

# The prevalence of isolated hepatitis B core antibody and its related risk factors among male injected drug users in Isfahan prisons

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## Abstract

**Background:** The prevalence of isolated hepatitis B core antibody (anti-HBc) varies between 1% and 30% in different populations. Isolated anti-HBc-positive patients who suffer from occult hepatitis B virus (HBV) infection have the potential to transmit HBV infection. So isolated anti-HBc screening is a valuable tool to prevent HBV transmission. Considering the importance of isolated anti-HBc screening and high prevalence of HBV among injected drug users (IDU) prisoners, we designed this study to evaluate the isolated anti-HBc positivity among inmates with the history of IDU in our area.

**Materials and Methods:** We did this cross-sectional study from September 2009 to March 2010 among volunteer male IDU prisoners in Isfahan. Blood samples were taken from all of subjects and tested for HBV markers. Then a questionnaire containing socio-demographic, drug histories and high risk behaviors information was completed for all participants. Data analysis was done utilizing univariate analysis and multiple logistic regressions. A  $P < 0.05$  was considered significant.

**Results:** Totally 970 male IDU prisoners (mean age  $32.6 \pm 8.1$ ) were included in our study. The prevalence of isolated HBC Ab was 4.5%. Isolated anti-HBc significantly was related to tooth filling (OR: 2.62, CI: 1.20-7.14) and imprisonment (OR: 3.95, CI: 1.39-11.18). We couldn't find any relationship between isolated anti-HBc positivity and addiction duration, incarceration frequency, recent incarceration duration or number of injection per month.

**Conclusion:** For screening high risk groups in parallel with hepatitis B surface antigen (HBsAg), hepatitis B surface antibody (HBsAb) and other viral markers, maybe it is better to check HBCAb too, because isolated HBCAb-positive patients may have occult hepatitis B infection which could transfer the infection to others.

**Key Words:** Injected drug users, isolated anti hepatitis B core, prison

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## INTRODUCTION

It has been estimated that about two billion people all around the world are infected with hepatitis B virus (HBV). About 400 million of these people are affected with chronic HBV and develop liver failure, cirrhosis and hepatocellular carcinoma.<sup>[1,2]</sup>

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The risk of HBV infection is high among injected drug users (IDUs).<sup>[3,4]</sup> The sharing of contaminated injection equipments and abnormal sex behaviors are known as the most important risk factors for HBV infection among IDUs.<sup>[5-7]</sup> Some studies have indicated that about one third of inmates are IDU. High prevalence of IDUs, drug injection and other high risk behaviors in prisons became suitable places for transmission of infection.<sup>[8,9]</sup>

Hepatitis B surface antigen (HBsAg) and antibodies to the Hepatitis B core antibody (anti-HBc) are serological markers for HBV infection diagnosis. Anti-HBc develops in the period of HBV infection and persists for a long time. The simultaneous presence of anti-HBc with HBsAg shows current infection while its presence together with antibodies against HBsAg (anti-HBs) indicates that infection has been resolved.<sup>[10,11]</sup> The prevalence of isolated positive anti-HBc, which is referred to anti-HBc positivity in the absence of both HBsAg and anti-HBs varies between 1% and 30% in different populations based on HBV endemicity in a particular area.<sup>[12-14]</sup> It has been reported that about 10-40% of patients with isolated anti-HBc are occult HBV patients.<sup>[15]</sup> These patients can transmit HBV infection and develop chronic liver diseases.<sup>[16,17]</sup> Considering the high prevalence of HBV among IDU prisoners and the importance of isolated anti-HBc screening in order to prevent infection transmission by HBV latent carriers, we designed this study to evaluate the prevalence of anti-HBc positivity and its related risk factors in male IDUs in Isfahan prisons.

## MATERIALS AND METHODS

This cross-sectional study was done among male IDUs in Isfahan prisons from September 2009 to March 2010. All prisoners with the history of drug injection based on their self-report and the confirmation of prison's health care professionals were included in our study. We informed subjects that the study is completely confidential and we obtained written informed consent from all of them. Blood samples (5 ml) were taken from each participant by trained prison's health personnel and sent to Infectious Disease Research Center Laboratory in cold boxes. To detect isolated anti-HBc-positive patients' sera from blood, specimens were tested using the fourth-generation enzyme-linked immunosorbent assay (ELISA) method to determine hepatitis B serum markers (HBs Ag, HBsAb, HBcAb). Then validated and reliable questionnaire<sup>[18]</sup> was completed for all of participants. Fortunately, 80% of male IDU prisoners participated in this study and all of them responded to the questioner. The questionnaire consisted of

socio-demographic information, drug histories, sexual habits, incarceration information and other dangerous behaviors that are related to HBV transmission. Data analysis was performed using SPSS software, version 16, and univariate analysis ( $P < 0.05$  was considered significant). Then significant variables in univariate analysis were entered in multiple logistic regression to determine the association between meaningful risk factors and isolated HBcAb positivity.

## RESULTS

We included 970 male IDU prisoners, aged 18 to 67 years (mean age  $32.6 \pm 8.1$ ) in this study. Of these, 55.4% were married and 44.6% were single. 92%, 7% and 1% of participant with marriage history had been married once, twice and more, respectively. Subjects consisted of 956 Iranian, 11 Afghan, 2 Armenia and 1 Hindi. The distribution of educational status is mentioned in Table 1. The majority of our samples had junior high school (40%) and elementary school (37.3%) educations. About 18% of participants were in grades higher than junior high school and 4.5% of them were illiterate or had reading and writing ability.

The prevalence of isolated anti-HBc positivity was 4.5% ( $n = 44$ ) in the current study. Table 2 shows the frequency of related risk factors in studied subjects. There was a significant relationship between isolated HBc Ab positivity and the history of imprisonment and dental filling ( $P < 0.05$ ) [Tables 2 and 3]. Isolated anti-HBc positivity was not related to the number of injection (median 30 times per month, range 1-500), addiction duration (median 12 years, range 0.5-57), frequency of incarceration (median 3 times, range 1-37) and duration of recent incarceration (median 3.66 years, range 0.08-35). There were also no relationship between socio-demographic characteristics and isolated anti-HBc positivity.

## DISCUSSION

In the current study, we estimated the prevalence of isolated anti-HBc positive male IDU prisoners in Isfahan province. The prevalence of isolated anti-HBc

**Table 1: The distribution of educational status in studied population**

Educational status	Number	Percent
Illiterate	35	3.6
Able to read and write	9	0.93
Elementary school	362	37.3
Junior high school	388	40
High school	48	5
Diploma degree	105	10.8
University degree	23	2.37

**Table 2: The frequency of related risk factors among participants**

Risk factor	Number	Percent	P value
Tattooing	582	60	0.88
Cupping	378	39	0.82
Blood transfusion	194	20.2	0.73
Surgery	491	50.6	0.25
Suture	765	78.9	0.21
Hospital injection	438	45.1	0.66
Dental filling	360	37.1	0.008
Dental extraction	820	84.5	0.43
Gum surgery	68	7	1
Illegal sex	696	71.8	0.84
Needle sharing	364	37.5	0.87
Former imprisonment	694	71.5	0.002
Endoscopy	78	8	0.77
Organ donation	392	40.4	0.70

**Table 3: Multiple logistic regressions of risk factors for anti-HBc positivity**

Risk factor	Odds ration	95% CI
Tooth filling		1.20-7.14*
Yes	2.62	
No	1	
Former imprisonment		1.39-11.18*
Yes	3.95	
No	1	

\*P<0.05, CI: Confidence interval, HBc: Hepatitis B core antibody

was about 4.5% among our subjects. As we searched, we only could find one study that had determined the prevalence of isolated anti-HBc among IDUs. They included 153 IDUs of Arak, central province of Iran; in their study, they found that about 7.84% of subjects have isolated anti-HBc.<sup>[19]</sup>

In this study, there was a significant relationship between the presence of isolated anti-HBc and a history of former imprisonment(s) except this time. Based on our knowledge, this study is the only one which has examined the relationship between high risk behaviors and isolated anti-HBc presence. The significant relationship between former imprisonment and HBV infection has been mentioned in some studies but its reasons are not clear.<sup>[20,21]</sup> It seems that sharing contaminated injection drug equipments is higher in prisons. In a study performed by Liang *et al.* they found an association between HBcAb positivity and HIV and they found that HBcAb positivity is higher in patients with HIV and HCV coinfection.<sup>[22]</sup> In this study, we didn't assess HIV and HCV on study group, and these two infections can be confounding factors that are common in IDUs especially IDU prisoners, which can influence on our results. On the other hand, participants with history of former imprisonment maybe infected with HIV or HCV or both more likely

than people without history of former imprisonment, and in fact coinfection with HIV, HCV or both could be the principle cause for isolated HBc Ab positivity in participant with history of former imprisonment.<sup>[22]</sup> So doing further studies is necessary to clarify the relationship between imprisonment and isolated anti-HBc positivity.

We also found that tooth filling is related to isolated anti-HBc positivity. This fact that dental procedures are associated with HBV infection transmission and high frequency of dental problems in IDUs can explain the relation between isolated anti-HBc and tooth filling.<sup>[23,24]</sup> In a study by Keyvani *et al.* on hemodialysis patients they found a relationship between isolated HBc Ab positivity and diabetes mellitus, older age and older age when dialysis started,<sup>[25]</sup> but in this study there were no relationship between isolated HBc Ab positivity and demographic characteristics such as age.

Isolated anti-HBc may reflect resolved previous HBV infection with undetectable level of HBsAb, window phase of an acute infection and chronic HBV infection with undetectable HBsAg levels that is called occult HBV.<sup>[26-28]</sup> Ramezani and her colleagues in a study detected occult HBV patients by doing HBV-DNA detection tests on subjects with isolated anti-HBc marker and concluded that isolated anti-HBc screening among high risk groups can reflect occult HBV.<sup>[29]</sup>

For screening of HBV infection among high risk groups, in parallel with HBsAg, HBsAb and other viral markers, maybe it is better to check HBcAb too, because isolated HBcAb positive patients may have occult hepatitis B infection which could transfer the infection to others. So it seems that doing other studies in future in order to detect occult HBV patients among cases with isolated anti-HBc is necessary to determine if isolated anti-HBc screening is a useful tool to prevent HBV infection transmission among IDU prisoners in our area.

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