Seroprevalence of Human Immunodeficiency Virus, Hepatitis B Virus, and Hepatitis C Virus Among People Who Use Drugs in Turkey

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Background. This study aimed to determine the prevalence of human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) in patients who applied to the Alcohol and Substance Abuse Treatment and Education Center and received outpatient or inpatient treatment and to raise awareness among people with these viruses who are unaware of their condition.

Methods. The study included 8071 patients whose files were retrospectively scanned via the Healthcare Information Management System for hepatitis B surface antigen (HBsAg), hepatitis B surface antibody (anti-HBs), hepatitis C virus antibody (anti-HCV), and HIV antibody (anti-HIV) positivity; demographic characteristics; and substance use. Our participants were divided into the people who inject drugs (PWID) and non-injection drug user (NIDU) groups.

Results. The mean age of the 8071 patients included in the study was 39.0 ± 12.9 years. The HBsAg, anti-HBs, anti-HCV, and anti-HIV positivity rates were 2.2%, 33.2%, 0.8%, and 0.6%, respectively. In total, 60.9% of the patients were using sedativehypnotics, 52% methamphetamine, 4.5% alcohol, and 2.8% intravenous substances. In the PWID group, the HBsAg, anti-HCV, and anti-HIV seropositivity rates were 25%, 24.4%, and 10.7%, respectively, and they were significantly higher than those in the NIDU group (P < .01). When stratified by sex, the HBsAg and anti-HBs positivity rates were significantly higher in men than in women.

Conclusions. The prevalence of HBV and HCV was similar to the frequency seen in the general population. Ensuring that individuals are aware of their diseases will prevent negative outcomes such as cirrhosis and cancer and contribute to the protection of public health by avoiding person-to-person transmission.

Keywords. addiction; HBV; HCV; HIV; seroprevalence.

The World Health Organization (WHO) reported that 1 in every 17 persons worldwide has used substances in the last year. Cannabis is the most commonly used substance in the world, and approximately 5.8% of the global population (219 million people) uses cannabis. Seventy percent of substance users are male [1]. Substance use, with its medical dimensions, is a problem that needs to be addressed in Turkey. It is thought that there is not enough research to determine the prevalence of substance use. In the 2019 drug report of the Turkish

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Monitoring Center for Drugs and Drug Addiction, 3.1% of the 1338 people surveyed stated that they had used at least 1 substance in their lifetime [2]. In recent years, methamphetamine use has increased in Turkey, and it is noteworthy that it was projected to increase 4-fold by 2022 [3].

Substance use is a significant risk factor for the transmission and spread of some infectious diseases [4]. Risky sexual behaviors of intravenous (IV) drug users and the sharing of syringes among them while under the influence of the substance they use pose a high infectious disease risk [5, 6].

According to WHO estimates, 14% (1.6 million) of IV drug users are infected with the human immunodeficiency virus (HIV), 52% (6 million) with the hepatitis C virus (HCV), and 9% (1.1 million) with the hepatitis B virus (HBV). While IV drug use is 5 times more common in men than in women, risky sexual behavior is more common in women than in men [1].

Viral hepatitis is considered a silent epidemic due to its largely asymptomatic nature. Most people are unaware of their infections, and HBV, HCV, and HIV are transmitted through similar routes. Untreated chronic HBV and HCV can result in liver cirrhosis and liver cancer. According to global disease

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burden estimates, HBV and HCV together cause 1.4 million deaths, including deaths from acute infection, liver cancer, and cirrhosis [7].

HBV and HCV are responsible for 60% of cirrhosis cases and 85% of hepatocellular carcinoma cases in Turkey [8]. It is estimated that 295 million people worldwide are infected with HBV and 50 million with HCV [9]. HIV causes 1.4 million deaths each year, and approximately 21 million AIDS-related deaths have been prevented with HIV treatment between 1996 and 2022 [10]. HCV and HIV infections are much more common in substance users than in the general population. Most new HCV and HIV cases are detected in substance users [10]. The diagnosis of the disease in substance users is essential in terms of the treatment and protection of addicts and the safety of their immediate environment and society [11].

To our knowledge, there are not many scientific studies investigating the frequency of HBV, HCV, and HIV among substance users in our country. Our study aimed to determine the prevalence of HIV, HBV, and HCV among patients who applied to our hospital's Alcohol and Substance Abuse Treatment and Education Center (ASATEC) clinic and received outpatient or inpatient treatment. Ensuring that these individuals were informed about their diseases and ensuring that they were evaluated for treatment to prevent their progression to life-threatening complications were our secondary aims. In this way, the transmission of HBV, HCV, and HIV from infected individuals to others will be prevented. This will also contribute to the protection of public health.

MATERIALS AND METHODS

The records of outpatients or inpatients with a history of alcohol and substance use who applied to the ASATEC clinics of the University of Health Sciences Bursa Yüksek İhtisas Training and Research Hospital, from the opening date of January 2011 to 31 December 2023, were analyzed retrospectively. Local ethics committee approval was received for the use of retrospective data on 2011-KAEK-25 2022/07-06. While the study was ongoing, individuals who applied to ASATEC clinics for the first time were informed about the study, and those who wanted to participate in the study were included prospectively after giving their informed consent. In this study, the HBV, HCV, and HIV screening results were obtained from the healthcare information management system, which is a wellestablished and widely used source in the field. Before data extraction, we conducted a preliminary assessment to verify the consistency and reliability of the dataset. Strict inclusion criteria were applied to ensure that only complete records having all necessary variables were included in the analysis.

The inclusion criteria for the study were as follows: having applied to ASATEC; having a history of substance use; having HIV, HBV, and HCV screening tests; and being >18 years of

age. People who did not agree to participate in the study and people with missing data were excluded from the study.

Individuals who applied to ASATEC but had not been previously screened for HIV, HBV, and HCV were contacted by phone, informed about the study, and invited to ASATEC clinics. Blood samples were taken from consenting individuals who accepted the invitation, centrifuged, and stored in refrigerators at -70° C until they were studied. People with HIV, HBV, and HCV were invited to the hospital.

In Turkey, all people working in any job are considered to be insured by the government. Private insurance helps pay for medical expenses for those who are not actively employed. The medical expenses of people without government-supported or private insurance were paid for from the budget within the scope of the project we prepared for this research.

An infectious diseases specialist was consulted for patients requiring antiviral treatment and a psychiatrist was consulted for medical rehabilitation.

Our study participants were divided into the people who inject drugs (PWID) and non-injection drug user (NIDU) groups. PWID were classified as the participants who reported ever using IV drugs, even if they had injected drugs only once. NIDUs were those who had never used IV drugs. We did not collect data on the frequency of IV drug use, whether the use was ongoing, the recency of the last injection, or the duration of IV drug use. Our primary focus was on whether participants had a history of IV drug use at any point in their lives.

The amount of alcohol consumed was calculated in terms of a standard drink in this study. Accordingly, raki, whiskey, gin, brandy, and vodka were accepted to contain almost equal amounts of alcohol, and 70 cL of highly alcoholic beverages was calculated as 30 units. Beer (0.33 cL) and wine (0.15 cL) were recorded as 1 unit after self-reporting.

Hepatitis B surface antigen (HBsAg), HCV antibody (anti-HCV), HIV antigen/antibody (Ag/Ab; HIV-1/HIV-2 immunoglobulin M and immunoglobulin G antibodies and HIV-1 p24 antigen), and hepatitis B surface antibody (anti-HBs) tests were performed. The chemiluminescence immunoassay technique was used in the microbiology laboratory using an Abbott Architect I2000SR macro–enzyme-linked immunosorbent assay autoanalyzer device (Abbott, USA). The results were evaluated according to the manufacturer's instructions. Illicit drug use by the patients was confirmed by analyzing urine samples via the enzyme multiplied immunoassay technique method using a Siemens Advia 1800 chemistry analyzer (Siemens, Germany).

Statistical Analysis

SPSS version 26.0 software was used for all statistical analyses. Continuous data are presented as mean values \pm standard deviations for normally distributed data and median values with interquartile ranges for skewedly distributed data. Categorical

Table 1. Demographic Characteristics and Substance Abuse Distribution of Patients (N = 8071)

Characteristic	No. (%)
Age, y, mean ± SD (min–max)	39.0 ± 12.9 (18–93)
Sex	
Male	5904 (73.2)
Female	2167 (26.8)
Type of substance use	
Sedative-hypnotics	4912 (60.9)
Methamphetamine	4197 (52)
Multiple substance use	1867 (23.1)
Alcohol	367 (4.5)
Heroin	227 (2.8)
Marijuana	133 (1.6)
Synthetic cannabinoids	80 (1.0)
Ecstasy	44 (0.5)
Cocaine	22 (0.3)
Seropositivity	
HBsAg	165 (2.2)
Anti-HBs	2539 (33.2)
Anti-HCV	49 (0.8)
Anti-HIV	42 (0.6)

Data are presented as No. (%) unless otherwise indicated

Abbreviations: Anti-HBs, hepatitis B virus surface antibody; Anti-HCV, hepatitis C virus antibody; Anti-HIV, human immunodeficiency virus antibody; HBsAg, hepatitis B surface antigen; SD, standard deviation.

variables are presented as frequencies and percentages. Student *t* test and the Mann-Whitney *U* test were used to compare normally and skewedly distributed data, respectively, between the 2 groups. The χ^2 test was used to compare categorical data between the 2 groups. The threshold for statistical significance was set at *P* < .05.

RESULTS

A total of 8745 patients applied to the ASATEC clinic during the study period. After excluding individuals aged <18 years and individuals who did not have HIV, HBV, or HCV screening tests, a total of 8071 eligible patients were included in the analysis. Among them, 452 patients without social security who tested positive for HBsAg, anti-HCV, and anti-HIV were invited to the ASATEC clinic. Eighteen patients were hospitalized for medical rehabilitation. Treatment for HBV, HCV, and HIV was arranged by an infectious diseases specialist. In total, 60.9% of the patients included in the study were using sedatives-hypnotics, 52% were using methamphetamine, 4.5% were using alcohol, and 2.8% were using IV substances; 73.2% of participants were male and 26.8% were female. The ages of our participants ranged from 18 years to 93 years with a mean value of 39.0 ± 12.9 years. Regarding age, 30.3%of the patients were aged 30-39 years, 27.8% were aged <30 years, and 21.4% were aged 40-49 years. The demographic data of our study participants are presented in Table 1. The positivity rates were 2.2%, 33.2%, 0.8%, and 0.6% for HBsAg, anti-HBs, anti-HCV, and anti-HIV, respectively.

In patients with a history of IV substance use, HBsAg, anti-HCV, and anti-HIV seropositivity rates were 25%, 24.4%, and 10.7%, respectively, and these rates were higher than those in the NIDU group (all P < .01; Table 2). In the PWID group, 1 patient had HBV + HIV coinfection, and in the NIDU group, 1 patient had HCV + HBV coinfection. Table 3 shows the substance use and seropositivity rates of the participants according to age.

When stratified by sex, the HBsAg positivity rates were 2.5% in men and 1.6% in women, and this difference was statistically significant (P = .02). Anti-HBs positivity rates were 34.4% and 29.9% in men and women, respectively, and this difference was statistically significant (P = .01). No statistically significant difference was found between the 2 sexes in terms of anti-HCV and anti-HIV positivity.

DISCUSSION

People with alcohol and substance use should be particularly screened for HBV, HCV, and HIV infections since they constitute a key population manifesting high-risk behaviors [4]. There are many studies on the prevalence of hepatitis B and hepatitis C in our country. However, to the best of our knowledge, there is a paucity of studies on the prevalence of HBV, HCV, and HIV in substance users.

Evaluation of Substance Use

When risk factors for blood-borne infections are considered, studies generally target PWID groups; studies on NIDU are not numerous enough to fully reflect the situation. While multiple substance use, cannabinoids, and alcohol are at the top of the list in different studies, including NIDU patient groups in the Aegean region [12], opioids, multiple substance use, and alcohol use were found to be at the top 3 in 2 studies conducted at different times in the Eastern Anatolia region [13, 14]. In our research, sedative-hypnotic substances, methamphetamine, multiple substance use (synthetic cannabinoids and methamphetamine), and stimulant drug use were at the top of the list. In studies conducted in 3 different regions of our country, different substance use trends are striking. In our study, unlike other studies, the use of sedative-hypnotics was found to be higher. This may be due to the use of sedative substances in addition to the abuse of sedative substances in order to reduce the effects of the substances of choice. It may be necessary for physicians to question patients' addiction status when prescribing these drugs.

Evaluation of Substance Use and Age

Substance use is most common in people aged 15-49 years worldwide; however, this age distribution may vary by region

Table 2. Hepatitis B Virus, Hepatitis C Virus, and Human Immunodeficiency Virus Serologies According to Intravenous Substance Use Status

Participant Group	HBsAg		Anti-HCV		Anti-HIV		0
	Positive	Negative	Positive	Negative	Positive	Negative	Value
PWID	41/205 (25)	164 /205 (75)	34/173 (24.4)	139/173 (75.6)	21/216 (10.7)	195/216 (89.3)	<.001 ^a
NIDU	124/7192 (1.7)	7068/7192 (98.3)	15/6243 (0.2)	6228/6243 (99.8)	21/7273 (0.2)	7252/7273 (99.8)	

Data are presented as No. (%).

Abbreviations: Anti-HCV, hepatitis C antibody; Anti-HIV, human immunodeficiency virus antibody; HBsAg, hepatitis B surface antigen; NIDU, non-injection drug user; PWID, people who inject drugs.

^aSignificant at P<.05

Table 3. Distribution of Hepatitis B Surface Antigen, Hepatitis B Surface Antibody, Hepatitis C Virus Antibody, and Human Immunodeficiency Virus Antibody Seropositivity, by Age of Study Participants

Age Group, y	HBsAg		Anti-HBs		Anti-HCV		Anti-HIV	
	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
18–29	2054 (28.4)	27 (16.4)	895 (17.5)	1213 (47.8)	1725 (27.1)	14 (28.6)	2123 (28.5)	10 (23.8)
30–39	2166 (30.0)	38 (23.0)	1761 (34.4)	544 (21.4)	1939 (30.5)	13 (26.5)	2256 (30.3)	17 (40.5)
40–49	1523 (21.1)	46 (27.9)	1308 (25.6)	339 (13.4)	1370 (21.5)	10 (20.4)	1591 (21.4)	7 (16.7)
50–59	857 (11.8)	34 (20.6)	688 (13.5)	231 (9.1)	780 (12.3)	7 (14.3)	861 (11.6)	3 (7.1)
≥60	632 (8.7)	20 (12.1)	463 (9.1)	212 (8.3)	553 (7.6)	5 (10.1)	616 (8.2)	5 (11.9)
Overall	7232 (97.8)	165 (2.2)	5115 (66.8)	2539 (33.2)	6367 (99.2)	49 (0.8)	7447 (99.4)	42 (0.6)

Data are presented as No. (%).

Abbreviations: Anti-HBs, hepatitis B surface antibody; Anti-HCV, hepatitis C antibody; Anti-HIV, human immunodeficiency virus antibody; HBsAg, hepatitis B surface antigen.

[15]. In the United States, 50% of the population aged ≥12 years reported having used PWID or NIDU at least once in their lives, and in the United Kingdom, as of the end of March 2023, 9.5% of people aged 16–59 years (approximately 3.1 million people) reported substance use [16, 17]. The substance use rate in Turkey is reported to be 3.1%. The highest substance use rate (65%) is observed in the 15–34 age group. This rate decreases with increasing age [18]. In our study, the mean age of participants was 39.0 ± 12.9 years, with 30.3% of the patients being aged 30–39 years, 27.8% aged <30 years, and 21.4% aged 40–49 years. Studies conducted in our country have found that 56%–75.6% of substance users are aged <40 years [12, 14, 19]. Our study data were similar to those of our country and other nations.

Evaluation of Substance Use and Sex

Substances such as alcohol, psychostimulants, opioids, and cannabis are commonly used by both men and women. According to the data from our country's Ministry of Internal Affairs, 94% of people who have used substances at least once are men [20]. Studies have reported that substance use is more common in men; however, the rate of substance use has been increasing more rapidly in women than in men in recent years [21–23]. As in our country and international data, we found that substance use was more common among men in this study.

Evaluation of Substance Use and HBsAg Seropositivity

Substance use poses a risk of blood-borne infections. HBV is 1 of these diseases [24]. In our study, the overall HBsAg positivity rate was found to be 2.2% (1.7% in the NIDU group and 25% in the PWID group). The HBsAg positivity rate was significantly higher in the PWID group. When we look at the studies investigating HBsAg positivity in NIDUs in our country, Karabulut et al reported the rate as 2.6% in their study evaluating 235 people [19], Arıkan et al reported it as 2.7% in their study evaluating 478 people [12], and Altuğlu et al reported it as 2.2% in their study evaluating 4357 people [25]. The HBsAg positivity rate in our study's NIDU group is consistent with their data. Since the blood contact situation is higher in PWID-dependent cases in which we conducted subanalyses, the HBsAg seropositivity rate was found to be significantly higher in this patient group compared with the general study population, as expected. The HBsAg positivity rate in the PWID group is consistent with global data [26, 27].

Evaluation of Substance Use and Anti-HBs Seropositivity

The anti-HBs positivity rate was highest among people aged 18–29 years (47.8%). The Hepatitis B Control Program was started in our country in 1998, and the hepatitis B vaccine was included in the vaccination schedule and added to the routine vaccinations administered to newborns. The fact that anti-HBs antibody titers are higher among people aged 18–29

years than in other age groups can be considered an effect of the national vaccination program. We did not have information on the hepatitis B vaccination status of our study participants. This information is not available in our database. Therefore, positivity could not be distinguished by natural immunity or vaccination.

Evaluation of Substance Use and Anti-HCV Seropositivity

The majority of newly developing HCV infections in the world are detected in PWID [28, 29]. In our study, the overall anti-HCV positivity rate was 0.8%; however, a significantly higher anti-HCV seropositivity rate (24.4%) was observed in the PWID subgroup. In studies conducted at different times in Turkey, in patient groups other than PWID, including substance users (including NIDUs) followed up in ASATECs, anti-HCV seropositivity rates have been reported to vary between 1.4% and 12% [30–36].

According to the World Drug Report, approximately 49% of PWID are infected with HCV [26]. According to the European Drug Report, the rates vary, and 13%-86% of the population is infected with HCV [20]. In a meta-analysis conducted by Degenhardt et al [37], the HCV seropositivity rate in PWID was 52.3%. Malekinejad et al reported the HCV seroprevalence as 45% in PWID and 8% in NIDUs in another meta-analysis (n =13 821) [38]. When we look at the Ministry of Internal Affairs data, the HCV seroprevalence among PWID is reported to be 49.5% [18]. Guure et al determined that the HCV prevalence was 6% in their study evaluating PWID [39]. Prevalence data in many countries are of low quality and must be constantly reevaluated [29]. In our study, the anti-HCV seropositivity rate in the NIDU group was found to be similar to our nation's general population data; however, this rate was found to be low when compared to global data. In the PWID group, our results were similar to the European Drug Report (which was reported in a wide range), but the rates were found to be lower than those reported by our country's data and the World Drug Report. The low anti-HCV seropositivity rate in our study population, especially in the PWID group, may be due to the HCV elimination program that was implemented in our province in 2020. Again, the fact that the PWID group in the study group constituted only 2.8% of the entire study population may have affected this finding.

Evaluation of Substance Use and Anti-HIV Seropositivity

In our study, the general anti-HIV positivity rate was 0.6%, but this rate was 10.7% in patients with a history of IV substance use. Studies conducted in our country report rates of 0–0.8% in the NIDU group [12–14, 19, 25, 36]. Our findings in the NIDU group are compatible with nationwide data. When global data were examined, it was seen that the HIV seropositivity rate among substance users varies between 1.9% and 9% [40–44]. Our HIV seropositivity data were found to be similar to worldwide data.

Limitations of the Study

Because of this study's retrospective design, data were obtained from existing patient files and healthcare information management systems. This may lead to limitations such as missing data, inaccurate records, and some information not being obtained with full accuracy. Only individuals who came to ASATECs were included in the study. Because individuals who used substances but did not apply to the clinics were excluded from the study, our findings are not fully representative of the entire population.

Although the PWID and NIDU groups were distinct in the study, the small number of PWID may limit the statistical power of the results of this group.

CONCLUSIONS

Although it is expected that the HBV, HCV, and HIV positivity rates would be higher in substance users, the prevalence of HBV, HCV, and HIV in our study's NIDU group was found to be similar to the frequency seen in the general population in recent studies in conducted our country.

The findings of this study highlight the importance of raising public awareness of HBV, HCV, and HIV. Ensuring that individuals are aware of their diseases will prevent negative outcomes of diseases such as cirrhosis and cancer and contribute to the protection of public health by avoiding the transmission of the abovementioned infections from these individuals to others.

Public health campaigns can be designed to educate communities about the prevention and treatment of these diseases and to encourage healthier behaviors.

Notes

Author contributions. A. A., C. T., and O. S. were responsible for conceptualization, search design, and execution. A. A., C. T., O. S., M. S. S., S. M., and I. N. H. were responsible for screening, data extraction, quality assessment, and interpretation. A. A., C. T., O. S., M. S. S., and I. N. H. performed writing, review, and editing. A. A. prepared the first draft.

Data availability. The data supporting this study's findings are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions. Patient informed consent was not needed in the retrospective analysis phase. Written informed consent was obtained from patients who were prospectively included in the study.

Ethics declaration. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Our institution has granted ethics committee approval.

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Potential conflicts of interest. All authors: No reported conflicts.

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