



# Investigation of the Prevalence of HBsAg, Anti-HCV, and Anti-HIV in a Prison in Turkey: A Point Prevalence Study

Türkiye’de Bir Cezaevinde HBsAg, Anti-HCV ve Anti-HIV Prevalansının Araştırılması: Nokta Prevalans Çalışması

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## ABSTRACT

**Objectives:** Access to health services is more difficult for prison inmates than for the general population. This study aimed to determine the prevalence of hepatitis B surface antigen (HBsAg), anti-hepatitis C virus (HCV), and anti-human immunodeficiency virus (HIV) in prisoners and to determine the rates of risky behavior in terms of these viral diseases using a questionnaire.

**Materials and Methods:** Nine hundred ninety-three prisoners participated in the Risky Behavior Questionnaire. On March 13-14, 2023, HBsAg, anti-HCV, and anti-HIV were studied by rapid tests in the fingertip blood of 553 volunteer prisoners. Positive samples were re-examined using ELISA.

**Results:** Out of 1,490 inmates remaining in prison, 993 voluntarily participated in the survey study and 553 participated in the blood control. All participants included in the study were male. The median age was 36 (17-81). Of the participants, 26 (4.7%) HBsAg positivity and 7 (1.3%) anti-HCV positivity were detected. Anti-HCV positivity was found in one (0.2%) of the HBsAg-positive patients and anti-HIV positivity in the other (0.2%), concurrently. Anti-HIV positivity was detected in one patient. The risky behavior questionnaire determined that 522 (54.8%) of the participants had tattoos, 511 (53.6%) had a history of surgery, 384 (10.3%) had unprotected sexual intercourse, 256 (26.9%) had intravenous substance abuse behavior, and 35 (3.7%) had homosexual intercourse.

## ÖZ

**Amaç:** Cezaevlerinde kalan mahkumların sağlık hizmetlerine ulaşmaları genel popülasyona göre daha zor olmaktadır. Bu çalışmada mahkumlar da hepatit B yüzey antijeni (HBsAg), anti-hepatit C virüs (HCV) ve anti-insan bağışıklık yetmezliği virüsü (HIV) prevalansının saptanması ve anket yoluyla bu viral hastalıklar açısından riskli davranış oranlarının belirlenmesi amaçlanmıştır.

**Gereç ve Yöntemler:** Riskli Davranış Anketi’ne 993 mahkum katıldı. Toplam 553 gönüllü mahkumdan 13-14 Mart, 2023 tarihinde parmak ucu kanı alınarak hızlı testlerle HBsAg, anti-HCV ve anti-HIV çalışıldı. Pozitif çıkan örnekler ELISA yöntemi ile tekrar edildi.

**Bulgular:** Cezaevinde kalan mahkum sayısı 1.490 olup, anket çalışmasına 993 mahkum, kan kontrolüne ise 553 mahkum gönüllü olarak katılmıştır. Çalışmaya alınan katılımcıların tamamı erkekti. Ortanca yaş 36 (sınırlar: 17-81) idi. Katılımcılardan 26 (%4,7) kişide HBsAg pozitifliği, 7 (%1,3) kişide anti-HCV pozitifliği saptandı. HBsAg pozitifliği olanların birinde (%0,2) anti-HCV, 1’inde de (%0,2) anti-HIV birlikte pozitifliği tespit edildi. Bir kişide ise anti-HIV pozitifliği saptandı. Riskli davranış anketinde katılımcıların 522’sinin (%54,8) dövme yaptırdığı, 511’inin (%53,6) ameliyat geçirdiği, 384’ünün (%10,3) korunmasız cinsel ilişkide bulunduğu 256’sinin (%26,9) damar yoluyla madde kullanıcısı olduğu ve 35’inin (%3,7) eşcinsel ilişkide bulunduğu saptandı.

**Sonuç:** Çalışmamızdan elde edilen bulgular mahkumlarda güncel hepatit B, hepatit C ve HIV prevalansını göstermektedir.

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**Conclusion:** The findings of our study show the current prevalence of hepatitis B, hepatitis C, and HIV in prisoners. It is important to detect index cases in prisons and to ensure that they receive treatment, both in the ward and after release, to prevent the spread of diseases in the community.

**Keywords:** Prisoner, prison, hepatitis B, hepatitis C, anti-HIV

## Introduction

The transmission chains of hepatitis B and hepatitis C are similar. The combined infection of these patients with human immunodeficiency virus (HIV) makes the clinic more dramatic as it triggers the development of cirrhosis and cancer, complicating the treatment. Besides the similar transmission routes of all three infections, there is an overlooked transmission route (1-3), which is defined as being over 40 years old and detained for more than 10 years (4,5).

Although clinicians are relieved by the vaccination program for hepatitis B and high treatment success for hepatitis C virus (HCV), measures need to be taken to achieve the goals of reducing HIV infection and deaths associated with these infections (6). The World Health Organization (WHO) recommends taking these precautions because of the mortality-reducing effect and the high cost-effectiveness of treatment (2,6).

Follow-up of hepatitis C, B, and HIV infections in prisoners is important because of the high-risk behaviors in the detainees. 85% of these infections detected in prisons were associated with pre-prison lifetime (7). However, there is a risk of transmission from infected prisoners to other inmates (4). Studies have reported that the prevalence of these infections in prisoners is high (8). Identification and treatment of infected prisoners in a closed environment are also important to prevent the transmission of the disease when they are released into the community. Infected prisoners released back into the community contribute to the spread of these infections. As can be seen, treating patients in closed environments will not only help the detainees but also take a step toward solving an important public health problem by breaking the chain of transmission (3,9). Obtaining epidemiological data on prisoners is one of the primary studies to be conducted in this regard. Prisoners often lack health care before being imprisoned. Infection management can be initiated by detecting infected persons in prisons (6,9,10).

This study aimed to determine the seroprevalence of hepatitis B surface antigen (HBsAg), anti-HCV, and anti-HIV in prisoners and to determine risky behavior rates in terms of these viral diseases.

## Materials and Methods

The study was conducted in Samsun t-type Closed Penitentiary Institution between 13 and 14 March 2023. The study protocol was approved by the ethics committee of Samsun University Clinical Research Ethics Committee (approval number: 2023/4/4, date: 01.03.2023). Official permissions were obtained from the decision of the T.R. Ministry of Justice General Directorate of Prisons and Detention Houses dated: 20.12.2022 and numbered: 790535500-622.02/E-447/178076, Samsun Chief Public Prosecutor's Office

Cezaevlerinde indeks olguların tespit edilmesi, ihtiyacı olanların tedaviye ulaşmalarını sağlamak gerek koşu içinde gerekse serbest kaldıktan sonra toplumda yayılımı önlemek açısından önemlidir.

**Anahtar Kelimeler:** Mahkum, cezaevi, hepatit B, hepatit C, anti-HIV

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## Risky Behavior Questionnaire and Participants

An 8-question survey was distributed to the convicts who voluntarily participated in the research. The survey included four information questions, including medical information such as age, surgery, blood transfusion, family history of hepatitis B, hepatitis C, and HIV, and four behavioral and attitude questions regarding IV drug use, tattooing, unprotected sexual activity, and homosexual intercourse. No other personal information was requested. The forms filled out anonymously were collected.

## Tests

In the second phase of the study, after obtaining signed informed consent forms from 553 volunteer participants, HBsAg (Abbott/Abon, China), anti-HCV (Abbott/Abon, China), and anti-HIV (Abbott/Abon, China) tests were performed in a whole blood sample taken from the fingertip as a screening test. The tests give qualitative results using the immunochromatographic method. In the package inserts, the sensitivity and specificity of the kits are 99.13% and 99.84% for HBsAg, 100% and 100% for anti-HCV, and 100% and 99.96% for anti-HIV, respectively. The working procedure was carried out as specified in the kits; 3 hanging drops of whole blood sample (approximately 75 µLT) taken from the fingertip were dropped into the sample wells of the test device, then 1 drop of buffer was added and the results were evaluated by the microbiologist after 15 min.

Venous blood samples taken from patients with positive HBsAg, anti-HCV, or anti-HIV tests with rapid tests were re-studied by the ELISA method on the Abbott I200 device in the Samsun Training and Research Hospital Medical Microbiology Laboratory.

## Statistical Analysis

The data were analyzed using the SPSS 25.0 software (IBM SPSS, Chicago, IL, USA). Descriptive data are given as numbers and percentages.

## Results

There were 1,490 detainees and convicts (40 women and the rest men) in the prison. A total of 553 volunteers, 21 women and 532 men, participated in the fingertip screening. HBsAg positivity was observed in 26 (4.7%) participants and isolated anti-HCV positivity in seven (1.3%). Anti-HCV positivity was found in one (0.2%) of the HBsAg-positive patients and anti-HIV positivity in the other (0.2%), concurrently. No isolated anti-HIV positivity was detected. Prisoners with positive rapid screening test results were called for examination in the infectious diseases and clinical

microbiology clinic. All positive samples were confirmed to be positive using the ELISA method.

It was determined in the hospital information management system inquiry that three of the patients with anti-HCV positivity had received previous treatment with a diagnosis of chronic hepatitis C. Two patients were still receiving entecavir treatment with a diagnosis of chronic hepatitis B.

The patient with HIV + HBV co-infection was still receiving antiretroviral therapy. The patient with HBV + HCV co-infection had previously received pegylated interferon (peg-IFN) and ribavirin therapy. Currently, the patient is on hepatitis B treatment. In addition, hepatitis C treatment was started in 1 patient and hepatitis B in 2 patients. Other cases were considered in the inactive phase and followed up.

All 993 volunteers who completed the Risky Behavior Questionnaire were male, with a 66.6% survey participation rate. The median age was 36 (17-81). 522 (54.8%) of the participants had tattoos, 511 (53.6%) had a history of surgery, 384 (10.3%) had unprotected sexual intercourse, 256 (26.9%) had intravenous substance abuse behavior, and 35 (3.7%) had homosexual intercourse (Table 1). The rates were calculated for the people who answered the related questions.

<b>Table 1.</b> Distribution of screening test results for hepatitis B, C, and HIV infection and questionnaire answers for risk factors		
	<b>n (%)</b>	<b>Number of participants</b>
<b>Screening tests</b>		
HBsAg	26 (4.3)	553
Anti-HCV	8 (1.3)	
Anti-HIV	1 (0.2)	
HBsAg + anti-HIV	1 (0.2)	
HBsAg + anti-HCV	1 (0.2)	
<b>Risky behaviors</b>		
Tattoo	522 (52.6)	993
Surgery history	511 (53.6)	
Unprotected sex	384 (40.3)	
Intravenous substance abuse	256 (26.9)	
Blood transfusion	235 (24.7)	
Family history	132 (13.9)	
Homosexuality	35 (3.7)	
Risky behavior percentages were calculated from those who answered the related survey questions. HIV: Human immunodeficiency virus, HBsAg: Hepatitis B surface antigen, HCV: Hepatitis C virus		

## Discussion

In this study, it was observed that the rates of hepatitis B, hepatitis C, HIV positivity, and some risky behaviors were relatively higher in prisoners than in the general population.

While the general HBsAg positivity is around 4% in our country, it has been reported to be in the range of 4-10 in prisoners (11-13). In a study conducted by Balci et al. (14) in 2008, 2.4% of 633 prisoners were found to be HBsAg positive and 0.5% were

anti-HCV positive. The prevalence of hepatitis B in prisoners was higher than the general prevalence in the community. This finding can be attributed to a higher risky behavior history in prisoners compared with the general population. The rate of HBsAg positivity in prisoners was reported 10 times higher than that in the general population in the USA, and 5.6% of the patients were detained during the incubation period (15). Two of the 26 HBsAg-positive patients detected in this study were under treatment. One patient was receiving treatment for HIV and HBV co-infection. Other patients learned about their positivity for the first time. This finding may indicate that there are hepatitis B patients who have not yet been detected in the prisoners, that some of them may be newly infected, that risky behaviors in prisoners may have increased the number of new patients, and that the disease continues to spread in the prison. This also demonstrates the necessity of routine hepatitis B screening in prisons.

According to the 2013 WHO report, the worldwide prevalence of HCV has increased to 2.8%. The report states that this rate is 3.6% (3.2-4.1%) in the North Africa/Middle East region, including Turkey (16). The rate of anti-HCV positivity in the general population in Turkey varies between 0.1% and 0.9% (11,12). In one study, the risk of HCV was 1.9 times higher in those with a prison history than in the normal population (17). HCV positivity in convicts was reported at 20% (2) in Australian prisons, 22.7% in Spanish prisons (18), and 22% in Irish prisons (3). Anti-HCV positivity has been reported as less than 1% in our country and between 0.6% and 3.2% in prisoners (11,12). Balci et al. (14) found anti-HCV positivity in 0.5% of the prisoners in their study. In our study, isolated anti-HCV positivity was found in seven (1.3%) prisoners and hepatitis B and anti-HCV co-positivity in one. This rate is also above the general population prevalence. This finding may be related to the higher risky behavior history in prisoners compared with that in the general population. In the study, it was determined that three of the patients with anti-HCV positivity received previous treatment with a diagnosis of chronic hepatitis C. This finding suggests that the other four patients were previously undetected and/or were newly infected in prison. This indicates that hepatitis C continues to spread in prisons and that routine hepatitis C screening is necessary because of higher risky behaviors in inmates.

Vaux et al. (19) found HIV positivity as high as 59.6% in HCV-positive male homosexual prisoners. A study conducted in Spain also found HIV positivity in 40% of HCV-positive prisoners (18). In another study, the risk of HCV infection was reported to be increased 32.4 times in HIV-positive patients (17). In our study, HBsAg and anti-HCV co-positivity was found in a prisoner, and HBsAg and anti-HIV co-positivity in the other. This finding shows that individuals infected with one of these blood or sexually transmitted viral diseases are most likely to have contracted the second viral infection as a result of continuing their risky behaviors.

In the risky behavior questionnaire, it was determined that a significant proportion of the participants had a history of surgery (53.6%), blood transfusions (24.7%), and family history (13.9%). These risky behaviors are not in the hands of the individual; however, the high prevalence of these stories among prisoners indicates that inmates should be screened for hepatitis B, hepatitis C, and HIV.

Intravenous drug use has been reported to significantly increase the risk of HCV (17,20). In a study conducted in Australia, HCV was found in 19.2% of prisoners using IV drugs, and the relationship between IV drug use and HCV was shown (21). A study conducted in Spain determined that 23.2% of prisoners with HCV are IV drug users and that IV drug use is an independent risk factor for contracting HCV infection, increasing the risk of HCV infection by an average of 55 times. The same study also reported that IV drug use increased the risk of HBV infection by 2.4 times (18). In a study, HCV infection was found in 67% of IV drug users and HBV infection in 50% (22). Although the rate of IV substance use in prisoners varies from country to country, it has been reported as 11% in Canada and 53% in Scotland (23,24). We determined that 26.9% of the prisoners used IV substances. This high rate indicates that these prisoners are also at risk of these viral diseases and should be screened. However, considering that IV substance use is unlikely to continue in prison, it seems that it may be sufficient to screen these prisoners at the end of the possible incubation period at the entrance and after a while.

It has been stated that tattooing in prisoners increases the risk of HCV infection (25). In our study, we determined that 54.8% of the prisoners had tattoos. This rate is well above that of the general population and poses a significant risk of viral diseases. In addition, considering that tattooing continues to be practiced in unhygienic conditions in prison despite the restrictions, it can be suggested that these prisoners should be routinely screened.

It has been reported that risky sexual behaviors in male homosexuals increase the risk of hepatitis B, hepatitis C, and HIV infection (26,27). In a study conducted in France, the rate of HCV positivity in male homosexual prisoners was reported as 1%, and a relationship was found between homosexuality and HCV (19). Todd et al. (28) reported that anal intercourse was an independent risk factor for HBV. Calleja Panero et al. (29) reported that 21% of people infected with HCV showed risky sexual behavior. In our study, we found that 10.3% of the prisoners had unprotected sexual intercourse and 3.7% had homosexual intercourse. Considering the difference between the rates of unprotected and homosexual intercourse revealed in the surveys, it can be thought that a significant part of unprotected intercourse may be related to pre-conviction and/or spousal visitation. Besides, it seems impossible to clearly detect this risky behavior in prison conditions. In the study, 3.7% of the prisoners stated that they had homosexual intercourse. It can be predicted that this rate will be below the real figure due to both the social point of view and the possibility of avoiding expression in prison conditions. It is also unknown whether the same-sex relationship was just pre-conviction or is still ongoing. It does not seem possible to detect the real situation. To prevent the spread of hepatitis B, hepatitis C, and HIV, it may be beneficial for the prison administration to determine the appropriate way and method of educating convicts on these issues.

### Study Limitations

There were some limitations in our study. An anonymous questionnaire was used to obtain the data more accurately; therefore, it could not be analyzed which risky behavior might be associated with the viral disease rate because it was not known

which participant the answers belonged to. Moreover, although names were not given, it can be considered that most of the rates are below the true rates due to the anxiety that may exist among the detainees. Nevertheless, the number of participants was kept high and it was tried to ensure that the rates caused fewer statistical errors. In addition, the use of tests giving qualitative results in screening can be considered a limitation of our study. However, the ELISA method that gives quantitative results requires a device; that is, it cannot be studied at the bedside. These screening tests are both easier to apply and more cost-effective.

### Conclusion

Our study shows the current prevalence of hepatitis B, hepatitis C, and HIV in prisoners and the frequency of risky behaviors. Considering that the risky behavior of the prisoners may continue, routine screening to prevent viral spread and treatment in positive cases will be beneficial both for the health of the person and for preventing transmission.

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### Ethics

**Ethics Committee Approval:** The study protocol was approved by the ethics committee of Samsun University Clinical Research Ethics Committee (approval number: 2023/4/4, date: 01.03.2023).

**Informed Consent:** It was obtained.

**Peer-review:** Internally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: E.M.Y., M.B., Z.Ş.K., M.A.O., F.T., Concept: E.M.Y., M.B., F.T., Design: E.M.Y., M.A.O., F.T., Data Collection or Processing: E.M.Y., M.B., Z.Ş.K., F.T., Analysis or Interpretation: E.M.Y., F.T., Literature Search: E.M.Y., M.B., Z.Ş.K., M.A.O., Writing: E.M.Y., Z.Ş.K., F.T.

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