THE TURKISH JOURNAL ON ADDICTIONS
www.addicta.com.tr

ORIGINAL ARTICLE

Seropositivity Rates of Anti-HCV, HbsAg, Anti-HIV, and the Relationship between Sociodemographic and Clinical Variables in Individuals Hospitalized with a Diagnosis of Opioid Use Disorder

Salih Cihat Paltun

Health Sciences University Erenkoy Mental and Nervous Diseases Training and Research Hospital, Alcohol and Substance Dependency Treatment and Education Center, İstanbul, Türkiye

ORCID iDs of the authors: S.C.P. 0000-0002-5884-6194.

Main Points

- Anti-HCV seropositivity was found in 8.2% of the sample.
- Anti-HCV seropositivity was significantly related to the age at first substance use, age at first opioid use, history of intravenous drug use, and city of residence.
- It is crucial to conduct viral serological screenings in individuals diagnosed with OUD, especially those with a history of intravenous drug use.

Abstract

Viral hepatitides and human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) are significant public health problems. Globally, there are an estimated 1.34 million deaths annually due to viral hepatitis and 1.33 million due to HIV/AIDS. Viruses transmitted through blood, including human immunodeficiency virus (HIV), hepatitis C virus (HCV), and hepatitis B virus (HBV), are highly prevalent among intravenous drug using (IDU) individuals. This study aimed to investigate the seropositivity rates of antibody to HCV (anti-HCV), HBsAg, and antibody to HIV (anti-HIV), along with sociodemographic and clinical characteristics, in patients diagnosed with opioid use disorder undergoing inpatient detoxification treatment at the Alcohol and Drug Addiction Treatment Center (ADATC). The patients diagnosed with Opoid Use Disorder and treated in Inpatient unit between January 1, 2016, and January 1, 2018, were retrospectively reviewed. In the serological analysis results, anti-HCV positivity was found in 50 (8.2%) patients, and HBsAg positivity was detected in seven (1.1%) patients, with no cases of anti-HIV positivity observed. Regarding anti-HCV positivity, statistically significant differences were found among subgroups related to the age at first substance use, age at first opioid use, history of intravenous drug use, and city of residence. However, no statistically significant differences were observed among subgroups related to age, gender, marital status, education level, employment status, legal history, and additional substance use history.

Keywords: Hepatitis B, hepatitis C, HIV, opioid

Corresponding Author:
Salih Cihat Paltun
E-mail:
drpaltun@gmail.com

Received: January 11, 2024
Revision Requested: May 17, 2024
Last Revision Received: May 28, 2024
Accepted: June 13, 2024
Publication Date: March 15, 2025

Introduction

Viral hepatitides and human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) are significant public health problems. Globally, there are an estimated 1.34 million deaths annually due to viral hepatitis and 1.33 million due to HIV/AIDS (Dalal et al., 2011; UNAIDS, 2023). Hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) are known to share similar transmission routes, including intravenous drug use (IDU), blood transfusion, sexual contact, and perinatal exposure. Therefore, co-infection with HIV, HBV, and/or HCV is frequently encountered (McGovern, 2007; Rotman & Liang, 2009). Globally, an estimated 15.6

Cite this article as: Paltun, S. C. (2025). Seropositivity rates of anti-HCV, HbsAg, anti-HIV and the relationship between sociodemographic and clinical variables in individuals hospitalized with a diagnosis of opioid use disorder. *Addicta: The Turkish Journal on Addictions*, 12(1), 58-62.

DOI: 10.5152/ADDICTA.2025.24006

million individuals are reported to engage in intravenous drug use (Degenhardt et al., 2017). Viruses transmitted through blood, including HIV, HCV, and HBV, are highly prevalent among intravenous drug-using (IDU) individuals (Degenhardt et al., 2017). Substance contamination as well as the sharing of tools such as syringes, spoons, and cotton during drug preparation and administration are significant factors facilitating the spread of infections among IDU individuals (Ceylan et al., 2022).

Opioid use disorder (OUD) is a psychiatric disorder that is increasingly prevalent not only globally but also in our country. In the European Union, it has been reported that 36% of all treatment admissions related to substance use are attributed to opioid use, with heroin being a widely used substance among opioids (EMCDDA, 2019). It has been observed that individuals who start using heroin generally begin by snorting, and later, approximately 75% of users continue to use it intravenously (Gandhi et al., 2006). In Turkiye, it was reported that around 21.3% of patients receiving inpatient treatment in 2018 used substances intravenously, and these individuals had a higher prevalence of HBV, HCV, and HIV seropositivity compared to the general population(Gıynaş Ayhan & Yıldızgören, 2021).

Targets have been developed for reducing HIV and viral hepatitis infections, and the scope of substance dependence treatment is listed as one of the United Nations' sustainable development goals (UNAIDS, 2017; WHO, 2016). Experiences of homelessness, arrest, incarceration, and involvement in sex work increase the risk of exposure to HIV, HCV, and HBV among IDU individuals, posing a heightened risk of negative impacts on their physical and mental health (Eckhardt et al., 2017; Genberg et al., 2015; Larney et al., 2013; Wood et al., 2017). Age, gender, and the types of drugs used intravenously are associated with the risk of viral transmission through blood among IDU individuals, necessitating diverse treatment and harm reduction methods (Kaye & Darke, 2000; Kozlov et al., 2006; Springer et al., 2015; Zule & Desmond, 1999). Determining the size, demographic characteristics, and levels of exposure to risky behaviors and environments within the IDU population is crucial for effective health policy planning (Altice et al., 2016).

This study aimed to investigate the seropositivity rates of antibody to hepatitis C virus (anti-HCV), hepatitis B surface antigen (HBsAg), and antibody to human immunodeficiency virus (anti-HIV), along with sociodemographic and clinical characteristics, in patients diagnosed with OUD undergoing inpatient detoxification treatment at the Alcohol and Drug Addiction Treatment Center (ADATC). The hypothesis of this study is that there are differences between anti-HCV positive and anti-HCV negative groups of OUD diagnosed patients in sociodemographic and clinical characteristics.

Material and Methods

Study Design and Data Collection

Data for all patients hospitalized for OUD at the ADATC inpatient unit of Ankara Numune Training and Research Hospital between January 1, 2016, and January 1, 2018, were retrospectively reviewed. Patients for whom serological analysis results could not be obtained for various reasons (such as those discharged without blood tests) were excluded from the study. All patients who were hospitalized with a diagnosis of opioid use disorder on the specified dates and whose serological analysis results, sociodemographic data, and clinical data were accessible were included in the study; psychiatric comorbidities were not excluded. Through a retrospective screening of patient records and the hospital software system, sociodemographic information (gender, age, marital status, education level, employment status, city of residence), legal history, history of intravenous drug use, additional substance use, age at first substance use, age at first opioid use, and serological test results for anti-HCV, HBsAg, and anti-HIV using the enzyme immunoassay method (Abbott) were collected. Ethical approval for the study was obtained Clinical Research Ethics Committee of Health Sciences University Dr. Abdurrahman Yurtaslan Oncology Training and Research Hospital, with approval number 2020-03/577, dated March 18, 2020.

Statistical Analysis

The statistical analysis was conducted using the SPSS v.22 (IBM SPSS Corp.; Armonk, NY, USA) program. The normal distribution suitability of the data was examined using the one-sample Kolmogorov – Smirnov test. The Mann – Whitney *U*-test was employed for comparing data that did not conform to a normal distribution between groups. In all tests, a significance level of $p < .05$ was considered statistically significant.

Results

Data for all patients hospitalized for OUD at the ADATC inpatient unit between January 1, 2016, and January 1, 2018, were reviewed. A total of 612 patients were included in the study,

Table 1.
Sociodemographic Data and Clinical Characteristics

		***N*(%)/Mean ± s.s.**
Age		24.29 ± 4.714
Gender	Female	42 (6.9%)
	Male	570 (93.1%)
Marital status	Married	125 (20.4%)
	Not married	487 (79.6%)
Education (years)		9.03 ± 2.060
Employment status	Employed	263 (43%)
	Unemployed	349 (57%)
Place of residence	The city of ADATC	564 (92.2%)
	Other cities	48 (7.8%)
Age at first substance use (years)		16.71 ± 4.248
Age at first opioid use (years)		19.63 ± 4.538
History of intravenous drug use	Yes	255 (41.7%)
	No	357(58.3%)
History of additional substance use	Yes	532 (86.9%)
	No	80 (13.1%)
Legal incident history	Yes	348 (56.9%)
	No	264 (43.1%)

Table 2.
Serology Test Results

	Serology Result	*N* (%)
Anti-HCV	Positive	50 (8.2%)
	Negative	572 (91.8%)
HBsAg	Positive	7 (1.1%)
	Negative	605 (98.9%)
Anti-HIV	Positive	0 (0%)
	Negative	612 (100%)

HBsAg, hepatitis B surface antigen; anti-HCV, antibody to HCV ; anti-HIV, antibody to HIV.

consisting of 570 (93.1%) males and 42 (6.9%) females. The average age of the patients was 24.29 (±4.714). While 564 (92.2%) patients lived in the city of ADATC, 48 (7.8%) patients lived in other cities. Among the patients, 125 (20.4%) were married, and 487 (79.6%) were not married. In terms of employment status, 263 (43%) patients were employed, and 349 (57%) patients were unemployed. The mean age at first substance use was 16.71 (±4.248), and the mean age at first opioid use was 19.63 (±4.538). Additional substance use history was present in 532 (86.9%) patients, while 80 (13.1%) had no additional substance use history. A legal history was reported in 348 (56.9%) patients, while 264 (43.1%) had no legal history. A history of intravenous drug use was reported in 255 (41.7%) patients, while 357 (58.3%) had no history of intravenous drug use (Table 1). In the serological analysis results, anti-HCV positivity was found in 50 (8.2%) patients, and HBsAg positivity was detected in seven (1.1%) patients, with no cases of anti-HIV positivity observed (Table 2). Regarding anti-HCV positivity, statistically significant differences were found among subgroups related to the age at first substance use, age at first opioid use, history of intravenous drug use, and city of residence. However, no statistically significant differences were observed among subgroups related to age, gender, marital status, education level, employment status, legal history, and additional substance use history (Table 3).

Table 3.
Comparison of Anti-HCV Serology Results With Sociodemographic and Clinical Data

		Anti-HCV (+) (n-%)	Anti-HCV (−) (n-%)	*P*
Age at first substance use	<15	22 (44%)	192 (34.2%)	<.05
	15 – 18	20 (40%)	170 (30.2%)	
	18 – 21	5 (10%)	103 (18.3%)	
	21 – 24	3 (6%)	46 (8.2%)	
	>24	0 (0%)	51 (9.1%)	
Age at first opioid use	<15	4 (8%)	53 (9.4%)	<.05
	15 – 18	24 (48%)	155 (27.6%)	
	18 – 21	11 (22%)	141 (25.1%)	
	21 – 24	7 (14%)	105 (18.7%)	
	>24	4 (8%)	108 (19.2%)	
Intravenous drug use	Yes	49 (98%)	206 (36.7%)	<.05
	No	1 (2%)	356 (63.3%)	
Place of residence	The city of ADATC	37 (74%)	527 (93.8%)	<.001
	Other cities	13 (26%)	35 (6. 2%)	

anti-HCV, anti-HCV antibody to HCV.
*Mann – Whitney *U*-test.

Discussion

It is reported that approximately 60% of newly detected HCV infections worldwide are observed in the group with substance use, primarily among intravenous drug users (Alter, 2007; Amon et al., 2008). Different studies conducted in Turkiye reveal varying rates of anti-HCV seropositivity. In a retrospective study with patients diagnosed with OUD, the reported anti-HCV seropositivity was 5.1%; while in a study specifically screening individuals using intravenous drugs, the reported rate was 44.9% (Sezak et al., 2012; Tan et al., 2003). In another study conducted abroad, where HCV RNA levels were measured in individuals with anti-HCV seropositivity, a 17.5% HCV infection rate was reported(Berbesi-Fernández et al., 2017). A meta-analysis conducted by Shayan et al. in three developing countries Iran, Afghanistan, and Pakistan, reported an HCV prevalence of 48.3% among IDU patients (Shayan et al., 2021). A review by Degenhardt et al. reported a global anti-HCV seropositivity rate of 52.5% among IDU patients although there were regional variations (Degenhardt et al., 2023). In our study, the rate of anti-HCV seropositivity among patients diagnosed with OUD and receiving inpatient treatment, either through intravenous or other routes, was 8.2%, while among those with intravenous drug use, the anti-HCV seropositivity rate was 19.2%. Differences in the reported rates of anti-HCV seropositivity in the literature have been attributed to variations in intravenous drug use rates, including histories of needle sharing, geographic differences, and other disparities in sample selection. It is believed that the rates observed in our study may be influenced by the inclusion of patients admitted to a single center for inpatient treatment. Additionally, the inability to include data from patients who sought inpatient treatment but were discharged without even undergoing serological analyses may have contributed to these rates.

As a result of peer pressure, the desire for risk-taking, and the pursuit of excitement, young adults are known to have a higher likelihood of initiating and continuing opioid use (Griffin, 2010). When looking at the age groups of anti-HCV positive individuals in our study, it was found that 80% of these individuals were in the age range of 15–21. Risky behaviors such as intravenous drug use, needle sharing, and unprotected sexual intercourse are significant risk factors for the transmission of viral hepatitides. Considering the incomplete development of the prefrontal cortex, which plays a crucial role in impulse control, in individuals within the specified age group, and the negative impact of substance use on this development, the observed age distribution within this range is an expected result.

The widespread use of hepatitis B vaccination in infants has significantly reduced the incidence of new chronic HBV infections. Between the pre-vaccination period (which may vary from the early 1980s to the early 2000s based on the introduction

year into regional vaccination schedules) and 2015, the rate of chronic infections among children under 5 years old has decreased from 4.7% to 1.3%. The remaining infections typically occur through mother-to-child transmission during birth or contact with other infected young children (World Health Organization, 2017). Hepatitis B vaccination was included in the immunization schedule in Turkiye in 1998. In a review that examined 129 studies evaluating seroprevalence in the general population in Turkiye between 1999 and 2009, the overall prevalence of HBsAg positivity was reported to be 4.57% (Toy et al., 2011). A study conducted in Elazığ in 2015 among individuals with substance use reported an HBsAg positivity rate of 2.6% (Karabulut et al., 2015). Another study conducted in our country in 2019, including cases referred to the probation polyclinic, reported an HBsAg positivity rate of 2.2% (Zeyti˙noğlu et al., 2019). In our study, which included inpatient individuals diagnosed with OUD, the HBsAg seropositivity rate was found to be 1.1%. Generally, in samples predominantly consisting of a younger age group, the rates of HBsAg positivity tend to decrease due to the impact of vaccination, and the frequency in cases with substance use appears to be similar to the general population. The lower HBsAg seropositivity rate in our study compared to other research may be related to a higher vaccination rate in this group, given the difference in the average age between our sample and other studies.

Approximately 39 million individuals worldwide are living with HIV, and intravenous drug use ranks among the primary risk factors for this infection (HIV and AIDS, n.d.). It is reported that around 10% of HIV infections occur through needle sharing during intravenous drug use (Aceijas et al., 2004). The prevalence of HIV in individuals who use intravenous drugs in Iran, Afghanistan, and Pakistan is reported to be 9.1%. In Turkiye, as of December 31, 2018, there were 19,748 reported cases of HIV(+) individuals and 1772 AIDS cases confirmed by a positive confirmation test since 1985. Among these cases, 49.4% were reported to be transmitted sexually, and 1.3% were due to intravenous drug use (Türkiye Halk Sağlığı Genel Müdürlüğü, 2018). Another study conducted in Istanbul among individuals with intravenous opioid use reported a rate of 4.7% (Tan et al., 2003). In another study conducted in Elazığ, the reported rate was 0% (Karabulut et al., 2015) and in a research conducted in Izmir, which included individuals with various substance use disorders using intravenous and other routes, the reported rate of anti-HIV positivity was 0.2% (Zeyti˙noğlu et al., 2019). When reviewing the literature, considering the variations in anti-HIV positivity rates among samples that include individuals using intravenous or other routes for substance use across countries and regions, it is not surprising that our study yielded diverse results.

The comparison between anti-HCV positive and anti-HCV negative groups, based on a large sample size of inpatients diagnosed with opioid use disorder, along with clinical features such as legal history, age of first opioid use, and age of first substance use, distinguishes this study from other research.

Limitations and Directions/Suggestions for Future Research

Since our study was conducted through a retrospective data review method, partial access to the patients' clinical data was obtained, and not all variables could be examined. Additionally, being a cross-sectional study makes it impossible to establish a cause-and-effect relationship. Nevertheless, considering the sample size, the study provides reliable information regarding the rates of anti-HCV, HBsAg, and anti-HIV in patients diagnosed with OUD in the city where the study was conducted, even though all variables could not be thoroughly examined.

In light of the results of this study, it is crucial to conduct viral serological screenings, especially in individuals diagnosed with OUD, particularly those with a history of intravenous drug use. Collaborating with infectious disease clinics and ensuring follow-up and treatment for individuals where necessary is highly important for public health protection. Given the current treatment methods for HCV infection, which can provide a cure, preventing the spread and complications of this infection, screening individuals diagnosed with substance use disorders, especially those with a history of intravenous drug use, is of great importance.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: This study was approved by the Ethics Committee of Health Sciences University Dr. Abdurrahman Yurtaslan Oncology Training and Research Hospital (approval number: 2020-03/577; date: March 18, 2020).

Informed Consent: N/A.

Peer-review: Externally peer-reviewed.

Declaration of Interests: The author has no conflict of interest to declare.

Funding: The author declared that this study has received no financial support.

References

Aceijas, C., Stimson, G. V., Hickman, M., Rhodes, T., & United Nations Reference Group on HIV/AIDS Prevention and Care among IDU in Developing and Transitional Countries (2004). Global overview of injecting drug use and HIV infection among injecting drug users. *AIDS*, *18*(17), 2295 – 2303. [CrossRef]

Alter, M. J. (2007). Epidemiology of hepatitis C virus infection. *World Journal of Gastroenterology*, *13*(17), 2436 – 2441. [CrossRef]

Altice, F. L., Azbel, L., Stone, J., Brooks-Pollock, E., Smyrnov, P., Dvoriak, S., Taxman, F. S., El-Bassel, N., Martin, N. K., Booth, R., Stöver, H., Dolan, K., & Vickerman, P. (2016). The perfect storm: Incarceration and the high-risk environment perpetuating transmission of HIV, hepatitis C virus, and tuberculosis in Eastern Europe and Central Asia. *Lancet*, *388*(10050), 1228 – 1248. [CrossRef]

Amon, J. J., Garfein, R. S., Ahdieh-Grant, L., Armstrong, G. L., Ouellet, L. J., Latka, M. H., Vlahov, D., Strathdee, S. A., Hudson, S. M., Kerndt, P., Des Jarlais, D., & Williams, I. T. (2008). Prevalence of hepatitis C virus infection among injection drug users in the United States, 1994 – 2004. *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*, *46*(12), 1852 – 1858. [CrossRef]

Avrupa uyuşturucu ve uyuşturucu Bağımlılığı İzleme merkezi(2019), avrupa uyuşturucu raporu. Eğilimler ve gelişmeler.

Berbesi-Fernández, D. Y., Segura-Cardona, A. M., Montoya-Velez, L. P., & Santamaría, A. Á. (2017). Uso de heroína inyectada y el riesgo de hepatitis C en tres ciudades de Colombia. *Revista Brasileira de Epidemiologia*, *20*(3), 435 – 444. [CrossRef]

Ceylan, M. R., Celik, M., Esmer, F., Levent, E., & Orer-Beginoglu, O. (2022). Substance use disorders and hepatitis C: A public health issue. *Klimik Dergisi/Klimik Journal*, *35*(4), 258 – 262. [CrossRef]

Dalal, S., Beunza, J. J., Volmink, J., Adebamowo, C., Bajunirwe, F., Njelekela, M., Mozaffarian, D., Fawzi, W., Willett, W., Adami, H.-O., & Holmes, M. D. (2011). Non-communicable diseases in sub-Saharan Africa: What we know now. *International Journal of Epidemiology*, *40*(4), 885 – 901. [CrossRef]

Degenhardt, L., Peacock, A., Colledge, S., Leung, J., Grebely, J., Vickerman, P., Stone, J., Cunningham, E. B., Trickey, A., Dumchev, K., Lynskey, M., Griffiths, P., Mattick, R. P., Hickman, M., & Larney, S. (2017). Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: A multistage systematic review. *Lancet. Global Health*, *5*(12), e1192 – e1207. [CrossRef]

Degenhardt, L., Webb, P., Colledge-Frisby, S., Ireland, J., Wheeler, A., Ottaviano, S., Willing, A., Kairouz, A., Cunningham, E. B., Hajarizadeh, B., Leung, J., Tran, L. T., Price, O., Peacock, A., Vickerman, P., Farrell, M., Dore, G. J., Hickman, M., & Grebely, J. (2023). Epidemiology of injecting drug use, prevalence of injecting-related harm, and exposure to behavioural and environmental risks among people who inject drugs: A systematic review. *Lancet. Global Health*, *11*(5), e659 – e672. [CrossRef]

Eckhardt, B., Winkelstein, E. R., Shu, M. A., Carden, M. R., McKnight, C., Des Jarlais, D. C., Glesby, M. J., Marks, K., & Edlin, B. R. (2017). Risk factors for hepatitis C seropositivity among young people who inject drugs in New York City: Implications for prevention. *PLoS One*, *12*(5), e0177341. [CrossRef]

Gandhi, D. H., Kavanagh, G. J., & Jaffe, J. H. (2006). Young heroin users in Baltimore: A qualitative study. *American Journal of Drug and Alcohol Abuse*, *32*(2), 177 – 188. [CrossRef]

Genberg, B. L., Astemborski, J., Vlahov, D., Kirk, G. D., & Mehta, S. H. (2015). Incarceration and injection drug use in Baltimore, Maryland. *Addiction*, *110*(7), 1152 – 1159. [CrossRef]

Gıynaş Ayhan, M., & Yıldızgören, E. (2021). Tedavi alan erkek eroin bağımlılarında sosyodemografik ve klinik özellikler. Retrieved from http://acikerisim.aksaray.edu.tr/xmlui/handle/20.500.12451/8684

Griffin, K. W. (2010). The epidemiology of substance use among adolescents and young adults: A developmental perspective. In *Handbook of drug use etiology: Theory, methods, and empirical findings* (pp. 73 – 92). American Psychological Association.

Türkiye halk sağlığı genel Müdürlüğü (2018). *HIV_AIDS_Kontrol_Programı.pdf*. Retrieved from https://Hsgm.Saglik.Gov.Tr/Depo/Yayinlarimiz/Programlar/HIV_AIDS_Kontrol_Programi.Pdf

Karabulut, N., Bulut, Y., & Telo, S. (2015). Frequency of hepatitis B and C viruses, and HIV among drug addicts in the eastern Anatolia, Turkey. *Jundishapur Journal of Microbiology*, *8*(8), e19698. [CrossRef]

Kaye, S., & Darke, S. (2000). A comparison of the harms associated with the injection of heroin and amphetamines. *Drug and Alcohol Dependence*, *58*(1 – 2), 189 – 195. [CrossRef]

Kozlov, A. P., Shaboltas, A. V., Toussova, O. V., Verevochkin, S. V., Masse, B. R., Perdue, T., Beauchamp, G., Sheldon, W., Miller, W. C., Heimer, R., Ryder, R. W., & Hoffman, I. F. (2006). HIV incidence and factors associated with HIV acquisition among injection drug users in St Petersburg, Russia. *AIDS (London, England)*, *20*(6), 901 – 906. [CrossRef]

Larney, S., Kopinski, H., Beckwith, C. G., Zaller, N. D., Jarlais, D. D., Hagan, H., Rich, J. D., van den Bergh, B. J., & Degenhardt, L. (2013). Incidence and prevalence of hepatitis C in prisons and other closed settings: Results of a systematic review and meta-analysis. *Hepatology*, *58*(4), 1215 – 1224. [CrossRef]

McGovern, B. H. (2007). The epidemiology, natural history and prevention of hepatitis B: Implications of HIV coinfection. *Antiviral Therapy*, *12*(Suppl. 3), H3 – H13. [CrossRef]

Rotman, Y., & Liang, T. J. (2009). Coinfection with hepatitis C virus and human immunodeficiency virus: Virological, immunological, and clinical outcomes. *Journal of Virology*, *83*(15), 7366 – 7374. [CrossRef]

Sezak, N., Tosun, S., Eris, N., & Ayer, A. (2012). Prevalence of hepatitis B and hepatitis C infections and evaluation of related factors in patients in a mental health hospital. *Klimik Dergisi/Klimik Journal*, *24*(1), 154 – 157. [CrossRef]

Shayan, S. J., Nazari, R., & Kiwanuka, F. (2021). Prevalence of HIV and HCV among injecting drug users in three selected WHO-EMRO countries: A meta-analysis. *Harm Reduction Journal*, *18*(1), 59. [CrossRef]

Springer, S. A., Larney, S., Alam-mehrjerdi, Z., Altice, F. L., Metzger, D., & Shoptaw, S. (2015). Drug treatment as HIV prevention among women and girls who inject drugs from a global perspective: Progress, gaps, and future directions. *Journal of Acquired Immune Deficiency Syndromes*, *69*(Suppl. 2), S155 – S161. [CrossRef]

Tan, D., Kalyoncu, A., Pektaş, Ö., Beyazyürek, M., & Mirsal, H. (2003). Damar yolundan eroin kullananlarda hepatit B, hepatit C ve HIV yaygınlığı. *Bağımlılık Dergisi*, *4*(1), 1.

Toy, M., Önder, F. O., Wörmann, T., Bozdayi, A. M., Schalm, S. W., Borsboom, G. J., van Rosmalen, J., Richardus, J. H., & Yurdaydin, C. (2011). Age- and region-specific hepatitis B prevalence in Turkey estimated using generalized linear mixed models: A systematic review. *BMC Infectious Diseases*, *11*, 337. [CrossRef]

UNAIDS (2017). *Fast-Track and human right,Advancing human rights in efforts to accelerate the response to HIV.*

UNAIDS (2023). *Global HIV & AIDS statistics, Fact sheet.*

Retrieved from https://www.unaids.org/en/resources/fact-sheet

Retrieved from https://www.unaids.org/sites/default/files/media_asset/JC2895_Fast-Track%20and%20human%20rights_Print.pdf

Retrieved from https://www.who.int/news-room/fact-sheets/detail/hiv-aids

Retrieved from https://www.who.int/publications-detail-redirect/WHO-HIV-2016.06

Wood, E. F., Werb, D., Beletsky, L., Rangel, G., Cuevas Mota, J., Garfein, R. S., Strathdee, S. A., & Wagner, K. D. (2017). Differential experiences of Mexican policing by people who inject drugs residing in Tijuana and San Diego. *International Journal on Drug Policy*, *41*, 132 – 139. [CrossRef]

World Health Organızatıon (2016). *Global health sector strategy on viral hepatitis 2016 – 2021. Towards ending viral hepatitis.*

World Health Organization (2017). *Global hepatitis report 2017*. Geneva: World Health Organization. Retrieved from https://apps.who.int/iris/handle/10665/255016

World Health Organızatıon (2023). *HIV and AIDS.*

Zeyti˙noğlu, A., Altintoprak, A. E., Altuğlu, İ., & Tanyer, S. (2019). Madde Kullanımı Olan Olgularda HBsAg, anti-HCV ve anti-HIV Seroprevalansı: Retrospektif bir Değerlendirme. *Nöropsikiyatri Arşivi*, *56*(3), Article 3. [CrossRef]

Zule, W. A., & Desmond, D. P. (1999). An ethnographic comparison of HIV risk behaviors among heroin and methamphetamine injectors. *American Journal of Drug and Alcohol Abuse*, *25*(1), 1 – 23. [CrossRef]