life will remain positive for hepatitis B surface antigen (HBsAg) for longer than six months⁶.

In contrast, approximately 85% of individuals exposed to HCV develop chronic infection and represent a potential reservoir of infection to the uninfected entrants⁷.

To our knowledge, data about the risk factors associated with higher prevalence of HBV, and HCV infections among prison inmates in Iraq are scarce and thus judgment about blood-borne infections within the prisons often was made based on data from other countries⁸.

As socio-economic and cultural situations are somehow different in Iraq therefore study about the rate, sources and associated risk factors for blood-borne diseases in prisons is a key factor for the prevention and control of the spreading of the infections within the prisons. This leads to decrease the rate of transmission not only in prisons but also in the whole community⁹.

In spite of the higher prevalence of blood-borne diseases among prisoners than general population, still the prevalence of HBV and HCV was lower than other reports from other countries as well. Iraq is a large country and people in different parts have different ethnicities, culture and lifestyles. Al-Diwaniya is located in the mid-south of Iraq with a fairly intermediate level of education and general health and low rate of crimes.

The aim of this study was to determine the prevalence and associated risk factors for HBV, and HCV infections among a sample of prison inmates in the central prison in Al-Diwaniya Province, Iraq.

2. Methods

A cross-sectional study was carried out on prisoners over a period of one year (March 2015–February 2016) in the central prison in Al-Diwaniya Province, Iraq.

The study protocol was performed in accordance with the declaration of Helsinki and subsequent revisions and approved by the ethics committee of Al-Qadisia Medical College and those who are responsible for the prison as well.

Participation in the study was voluntary and the confidentiality of information was guaranteed. Informed

consent was obtained from each prisoner who participated in this study.

A total of 190 male prisoners from the central prison in Al-Diwaniya Province were enrolled in the study. The participants were clients of Voluntary Counseling and Testing Services.

After obtaining informed consent, each participant underwent venipuncture for HBV, and HCV testing. An anonymous questionnaire including questions on socio demographic and risk behavior data was given to all participants. Each participant agreed to answer the socio demographic data and 115/190 (60%) to answer the risk behavior data.

Sample size was calculated as 190 cases and based on a systematic, stratified random sampling, 244 prisoners were invited for this study and finally 190 prisoners enrolled in the study.

Blood was drawn (5 ml of venous) from all participants and sera were screened for anti-HCV antibody (Dia-pro diagnostic * HCV ELISA, Italy), hepatitis B surface antigen (Dia lab * HBs Ag, Austria), in duplicate. All sera positive for HCV-Ab and HBsAg were confirmed by the second generation of recombinant immunoblot assay (RIBA) kits (Diagnostics* HCV blot; Germany) and western blot as a complementary test respectively.

3. Statistical Analysis

The data were analyzed by SPSS software version 12 (SPSS Inc., Chicago, IL, USA) and chi-square. Fisher exact tests were also used to compare the variables. A *P* values < 0.05 was considered as statistically significant.

4. Results

The mean patient age was 34±9 years. Of all participants included in the study, 35% had primary school or lesser education while 78% were unemployed before entering the prison. Of the 115 participants with available risk behavior data, 53% reported more than one potential risk behavior, such as drug users, tattooing, and history of surgery.

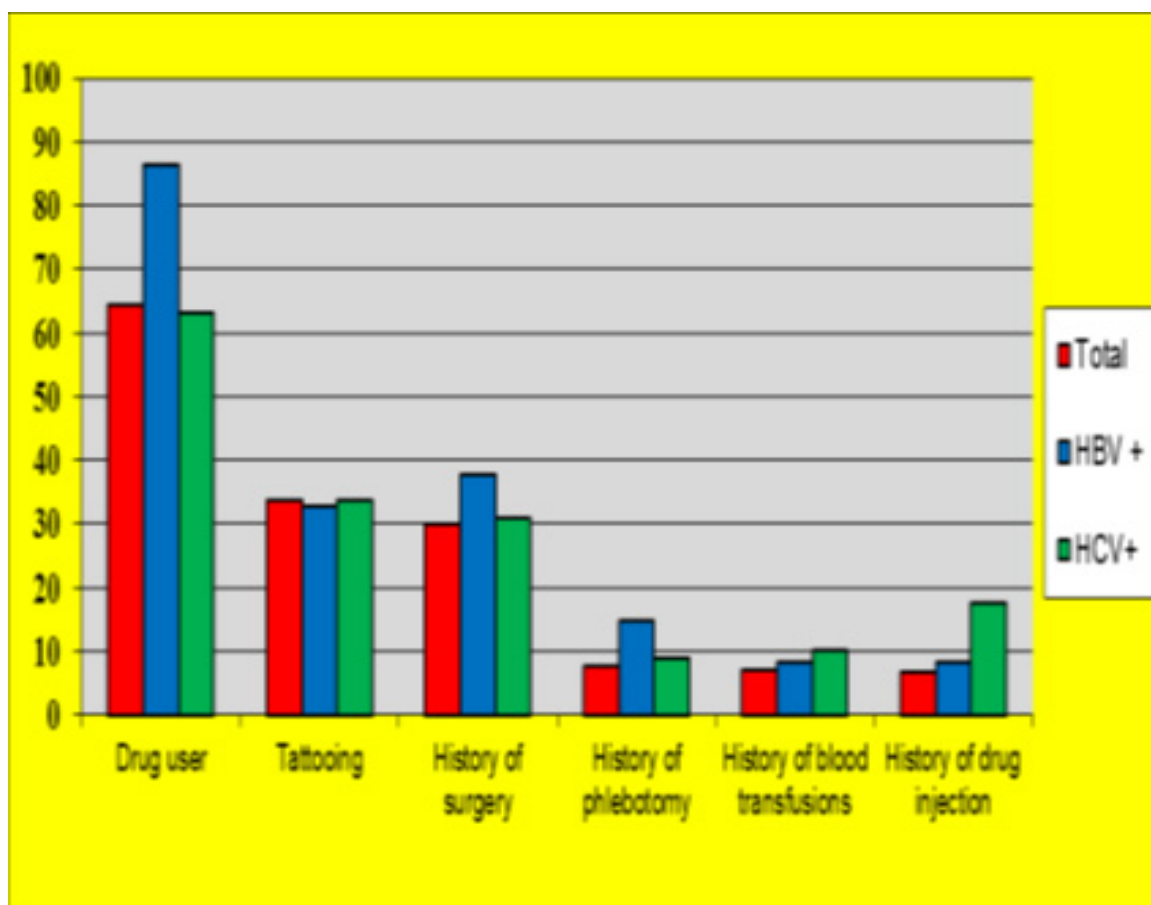


Figure 1.

The prevalence of IDU was 35%, and 19% of the injectors reported sharing injecting equipment. The majority of participants reported risk sexual behavior (13% male-to-male sex, 63% multiple sexual partners, 23% paid sex and 76% unprotected sexual activity with casual partners). 41.7% reported being tattooed and 17% reported a history of long staying in countries with high HBV and HCV prevalence.

By using SPSS 12, fifteen participants (8%, 95% CI = 5-13%) tested positive for HBs Ag, and 20 (11%, 95% CI = 7-16%) for anti-HCV. Significantly higher HCV seroprevalence rates were found in prisoners who were unemployed (13 versus 0%, $P = 0.013$) as well as in those who resided in urban areas (14% versus 4%, $P = 0.046$).

The HCV seropositivity was correlated to IDU (42% among prisoners who reported ever having injected drugs compared to 4% among those who denied drug use, $P < 0.001$).

Prevalence of different risk factors among HBV and HCV positive subject Statistical analysis showed that the prevalence of HBsAg was significantly higher among drug users (10.8 vs. 28%, $P < 0.001$) or those who had a history of traditional phlebotomy (cupping) (13.08 vs. 1.2%, $P = 0.03$).

Among IDUs, a significantly higher prevalence was found in prisoners who shared injecting equipment (73% versus 4%, $P < 0.001$). In contrast, HBV seroprevalence did not differ among these groups.

Table 1. Analysis of potential risk factors for HBV infection among prisoners

Risk factor	HBsAg +	HBsAg-	P-value
Drug user	10 (9.3)	3(2.6)	<0.001
Tattooing	5(4.1)	8(7)	0.86
History of surgery	6 (8.7)	7 (6.2)	0.17
History of traditional phlebotomy	9 (13.2)	4 (6.4)	0.03
History of blood transfusions	5 (8.1)	8 (6.8)	0.6
History of drug injection	2 (8.5)	11 (9.4)	0.81

Table 2. Analysis of potential risk factors for HCV infection among prisoners

Risk factor	Anti-HCV +	Anti-HCV -	P-value
Drug user	11 (7.6)	4 (8)	0.82
Tattooing	6 (7.7)	9 (7.7)	1
History of surgery	5 (8)	10 (7.6)	0.86
History of traditional phlebotomy	12 (8.8)	3 (7.6)	0.72
History of blood transfusions	4 (11.3)	11 (7.4)	0.27
History of drug injection	5 (20.3)	10 (6.1)	<0.001

Table 3. Seroprevalence of HBV and HCV according to risk behaviors

		HBsAg+		Anti-HCV+	
CHARACTERISTIC	N (%)	N pos (%)		N pos (%)	
Age (years)					
20-29	75 (40)	4 (5)		5 (7)	
30-39	66 (35)	7 (11)		10 (15)	
40-49	31 (16)	4 (13)		5 (16)	
50 +	18 (9)	0		0	
Employment (before prison)					
Yes	41 (22)	3 (7)		0	
No	149 (78)	12 (8)		20 (13)	
Area of residence					
Urban	137 (72)	12 (9)		18 (14)	
Rural	53 (28)	3 (6)		2 (4)	
Ever injected drugs					
Yes	40 (35)	4 (10)		17 (43)	
No	150 (65)	11 (15)		3 (4)	
Ever been tattooed					
Yes	48 (25.2)	7 (15)		15 (27)	
No	142 (74.8)	8 (8)		5 (8)	
Ever using drug					
Yes	120	13 (10.8)		16 (13.3)	

No	70	2 (2.8)		4 (27)	
History of traditional phlebotomy					
Yes	107 (76)	14 (13.08)		19 (22)	
No	83 (24)	1 (1.2)		1 (4)	
History of surgery					
Yes	101	9		10	
No	89	6		10	
History of blood transfusions					
Yes	76	5		7	
No	114	10		13	

Prisoners who reported unprotected sexual activity with casual partners had a significantly higher HCV seroprevalence rate than those who reported using condoms (22% versus 4%; $P = 0.027$). However, differences in HBV seropositivity between these groups did not reach statistical significance (17% versus 4%, $P = 0.087$).

Having tattoos was associated with higher anti-HCV positivity ($P = 0.007$). No difference in seroprevalence rates was found in prisoners who reported travelling and a long stay abroad compared to those who denied travelling (Table 1). There was an increase in seropositivity rate with the increasing number of risk factors for both HBV ($P = 0.033$) and HCV ($P < 0.001$) as shown in Tables 2 and 3.

5. Discussion

Prisoners are a high risk population for blood-borne diseases. Regular assessment of prisoner's health and the

identification of infected cases as well as related risk factors have a very important role in preventing and reducing the risk of transmission in-side and outside prisons.

In the present study the rate of HCV and HBV, infections in the central prison of Al-Diwaniya was fairly higher than of the general population which is only about 4.2%. In another study on prisoners in Iran, (Birjand) also report similar results in which the HBV and HCV prevalence was 6.1% and 8.1%, respectively¹⁰.

In comparison to other studies, the rate of HCV infection in our study (8% in all, 9.3% in drug users, and 8.5% in IDUs) was lower and could be explained by differences in the prevalence of infection in communities and some socio-economical and cultural factors. A study in west of Iran (Hamedan) indicated that 30% of all drug using prisoners and 31.5% of IDUs had HCV infection¹¹.

The rate of HCV infections in drug using prisoners was reported as around 30.8 and 45.4 in Gilan and

Mazandaran, Iranian provinces, respectively and HCV was high as 88.9% in IDUs prisoners in the Gilan study^{12,13}.

The rates of all blood-borne infections were dramatically high among prisoners in the south of Iran. HIV, HCV and HBV infection rates among IDU inmates in Hormozgan Province (in the northern margin of Arabian Gulf) were found to be 15.1%, 64.8%, and 4.7%, respectively¹⁴.

In other countries, studies on prisoners reported a variety of results. In Pakistan, which is relatively near to our study location, the rate of HCV among prisoners was 12.8%¹⁵.

A study in Europe (Croatia) had similar rates to our result for overall infections (HBV 11.3%, HCV 8.3%, HBV/HCV 6.3%), but higher rates among IDUs (52% HCV and 26.2% HBV)^{16,17}.

Another study in a prison in Australia showed that the incidence rate for HCV infection among IDUs was 34.2% per 100prisoners per year¹⁸.

Although the results are different and it could be explained by differences in the prevalence of infection in communities and some socio-economic and cultural factors, all studies indicated that the rate of HCV infection in IDUs is higher than in non-IDUs prisoners.

Our study showed that HBV infection was significantly associated with drug abuse and traditional phlebotomy which is a therapeutic method used in traditional medicine and is still popular in many societies including Iran. It can be a risky behavior especially considering that most of the hygienic criteria is not met during phlebotomy. The association of HBV seropositivity with phlebotomy was reported in other parts of Iran as well¹⁹.

In the same context, prevalence of hepatitis B among blood donors was reported around 0.8%²⁰.

While the prevalence in our province is around 0.47%, the lower rate of infections among prisoners can be as a result of several factors. These could include low prevalence of these diseases among the general population, good level of education, traditional lifestyles and a low density of inmates in prison.

6. Limitations of the study

1. Prisoners represent a hard to reach population, which limits the number of individuals who are willing to participate in a study.
2. The information on the potential risk behaviors was collected using a self-reported questionnaire and may have been inaccurate.

7. Conclusions

The prisoners represent a risk group with multiple risk factors (53% of participants reported more than one potential risk behavior) for HBV and HCV transmission. They also constitute a potential reservoir of viral hepatitis in the community after release.

8. Recommendations

With the consideration of the higher prevalence of blood-borne infections among prisoners, it is necessary to effectively apply practical approaches to reduce the risk of transmission for these infections in prisons. Two useful approaches are: vaccinations and educating prisoners and prison staff about blood-borne infections and transmission risk factors especially sharing needles, syringes and phlebotomy.

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