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Prevalence and Risk Factors for Hepatitis B and Hepatitis C Exposure in Iranian Prisoners: A National Study in 2016

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Abstract

Background: People in prisons are at high risk of hepatitis B virus (HBV) and hepatitis C virus (HCV) infection.
Objectives: This study aimed to evaluate the prevalence of HBV and HCV exposure and associated risk factors in Iranian prisons.
Methods: This cross-sectional study was conducted in 2016, among 29 prisons in Iran, blood samples were collected using multi-stage sampling. HBV and HCV diagnostic tests were conducted using enzyme-linked immunosorbent assay (ELISA). Univariate and multivariate logistic regression were used for the evaluation of factors associated with HBV and HCV exposure.
Results: Among 6,481 people in prisons, the prevalence of HCV and HBV antibodies were 8.21% (95% CI: 7.55 - 8.90) and 3.06% (95% CI: 2.65 - 3.50), respectively. Based on multivariate analysis, the most important risks associated for HCV exposure were the history of drug use (AOR 5.75, 95% CI 3.54 - 9.35) followed by the age of 30 years and older (AOR: 5.02, 95% CI: 3.65 - 6.9), the history of tattooing (AOR 2.42, 95% CI 1.96 - 3), the history of imprisonment (AOR 2.23, 95%CI 1.76 - 2.82), being single (AOR 1.91, 95% CI 1.54 - 2.37), low education (AOR 1.81, 95%CI 1.01 - 3.27), and the history of piercing (AOR 1.26, 95% CI 1.04 - 1.52). There was no significant association between HBV prevalence and independent variables ($P > 0.05$).
Conclusions: These findings highlight a high prevalence of HCV infection in Iranian prisons. Efforts are needed to improve HCV screening and interventions, particularly among people with a history of drug use, and linkage to care.

Keywords: Hepatitis B, Hepatitis C, Prison, Iran, High-Risk Behaviors, Prevalence

1. Background

Globally neglected a decade ago, viral hepatitis is now considered a health challenge alongside important infectious diseases such as human immunodeficiency viruses (HIV), tuberculosis and malaria (1). Although some drugs, alcohol, autoimmune diseases, bacteria, and many viruses are among the reasons that may contribute to the disease, viral hepatitis is the most important cause of hepatitis from a public health perspective. Hepatitis B and C viruses (HBV and HCV) are known to be the leading cause of viral hepatitis and despite the considerable advances in the treatment of viral hepatitis, these infections are still one of the main causes of mortality and disability in the world (2).

In Iran, vaccination of HBV in newborn infants and high-risk groups began in 1993. Twenty-five years after the start of HBV vaccination, studies show that HBV prevalence has declined in the general population and it is now estimated to be about 1.79% in the general population (3). The HCV prevalence is also low in the general population, estimated to be about 0.4% (4). But studies show that HCV prevalence in some of the high-risk groups, such as people who inject drugs or prisoners, is high with the values of 45% and about 10%, respectively (5, 6).

Prisons are among the most important places to be monitored in terms of transmitting infectious diseases, especially blood-borne diseases. Prison conditions such as overcrowding, inadequate medical care and high-risk sexual behaviors make people exposed to various infectious diseases (7). Drug injection is also associated with viral in-

fections and some prisoners are drug injectors, 10% to 60% of all prisoners worldwide have reported a history of drug injection (8). These people enter the community after being released from prison and can spread these infections in the general population.

Given the significant burden that viral hepatitis imposes on national health systems, the World Health Organization (WHO) has proposed new goals for controlling HBV and eliminating HCV by 2030 (9). Five strategies/steps have been considered to achieve these goals that in the first step, it is recommended to develop a strong surveillance system for HBV and HCV, especially in high-risk groups (1). Previous studies in Iran were conducted to determine the prevalence of HBV and HCV in prisoners at the local and provincial levels not generalized to the national level (7, 10, 11). In 2015, the first HBV and HCV surveillance program was conducted on nearly 6,000 prisoners in 10 provinces and 25 prisons and the results were reported (6). Along with other countries around the world, Iran seeks to control and eliminate viral hepatitis. In line with this aim, it conducts surveys on high-risk groups such as prisoners to estimate the prevalence of the disease and evaluate the measures taken over time in national and sub-national levels. The HBV and HCV surveillance system in Iran's prisons is designed to cover all provinces in three periods and provide an adequate estimate of the sample size in each province which can be generalized to the national level.

2. Objectives

Based on the above, this study aimed to determine the prevalence of HBV and HCV exposure and the associated risk factors in Iranian prisoners.

3. Methods

This cross-sectional study is the second round of bio-behavioral and observational studies of HBV and HCV in Iranian prisons conducted in 2016. The target population in this round included all prisoners in Iran during the study period, except provinces that were surveyed during the first round in 2015 (10 provinces) and who disapproved to participate in the study. The provinces were divided into the three categories of north, center, and south of Iran. Samples were taken from 21 non-sampled provinces using multi-stage sampling method. This round consisted of 10 provinces (3, 3, and 4 provinces from the north, center, and south, respectively), 29 prisons (9, 9, and 11 from the north, center, and south, respectively). Selected provinces were Gilan, Khorasan, North, Qazvin, Yazd, Tehran, Kermanshah, Khuzestan, Hormozgan, Chahar Mahaal and Bakhtiari, Kohgiluyeh and Boyer-Ahmad. Finally, 6,600 prisoners were selected for including in the study. At enrolment, trained interviewers collected questionnaire-based data, including demographic information, a history of a criminal conviction (a history of being convicted for a crime in the past), sexually transmitted diseases (STDs), drug use, tattooing, and high-risk sexual behavior, and HBV and HCV knowledge.

The blood samples were taken from individuals. Dried blood spot was collected from individuals willing to participate in the study and preserved in a standard manner (The samples were stored at -20°C and transferred to the laboratory at the earliest time). HBsAg and HCV antibodies were determined using optical density and cut-off points in the ELISA method and Dia Pro kits (Diagnostic Bioprobes Srl, Italy). HBS-Ag test had also a sensitivity of 100% and a specificity 98.8%, HCV antibody test had the sensitivity and specificity of 100%. The results were validated through repeated testing for both positive and negative cases. All laboratory experiments were carried out at the Pasteur Institute of Iran.

This research was approved by the Ethics Committee of Kurdistan University of Medical Science with the ethical approval code of IR.MUK.REC.1395/280. Informed consent was taken from the participants and those not willing to participate or not submitting the form were excluded from the study. A special code was considered for each prisoner in the questionnaire and on the serological sample to keep confidentiality. To statistically analyze the data, the collected data were first cleaned in terms of errors and outliers. We calculated the distribution of demographic and high-risk variables and also the prevalence of HCV and HBV in a subgroup of prisoners (Table 1). Univariate logistic regression was performed to identify the relationship between HCV and HBV prevalence and independent variables (Table 2). In this stage, all significant variables ($P < 0.05$) to determine the final model were entered the multivariate logistic analysis and if any variable had a correlation with each other the variables with higher significant OR was entered into multivariate logistic regression model (the variables of a, the history of previous imprisonment and duration of imprisonment; b, the history of drug use, drug injection, and common injection; c, the history of tattooing or tattooing in prison; and d, the history of extramarital sex and condom usage had a correlation with each other). Eventually, the final model was presented with a significant P value and we reported AOR for all variables (Table 3). All results related to descriptive and analytical statistics were performed using Stata/SE 14.0.

4. Results

Of the 6,600 sampled individuals, 6,481 individuals with an average age of 36.29 $\pm$ 10.05 years participated

Table 1. Distribution of Demographic and Behavioral Variables and the Prevalence of HCV and HBV in Subgroup of the Prisoners (N = 6,481)

Variables	Sample Size	HCV		HBV	
		Positive Case	Prevalence (95% CI)	Positive Case	Prevalence (95% CI)
Gender					
Male	6,306	530	8.40 (7.73 - 9.12)	196	3.11 (2.69 - 3.57)
Female	175	2	1.14 (0.14 - 4.07)	2	1.14 (0.14 - 4.07)
Age groups, y					
< 30	1,693	48	2.84 (2.10 - 3.74)	52	3.07 (2.30 - 4.00)
≥ 30	4,752	479	10.08 (9.24 - 10.97)	144	3.03 (2.56 - 3.56)
Marriage status					
Married	3,196	192	6.01 (5.21 - 6.89)	88	2.75 (2.21 - 3.38)
Widowed/divorced	880	98	11.14(9.13 - 13.40)	28	3.18 (2.12 - 4.56)
Single	2,400	241	10.04 (8.87 - 11.31)	82	3.42 (2.72 - 4.22)
Education					
Academic	526	13	2.47 (1.32 - 4.19)	21	3.99 (2.49 - 6.04)
Junior-diploma	3,887	316	8.13 (7.29 - 9.03)	112	2.88 (2.38 - 3.46)
Illiterate-primary	2,065	202	9.78 (8.53 -11.14)	65	3.15 (2.44 - 3.99)
History of previous imprisonment					
No	2,889	100	3.46 (2.82 - 4.19)	83	2.87 (2.29 - 3.55)
Yes	3,563	431	12.10 (11.04 - 13.21)	115	3.23 (2.67 - 3.86)
Duration of imprisonment (current 10 years)					
≤ 5	1,359	147	10.82 (9.21 - 12.59)	40	2.94 (2.11 - 3.99)
> 5	365	65	17.81 (14.02 - 22.13)	12	3.29 (1.71 - 5.67)
History of drug use					
No	1,829	18	0.98 (0.58 - 1.55)	57	3.12 (2.37 - 4.02)
Yes	4,648	514	11.06(10.17 - 11.99)	141	3.03 (2.56 - 3.57)
History of drug injection					
No	3,917	209	5.34 (4.65 - 6.09)	120	3.06 (2.55 - 3.65)
Yes	697	304	43.62 (39.89 -47.39)	19	2.73 (1.65 - 4.22)
History of shared injection					
No	432	172	39.81 (35.17 - 44.60)	13	3.01 (1.61 - 5.09)
Yes	251	130	51.79 (45.42 - 58.12)	6	2.39 (0.88 - 5.13)
History of tattooing					
No	3,362	136	4.05 (3.40 - 4.77)	97	2.89 (2.34 - 3.51)
Yes	3,105	395	12.72 (11.57 - 13.94)	101	3.25 (2.66 - 3.94)
History of tattooing in prison					
No	2,188	252	11.52 (10.21 -12.93)	78	3.56 (2.83 - 4.43)
Yes	888	142	15.99 (13.64 -18.57)	21	2.36 (1.47 - 3.59)
History of piercing					
No	3,522	250	7.10 (6.27 - 8.00)	103	2.92 (2.39 - 3.53)
Yes	2,945	281	9.54 (8.50 - 10.66)	95	3.23 (2.62 - 3.93)
History of piercing in prison					
No	2,543	241	9.48 (8.37 - 10.68)	80	3.15 (2.50 - 3.90)
Yes	348	38	10.92 (7.84 - 14.68)	13	3.74 (2.00 - 6.30)
History of extramarital sex					
No	2,421	141	5.82 (4.92 - 6.83)	68	2.81 (2.19 - 3.55)
Yes	3,275	327	9.98 (8.98 - 11.06)	109	3.33 (2.74 - 4.00)
Condom usage in extramarital sex					
Always	769	58	7.54 (5.78 - 9.64)	31	4.03 (2.75 - 5.67)
Sometimes	1,294	137	10.59 (8.96 - 12.39)	44	3.40 (2.48 - 4.54)
Never	1,174	130	11.07 (9.33 - 13.00)	33	2.81 (1.94 - 3.92)
History of STD in last year					
No	5,996	490	8.17 (7.49 - 8.89)	186	3.10 (2.68- 3.58)
Yes	473	41	8.67 (6.29 -11.57)	11	2.33 (1.17 - 4.12)

Table 2. Univariate Logistic Regression Analysis Among the Prisoners

Variables	HCV			HBV		
	OR	95% CI	P Value	OR	95% CI	P Value
Gender						
Female	1			1		
Male	7.94	1.96 - 32.08	0.004	2.77	0.68 - 11.26	0.153
Age groups, y						
< 30	1			1		
≥ 30	3.84	2.84 - 5.20	< 0.001	0.99	0.71 - 1.36	0.932
Marriage status						
Married	1			1		
Widowed/divorced	1.96	1.52 - 2.53	< 0.001	1.16	0.75 - 1.79	0.499
Single	1.75	1.43 - 2.13	< 0.001	1.25	0.92 - 1.70	0.153
Education						
Academic	1			1		
Junior -diploma	3.49	1.99 - 6.13	< 0.001	0.71	0.44 - 1.15	0.164
Illiterate-primary	4.28	2.42 - 7.56	< 0.001	0.78	0.47 - 1.29	0.335
History of previous imprisonment						
No	1			1		
Yes	3.84	3.07 - 4.80	< 0.001	1.13	0.85 - 1.50	0.412
Duration of imprisonment (current 10 years)						
≤ 5	1			1		
> 5	1.79	1.30 - 2.45	< 0.001	1.12	0.58 - 2.16	0.733
History of drug use						
No	1			1		
Yes	12.51	7.79 - 20.08	< 0.001	0.97	0.71 - 1.33	0.862
History of drug injection						
No	1			1		
Yes	13.72	11.18 - 16.84	< 0.001	0.89	0.54 - 1.45	0.631
History of shared injection						
No	1			1		
Yes	1.62	1.19 - 2.22	0.002	0.79	0.30 - 2.10	0.636
History of tattooing						
No	1			1		
Yes	3.46	2.83 - 4.23	< 0.001	1.13	0.85 - 1.50	0.392
History of tattooing in prison						
No	1			1		
Yes	1.46	1.17 - 1.83	0.001	0.66	0.40 - 1.07	0.090
History of piercing						
No	1			1		
Yes	1.38	1.15 - 1.65	< 0.001	1.11	0.83 - 1.47	0.484
History of piercing in prison						
No	1			1		
Yes	1.17	0.81 - 1.681	0.393	1.19	0.66 - 2.17	0.559
History of extramarital sex						
No	1			1		
Yes	1.79	1.46 - 2.20	< 0.001	1.19	0.88 - 1.62	0.265
Condom usage in extramarital sex						
Always	1			1		
Sometimes	1.45	1.05 - 2.00	0.023	0.84	0.52 - 1.34	0.460
Never	1.52	1.10 - 2.11	0.010	0.69	0.42 - 1.13	0.143
History of STD in last year						
No	1			1		
Yes	1.07	0.76 - 1.49	0.705	0.74	0.40 - 1.38	0.346

Table 3. Result from Multivariate Logistic Regression Final Models for HCV Among the Prisoners

Variables	AOR	95% CI	P Value
Gender			
Female	1		
Male	5.34	1.30 - 21.99	0.020
Age groups, y			
< 30	1		
≥ 30	5.02	3.65 - 6.90	< 0.001
Marriage status			
Married	1		
Widowed/divorced	1.52	1.16 - 1.99	0.003
Single	1.91	1.54 - 2.37	< 0.001
Education			
Academic	1		
Junior-diploma	1.52	0.85 - 2.73	0.158
Illiterate-primary	1.81	1.01 - 3.27	0.049
History of previous imprisonment			
No	1		
Yes	2.23	1.76 - 2.82	< 0.001
History of drug use			
No	1		
Yes	5.75	3.54 - 9.35	< 0.001
History of tattooing			
No	1		
Yes	2.42	1.96 - 3.00	< 0.001
History of piercing			
No	1		
Yes	1.26	1.04 - 1.52	0.018

in the study (response rate = 98.20%). Moreover, 6,306 (97.30%) participants were male, 3,196 (45.35%) were married, and 5,952 (91.88%) had non-academic education. The study of high-risk behaviors showed that the majority of individuals (72%) had a history of drug use; 15% had a history of injecting drug use, and 37% had ever shared needles. Less than half of participants (48%) had a history of tattooing and the majority (58%) had extramarital sex (Table 1).

The prevalence of HCV in Iranian prisons was 8.21% (95% CI: 7.55 - 8.90). This estimation was significantly different in 10 provinces: from 2.92% to 13.22% (P < 0.001) (Figure 1). The prevalence of HBV in this study was 3.06% (95% CI: 2.65 - 3.50). This value was significantly different in the studied provinces: from 1.74% to 4.83% (P = 0.003) (Figure 2).

Assessing the prevalence in subgroups of prisoners indicated that HCV prevalence was remarkably less among woman, people younger than 30 years of age, married, and educated persons. In contrast, this proportion was considerably higher in prisoners with a history of drug injection and tattooing (Table 1).

Univariate analysis showed that the prevalence of HCV was associated with demographic variables such as being male (P = 0.004), age 30 and above (P < 0.001), being single (P < 0.001), and non-academic education (P < 0.001); behavioral variables such as imprisonment record (P < 0.001) and more than 5 years imprisonment term (P < 0.001); high-risk behaviors such as a history of drug use (P < 0.001), a history of drug injection (P < 0.001), a history of needle sharing (P = 0.002), tattooing history (P < 0.001), tattooing history in prison (P = 0.001), piercing history (P < 0.001), extramarital sex (P < 0.001), and unstable condom use (P = 0.017) (Table 2). However, there was no significant association between HBV prevalence and any of the independent variables (Tables 2).

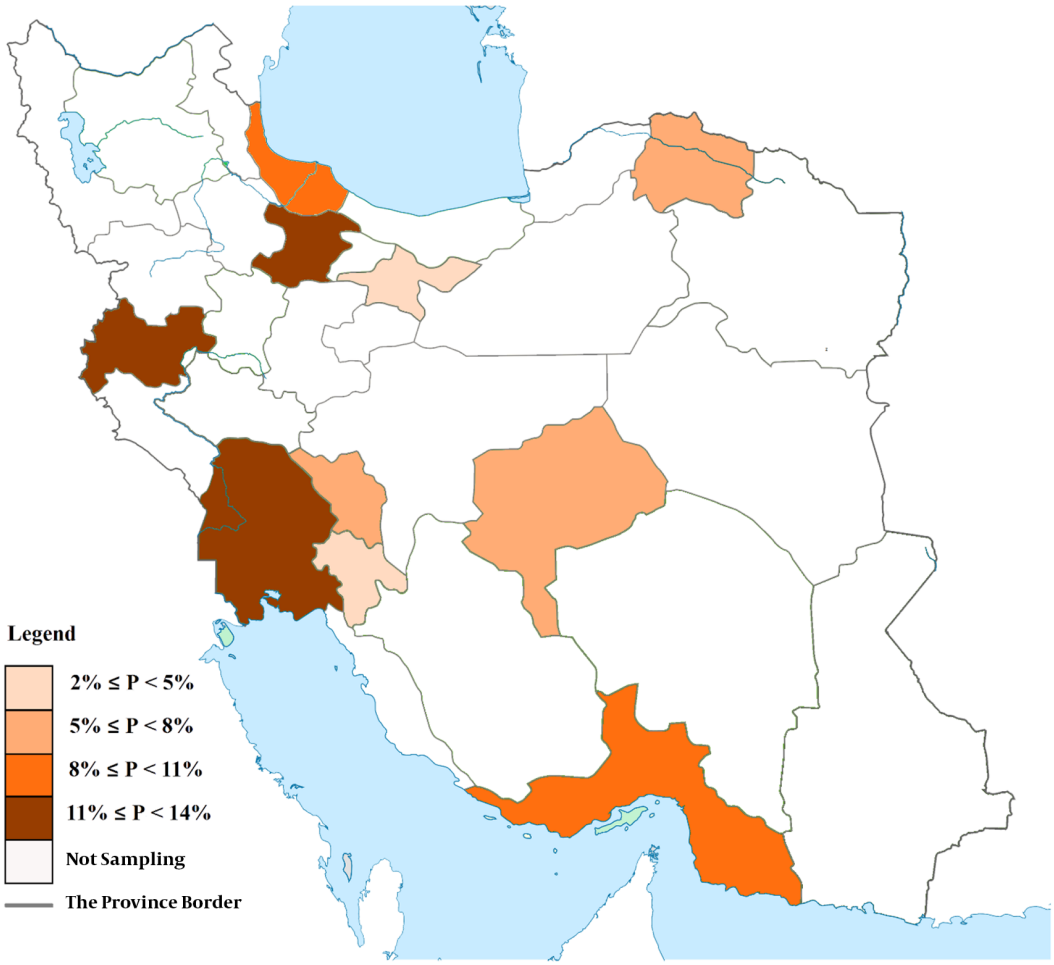

Figure 1. The prevalence and distribution of HCV in the studied provinces

After estimating the final model using multivariate logistic regression, this association was observed for male gender (P = 0.020), age 30 and above (P < 0.001), being single (P < 0.001), being widowed/divorced (P = 0.003), illiteracy (P = 0.049), imprisonment record (P < 0.001), a history of drug use (P < 0.001), tattooing (P < 0.001), and piercing (P = 0.018) during their lifetime (Table 3). It is notable that we did not perform multivariate logistic regression for final model of HBV prevalence because there was no significant variable (P < 0.05) in univariate analysis.

5. Discussion

In developed or developing countries, HCV is a very serious problem in prisoners. Therefore, it is required that healthcare professionals and policymakers pay particular attention to this issue. Based on the findings of the present study, the HCV exposure prevalence in prisoners was estimated to be at 8.21%. Considering the 0.4% HCV prevalence in the general population (4) and 0.5% in blood donors (12), it can be said that HCV prevalence in Iranian prisoners is 21 times higher than the general population and 16 times higher than the blood donors. Evidence has shown that a higher prevalence of HCV in prisons than the general population may be due to prison conditions and higher prevalence of high-risk behaviors such as the use of non-sterile tools for drug injection, tattooing, and higher risk sexual behaviors of prisoners relative to the general population (13, 14).

In Iran, the spread of HCV is similar to the HIV epidemic, and prisons have played a very important role (15). A systematic review in 2017 estimated HCV prevalence in

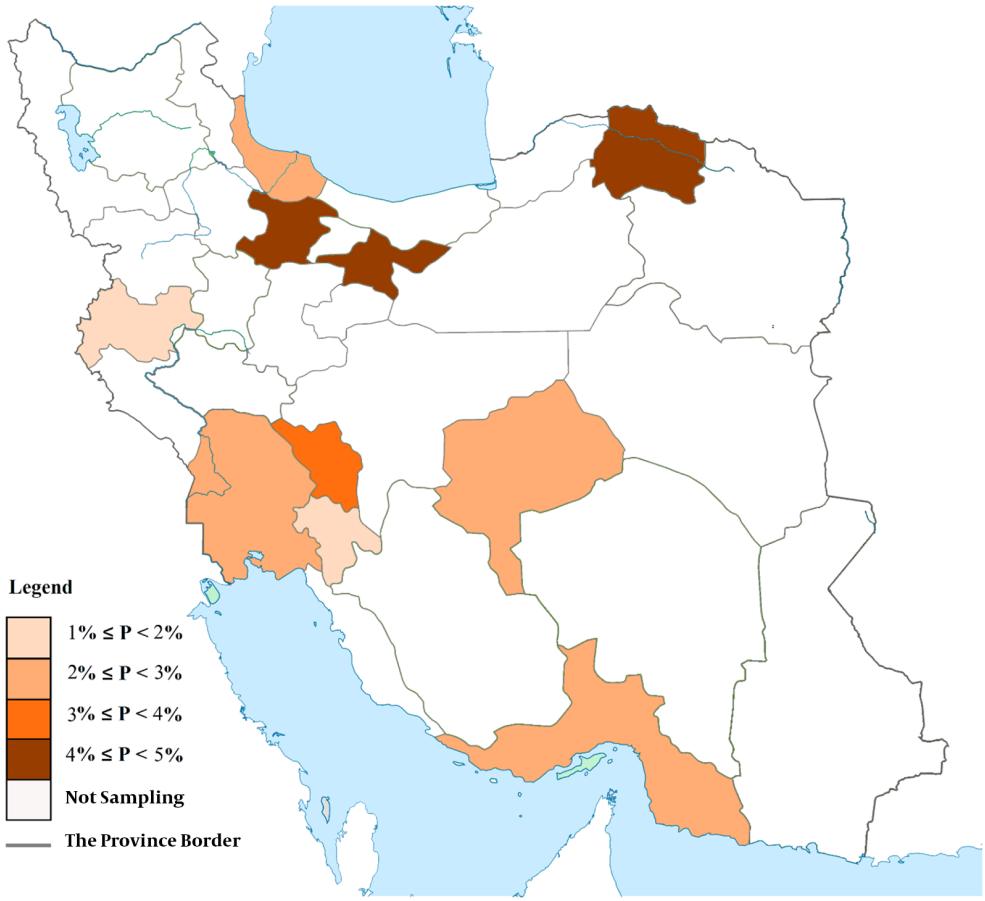

Figure 2. The prevalence and distribution of HBV in the studied provinces

Iranian prisons to be at 28%, which is different from the results of this study (16). This tangible difference can be attributed to the different conditions of the studies, as well as the study of specific and selective groups or the implementation of preventive programs in prisons, such as the harm reduction programs, methadone maintenance therapy, triangular clinics, condom distribution, etc. in recent years. Methadone maintenance treatment is one of the most important components of the harm reduction program that was launched in prisons since 2003 and has provided service to more than 30,000 prisoners in 164 prisons (17). This intervention in Iranian prisons is one of the most effective interventions to reduce the spread of diseases such as HIV and HCV. The results of this study are roughly similar to another study on 6,200 prisoners in Iran in 2015. It can be argued that it has provided a more accurate estimate of HCV exposure prevalence due to the large sample size and nation-wide coverage (6).

Various studies have also been conducted in other parts of the world to determine HCV prevalence in prisoners. One of these studies is the one by Marco Antonio Moreira Puga in Brazil that estimated the overall HCV prevalence to be 2.4% (95% CI: 1.9 - 2.9) (18). The HCV prevalence was 18% in the prisons of the United States (19), 4.9% in Hungary (20), 4.8% in France (21), and 22.4% in Italy (22). The reason for the difference in the studies conducted in different countries can be explained by the difference in the prevalence in different communities, the type of prisoners surveyed in each study, the adoption of high risk behaviors before imprisonment, the culture of each country, and the type of care systems and health conditions in prisons. In addition to the above, this difference may be due to the size of the sample and the selection of prisoners and also for a different definition of HCV positivity. The present study carried out the survey in a completely random way on all prisoners.

For accessing to eliminate hepatitis in line with 2030 Sustainable Development Goals target, the country should establish high-level national hepatitis elimination committees with commitment with plans and targets, especially in high-risk groups such as prisoners. Iran should begin and continue to develop national hepatitis plans in prisons to enable access to effective prevention, screening, diagnosis, treatment, and healthcare services. For hepatitis elimination to become a reality in the country, Iran needs to accelerate its efforts and increase investments and funds for care, especially HCV treatment.

On the other hand, male gender (AOR = 5.34), age 30 and above (AOR = 5.02), being single (AOR = 1.91), being widowed/divorced (AOR = 1.52), illiteracy (AOR = 1.81), previous imprisonment record (AOR = 2.23), the history of drug use (AOR = 5.75), having a tattoo (AOR = 2.42), and piercing (AOR = 1.26) were identified in this study as the main risk factors for HCV infection in prisoners. Various studies have been conducted to determine the effective factors on the incidence of HCV in prisoners throughout the world. The main risk factor associated with HCV in the prison population can be considered drug use and it is still a dilemma despite the severe ban on drug use in prisons (23-25). Roshandel et al. demonstrated that 36.3% of the prisoners had been imprisoned for drug-related crimes. There was an important association between the prevalence of hepatitis C and addiction to drugs that concerning the fact that one of the main transmission ways of hepatitis C is shared syringes and needles, the high amount of this infection is clearly expected in this group (26). Moreover, people with drug use are more likely to engage in high-risk behavior (27). Also, old age has been reported by several studies to be a risk factor for HCV infection in prisoners, which could be due to a longer history of addiction and other high-risk behaviors in older people. Similarly, in our study, the age of 30 and above had an effective role in HCV infection in prisoners (6, 25, 28). The history of tattooing in prisoners is associated with an increased risk of developing HCV, a result reported by recent studies (29-31). To sign a tattoo, pigments are injected into the cortical layer of skin by piercing the skin 80 to 150 times in a minute. Therefore, tattooing tools are in direct contact with the blood and other body fluids, and if tattooing needles are reused for more than one person without appropriate sterilization process (especially in prison conditions), the blood-borne diseases may be transmitted (29).

According to the WHO reports, approximately 257 million people worldwide are infected with HBV (32). After HBV immunization in Iran in recent past decades, now it is taken into account of the countries with a low HBV epidemic (33). In the current study, the HBV prevalence in prisoners was 3.06%, which is almost two times the prevalence in the general population. A study conducted on 1,431 male prisoners in three Iranian provinces estimated the HBV prevalence to be at 3%, which is similar to the results of this study (34). In another study on prisoners in Khorasan Razavi province, the HBV prevalence in three prisons was 6.9%, which is very different from the reported percentage on this study (35). This difference may be due to a much smaller sample size, non-random sampling of people surveyed or the geographical location of the province that has long borders with Afghanistan, the world's largest drug producer, which can lead to easy access to drugs and adopt high-risk behaviors (36).

Although high-risk sexual relationships, sharing drug injection equipment, and tattooing have been reported by different studies to be HBV risk factors in prisoners (35, 37, 38), there was no association between HBV prevalence in prisoners and the above risk factors in this study.

This study had several limitations, including social desirability and recall bias. The bias of social desirability occurs when collecting data related to unprotected sex, drug use history, and extramarital sex. That is because of social and prison conditions; people report a behavior that matches social norms rather than their actual behaviors. Also, in recall bias, people may have difficulty recalling what happened in the past, and they might not remember things correctly. Another limitation of this study is the use of HCV-Ab as an indicator of HCV exposure. HCV RNA measurement is the definite method to confirm HCV infection and to confirm HCV seropositivity, those with positive HCV-ab should be confirmed with another method such as RIBA, but in this study, conditions were not feasible to use confirmation methods.

5.1. Conclusions

According to the above and the estimated prevalence, it seems that HBV and HCV exposure prevalence in prisons is higher than the general population. The most important reason might be the gathering of individuals with high-risk behaviors and the continuation of these behaviors in prisons. Since prisons are not a place separate from the community and prisoners return to the community after being released or during their time of leave, they can transfer diseases through surgery, dentistry, sexual contact, home contacts, etc. Therefore, the authorities must take measures to prevent the spread of these infections among prisoners, especially among prisoners with drug-related offenses. Although prisoners are a high-risk group for the transmission of blood-borne infections, their accessibility provides valuable opportunities for the implementation of health and treatment interventions, especially for the treatment of HCV, which needs to be used properly. Implementation of educational programs on the transmission of diseases and prevention methods, vaccination of prisoners who have not been vaccinated against HBV, and

the design of appropriate interventions can help to prevent the spread of these infections among prisoners.

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Footnotes

Authors' Contribution: Study supervision: Mohammad Mehdi Gouya and Ghobad Moradi. Statistical analysis: Saeedeh Jafari. Critical revision of the manuscript for important intellectual content: Ghobad Moradi and Marzieh Mahboobi. Analysis and interpretation of data: Ghobad Moradi, Saeedeh Jafari, and Bushra Zarei. Acquisition of data: Fatemeh Azimian Zavareh, Leila Molaei, Amjad Mohamadi Bolbanabad, and Sonia Darvishi. Drafting of the manuscript: Ghobad Moradi, Marzieh Mahboobi, Mohammad Reza Aghasadeghi, and Mehrzad Tashakorian. Administrative, technical, and material support: Mohammad Mehdi Gouya, Mehrzad Tashakorian, and Ghobad Moradi.

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