Clinical Features and Prevalence of HIV, Hepatitis B and Hepatitis C Infections in Patients with Opioid Use Disorder

Opioid Kullanım Bozukluğu Olan Hastalarda HIV, Hepatit B ve C Enfeksiyonlarının Sıklığı ve Klinik Özellikler

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Abstract
Objective: The aim of this study was to determine the prevalence rate of HBV, HCV, and HIV, along with socio-demographic and clinical characteristics in patients with opioid use disorder.
Method: The study sample consisted of 244 inpatients diagnosed with opioid use disorder. A data form documenting the socio-demographic features and clinical characteristics of opioid use disorder was completed. Routine blood and urine drug test results were retrieved from the hospital information system. The sample group was divided into two categories based on anti-HCV seropositivity, and the groups were compared according to socio-demographic features, clinical characteristics, and laboratory findings.
Results: 9% of the sample group was anti-HCV positive, and the rate of HBsAg positivity was 0.8%. All patients tested negative for anti-HIV. Patients infected with HCV were male, older (36.4±10.2 vs. 30.8±10.5), and had more comorbid physical disorders (68.2%). Use of injectable drugs over a lifetime (77.3%), in the last year (36.4%), and/or in the last month (27.3%) was related to an increased risk of HCV infection.
Conclusion: Female patients with opioid use disorder are estimated to be underrepresented and undertreated. As older age and intravenous drug use increase the risk of hepatitis C infection, and comorbid physical disorders are more prevalent in patients with HCV, screening programs and preventive approaches are crucial for this patient group.
Keywords: Opioid use disorder, viral hepatitis, prevalence

Öz
Amaç: Bu çalışmada opioid kullanım bozukluğu tanısıyla yatan hastalarda Hepatit B, Hepatit C ve HIV enfeksiyonu yaygınlığı ve enfeksiyonla ilişkili sosyo-demografik ve klinik özelliklerinin belirlenmesi amaçlanmıştır.
Yöntem: Araştırmanın örneklemini opioid kullanım bozukluğu tanısı olan 244 yatan hasta oluşturdu. Sosyo-demografik ve klinik özellikler için veri formu dolduruldu. Rutin kan ve idrarda madde testleri hastane bilgi yönetim sisteminden tarandı. Örneklem grubu anti-HCV sonucuna göre ikiye ayrıldı ve gruplar sosyo-demografik ve klinik özellikler ile laboratuvar bulgularına göre karşılaştırıldı.
Bulgular: Örneklem grubunun % 9'u anti-HCV pozitifti ve HBsAg pozitifliği oranı % 0.8 olarak bulundu. Tüm hastalar anti-HIV negatifti. HCV ile enfekte hastaların tümü erkekti, yaş ortalaması daha yüksekti (36.4±10.2 karşı 30.8±10.5) ve bu hastalarda ek tıbbi hastalık görülme sıklığı daha fazlaydı (% 68.2). Yaşamboyu (%77.3), son 1 yıl (%36.4) ve / veya son 1 ayda (% 27.3) damardan madde kullanımı artmış HCV enfeksiyonu ile ilişkiliydi.
Sonuç: Opioid kullanım bozukluğu tanılı kadın hastaların tedaviye başvurma ve tedavi alma oranlarının beklenenin altında olduğu tahmin edilmiştir. İleri yaş ve damardan madde kullanımı Hepatit C ile enfekte olma riskini artırdığından ve komorbid fiziksel hastalıklar bu hastalarda daha sıklıkla görüldüğünden; tarama programları ve önleme çalışmaları bu hasta grubunda büyük önem arz etmektedir.
Anahtar kelimeler: Opioid kullanım bozukluğu, viral hepatitler, yaygınlık

Introduction

Opioid use disorder (OUD) is a chronic brain disease characterized by loss of control over drug use despite serious potential consequences, such as disability, relapses, and death (1,2). The prevalence of blood-borne infections like hepatitis C virus (HCV), hepatitis B virus (HBV), and human immunodeficiency virus (HIV) increases in patients with OUD, particularly when the drug is used via injection (3). In the Turkish Drug Report 2024, the screening test results of inpatients from the previous year (2023) were examined, revealing rates of seropositivity of 1.2%, 6.1%, and 0.5% for Hepatitis B, Hepatitis C, and HIV, respectively (4). These rates rose to 3.3% for hepatitis B, 41.7% for hepatitis C, and 1.3% for HIV among intravenous drug users (4).

Viral hepatitis and HIV impose a significant public health burden worldwide, resulting in chronic infections, cancer, and death, particularly when not addressed (5). It is estimated that 4.5 million new cases of HIV and hepatitis arise each year, with 2.3 million people dying and 1.2 million developing cancer due to HIV, hepatitis, and other sexually transmitted infections (5). Drug users, especially those who inject drugs, face an increased risk of acquiring HIV, HBV, and HCV infections due to unsafe injection practices and risky sexual behaviors, such as unprotected sex with multiple partners (6).

In Turkey, the prevalence studies are hospital-based and are reported to be 1.5-2.5 % for HCV (7,8). The prevalence rate of anti-HCV positivity was found to be 10.9 % in patients hospitalized with OUD and is related with poor adherence to treatment (9). It is estimated that 4.6 % of the general community is HBsAg positive (10). Studies investigating the incidence and prevalence rate of HIV in the general population are lacking, but it is well known that the number of HIV positive people is increasing in Türkiye (11).

Using illicit substances is not only a rising public health crisis, but is also linked to contracting viral hepatitis and HIV, especially when used through injection, as injecting drugs is one of the primary methods for acquiring or spreading HBV, HCV, and HIV (12,13). OUD, blood-borne infections, and the coexistence of these two diseases are associated with increased treatment nonadherence, re-infections, poor clinical outcomes, morbidity, and mortality (9). Screening, detection, and treatment of these infections in individuals with OUD are crucial for both individual and public health. There are limited studies in this area in Türkiye, and there is no routine screening program for risk groups such as opioid addicts or intravenous drug users. We aimed to determine the prevalence and associated factors of HBV, HCV, and HIV in patients diagnosed with OUD, providing regional insight to enhance screening, prevention, treatment, and monitoring strategies to reduce the social and economic burden while also contributing to the limited literature in this area. This retrospective study hypothesized that the prevalence rate of viral hepatitis and HIV is higher in patients with OUD and is associated with clinical features such as intravenous drug use and comorbid medical conditions.

Method

Sample

Ethics committee approval (numbered 2018/15 and dated 01/11/2018) was obtained from Van Training and Research Hospital, and the study was conducted in accordance with the Declaration of Helsinki. Following the approval of the study protocol, inpatients admitted to the Alcohol and Drug Addiction Research, Treatment and Education Center (AMATEM) and diagnosed with opioid use disorder according to DSM 5 (hospitalized with ICD 10 codes F11.1 and F11.2 in hospital system) between October 2017 and December 2018 were evaluated. OUD is defined as repeated opioid use within 12 months leading to functional impairment or distress with 2 or more of the diagnostic criteria, including tolerance, withdrawal symptoms, and craving in DSM 5 (1). AMATEM is a health institution that provides treatment for adult patients with drug and alcohol addiction; therefore, our sample group consisted of patients aged 18 and over with OUD.

Procedure

A three-week treatment program consisting of detoxification treatment and a psychosocial intervention

program for substance users called SAMBA (the tobacco, alcohol, and drug dependence treatment program) was implemented in the inpatient clinic during the study (14). SAMBA was applied in a closed group format by a clinic psychologist five days a week, consisting of a total of 10 sessions. The sessions cover topics such as the effects of drugs, alcohol, and tobacco, motivation, mindfulness, anger and stress management, relapse prevention, communication skills, and thinking errors (14).

A socio-demographic and clinical data form was prepared and filled based on medical records. In clinical data form, patients who wanted to be discharged as admitted to hospital are evaluated as "rejecting treatment", patients discharged voluntarily at any stage of treatment without completing the treatment program are defined as "unwilling to complete treatment". Partial recovery refers to completing detoxification treatment but being discharged before the treatment program (medical and/or psychosocial) ends. Patients who were discharged after completing the treatment program with the doctor's approval were defined as "remitted". Routine blood and drug urine test results were scanned and recorded from the hospital information system. The final sample group consisted of 244 patients (241 male, 3 female).

Statistical analysis

Statistical analysis was performed with SPSS for Windows version 22.0 package program. Descriptive statistical analyzes were carried out. Frequencies and rates of categorical variables were determined. The sample group was divided into two groups based on anti-HCV seropositivity, and the groups were compared according to socio-demographic features, clinical characteristics and laboratory findings. The Kolmogorov-Smirnov test was used to assess the normal distribution of numerical data. The Mann-Whitney U test was used to compare differences between two independent groups when the dependent variable is either ordinal or continuous. Chi-Square tests were used for comparison of categorical variables, and the t-test was used for the comparison of quantitative variables. All p values were two-tailed, and $p < 0.05$ was set as a cut-off for statistical significance.

Results

Socio-demographics and clinical characteristics of sample group and comparison of them in anti-HCV positive and anti-HCV negative patients are listed in Table 1. The median age of sample group was 31.3 ± 10.5 years (ranges between 18-68 years). The majority of patients were male (98.8%), stably housed (98 %) and lived in a county (91.4 %). The sample group had predominantly elementary or middle level of education, was unemployed and single. 24.2 % of the patient group had been in prison at least once lifetime, 13.5 % reported to have comorbid physical illness and 5.7 % used at least one medication regularly. The rate of smoking cigarettes was 97.5 % currently. The mean age of starting to use any illicit drug was 21.1 ± 8.1 years and the firstly used drug was heroin followed by cannabis.

The majority of patients were poly-drug user lifetime (63.9 %). The average age of beginning to use opioids was 22.4 ± 7.8 years, and the most common way of use was smoking and inhalation. Using opioids by injection was at the rate of 14.8 % lifetime and 6.1 % last month. 69.3 % of patients had a history of treatment for dependence, and half of the sample group admitted to an inpatient clinic for treatment at least once.

It was the first admission of 63.1 % of patients to our inpatient clinic. The mean hospitalization time was 12.2 ± 8.5 days, as the patients are being hospitalized based on the recommendation of the clinician and their voluntary admission. Half of patients admitted had a history of substitution therapy with buprenorphine+naloxone and 6.1% treated with naltrexone implant in the past. Nearly half of the patients completed the treatment program, and the rate of patients discharged with buprenorphine+naloxone and naltrexone implant was 36.5 % and 10.7 %, respectively.

Patients positive for anti-HCV differ from anti-HCV negative patients in terms of mean age, gender, educational status, history of physical disorders, using any medication regularly, and the difference between groups seems to be statistically significant ($p < 0.05$). The association between educational status and anti-

HCV positivity is interpreted as insignificant, since no sequential increase is observed. Although the difference between groups did not reach statistical significance, poly-drug use was more common in patients with HCV. Concomitant with the literature, patients who have used opioids with injection lifetime, in last year and / or month are at increased risk of becoming infected with HCV, and the difference between groups is statistically significant. In patients with anti-HCV, the rate of treatment with buprenorphine+naloxone is statistically higher than anti-HCV negative patients.

Table 1. Comparison of socio-demographics and clinical characteristics of sample group

Variables	Total	Anti-HCV (+)	Anti-HCV (-)	p
Mean age (years) (mean ±SD) Age (min-max)	31.3 ± 10.5 (18-68)	36.4±10.2	30.8±10.5	0.019
Gender N (%)				
Male	241 (98.8)	22 (100)	213 (99.1)	0.006
Female	3 (1.2)	0 (0)	2 (0.9)	
Marital status				
Married	80 (32.8)	7 (31.8)	70 (32.6)	0.435
Single	157 (64.3)	13 (59.1)	140 (65.1)	
Divorced	7 (2.9)	2 (9.1)	5 (2.3)	
Education				
None	14 (5.7)	0 (0)	13 (6)	
Only literate	9 (3.7)	0 (0)	9 (4.2)	
Elementary school	62 (25.4)	10 (45.5)	52 (24.2)	0.006
Middle school	110 (45.1)	3 (13.6)	104 (48.4)	
High school	44 (18)	9 (40.9)	32 (14.9)	
University	5 (2)	0 (0)	5 (2.3)	
Employment				
Employed	45 (18.4)	2 (9.1)	39 (18.1)	0.092
No regular job	25 (10.2)	3 (13.6)	21 (9.8)	
Unemployed	167 (68.4)	17 (77.3)	149 (69.3)	
Student	1 (0.4)	0 (0)	1 (0.5)	
Retired	5 (2)	0 (0)	4 (1.9)	
Housewife	1 (0.4)	0 (0)	1 (0.5)	
Place of residence				
County	223 (91.4)	20 (90.9)	198 (92.1)	0.158
Rural	21 (8.6)	2 (9.1)	17 (7.9)	
Housing				
Stable	239 (98)	21 (95.5)	211 (98.1)	0.648
Unstable	5 (2)	1 (4.5)	4 (1.9)	
History of being in prison	59 (24.2)	10 (45.5)	48 (22.3)	0.153
Cigarette consumption	238 (97.5)	22 (100)	209 (97.2)	0.934
History of physical disorders	33 (13.5)	15 (68.2)	17 (7.9)	<0.0001
Using any medication regularly	14 (5.7)	4 (18.2)	9 (4.2)	0.017
Age of onset of using any substance (year)[a]	19[aa] (16-24)[aaa]	19.5[aa] (15.75-22)[aaa]	19[aa] (16-24)[aaa]	0.593
The initial substance used				
Opioids	161 (66)	11 (50)	145 (67.4)	0.160
Cannabis	73 (29.9)	10 (45.5)	62 (28.8)	
Amphetamines	4 (1.6)	1 (4.5)	3 (1.4)	
Others	6 (2.5)	0 (0)	5 (2.3)	
Drug used lifetime				

Variables	Total	Anti-HCV (+)	Anti-HCV (-)	p
Only opioids	88 (36.1)	5 (22.7)	78 (36.3)	0.064
Poly-drug	156 (63.9)	17 (77.3)	137 (63.7)	
Age of onset of using opioids	22.4 ± 7.8 (10-53)	21.8±6.3	22.4±8.0	0.724
Method of heroin use (current)				
Smoking and inhalation	215 (88.1)	10 (45.5)	199 (92.6)	<0.0001
Snorting	16 (6.6)	4 (18.2)	12 (5.6)	
Injection	12 (4.9)	8 (36.4)	3 (1.4)	
Eating and drinking	1 (0.4)	0 (0)	1 (0.5)	
Using heroin with injection lifetime	36 (14.8)	17 (77.3)	18 (8.4)	<0.0001
Using heroin with injection in last one year	15 (6.1)	8 (36.4)	7 (3.3)	<0.0001
Using heroin with injection in last one month	13 (5.3)	6 (27.3)	7 (3.3)	<0.0001
History of treatment				
In an outpatient clinic	169 (69.3)	17 (77.3)	146 (67.9)	0.419
In an inpatient clinic	135 (55.3)	14 (63.6)	115 (53.5)	0.172
Hospitalization in our inpatient clinic				
One hospitalization	154 (63.1)	14 (63.6)	135 (62.8)	0.896
Two and more hospitalization	90 (36.9)	8 (36.4)	80 (37.2)	
Mean hospitalization number (in our clinic)[a]	1[aa] (1-2)[aaa]	1[aa] (1-2)[aaa]	1[aa] (1-2)[aaa]	0.777
Days of last hospitalization (mean)[a]	13[aa] (3-21)[aaa]	21[aa] (4-21)[aaa]	12.5 [aa] (2-21)[aaa]	0.109
Discharge status				
Remitted	119 (48.8)	14 (63.6)	99 (46)	0.310
Unwilling to complete treatment*	113 (46.3)	8(36.4)	104(48.4)	
Partial recovery**	10 (4.1)	0 (0)	10 (4.7)	
Rejection of treatment	2 (0.8)	0(0)	2(0.9)	
Treatment recommended after discharge				
Substitution therapy with buprenorphine	89 (36.5)	12(54.5)	71(33)	0.019
Naltrexone implant	26 (10.7)	1(4.5)	25(11.6)	
Other symptomatic treatments	129 (52.9)	9(40.9)	119(55.3)	
History of substitution therapy with buprenorphine	126 (51.6)	16 (72.7)	107 (49.8)	0.109
History of treatment with naltrexone implant	15 (6.1)	0 (0)	15 (7)	0.340
History of other symptomatic treatments	133 (54.5)	13 (59.1)	116 (54)	0.890

*Discharge at patient's request **Partial recovery: Complete detoxification treatment but discharge before treatment programme (medical and/or psychosocial) ended.; Bold values indicate significance of p<0.05. SD: Standard Deviation; [a] Mann Whitney U test is used for comparing continuous variables. Median. [aa] (25 percentiles-75 percentiles) [aaa]

When the results of laboratory tests were examined, routine blood tests (liver and kidney function tests, coagulation tests) were found to be in normal range. All patients were anti-HIV negative. Two patients were seropositive for HBsAg, and anti-HBc IgG was positive in 25 patients. 9 % of the patient group was anti-HCV positive. Patients who were found to be HBsAg negative, anti-HBc IgG and anti-HBs positive were accepted as naturally immune. The number of naturally immune patients was 20 (8.2 %) and the number of patients with isolated anti-HBc IgG positive was five (2 %) and was significantly more in patients with HCV. Anti-HBs

indicate immunity to hepatitis B due to vaccination and were positive in 27 % of the sample group. When groups compared, the rate of anti-HBc IgG and anti-HBs positivity is significantly higher in anti-HCV positive patients than anti-HCV negative ones. Although the majority of patients had liver and kidney enzymes in normal range, ALT (alanine amino transferase), GGT (gamma glutamyl transferase), fasting blood sugar and BUN (blood urea nitrogen) were significantly higher in patient with HCV (p<0.05). The laboratory findings of patients are shown in Table 2.

Table 2. Comparison of laboratory findings of patients with or without HCV

	Total	Anti-HCV (+)	Anti-HCV (-)	p
Anti-HBs Positive(N/%)	66 (27)	7 (31.8)	59 (27.4)	**<0.0001**
Anti-HBC IgG Positive	5 (10.2)	1(4.5)	4(1.9)	
Anti-HBs and Anti-HBC IgG Positive	20 (8.2)	4 (18.2)	16 (7.4)	
HBs-Ag Positive	2 (0.8)	0(0)	2(0.9)	**<0.0001**
ALT (alanine aminotransferase) (U/L)[a]	13.6[aa] (10-20.3)[aaa]	32.6[aa] (17.2-45.8)[aaa]	13[aa] (10-18.6)[aaa]	**<0.0001**
GGT (gamma glutamyl transferase) (U/L)[a]	14.3[aa] (11-22)[aaa]	24[aa] (13.5-31.5)[aaa]	14[aa] (11-21)[aaa]	**0.042**
BUN (blood urea nitrogen) (mg/dL)[a]	13[aa] (3-21)[aaa]	29.8[aa] (25-36.5)[aaa]	26[aa] (22-31)[aaa]	**0.001**
PT-INR (%)[a]	0.99[aa] (0.94-1)[aaa]	0.96[aa] (0.90-1)[aaa]	1[aa] (0.95-1)[aaa]	0.956
Fasting Blood Sugar(mg/dL) (mean ±SD) (min-max)	89.8 ± 24.3 (54-371)	107.8±59.4	87.9±16.3	**<0.0001**
Creatinine (mg/dL)	0.73 ± 0.12 (0.4-1.2)	0.74±0.13	0.73±0.12	0.677
PT (seconds)	12.0±1.07 (10.4-15.2)	11.7±1.2	12.1±1.04	0.376
Hemoglobin (g/dL)	15.1 ± 1.2 (10.4-17.8)	15.2±1.5	15.1±1.1	0.888
PLT (Platelet) (10^3/μL)	260 ± 58.3 (152-467)	255±58	260±58	0.670
WBC (White blood cells) (10^3/μL)	8.8 ± 2.2 (4.15-17.9)	8.6±2.2	8.9±2.2	0.598

Bold values indicate significance of p<0.05. SD: Standard Deviation; [a] Mann Whitney U test is used for comparing continuous variables. Median. [aa] (25 percentiles-75 percentiles) [aaa]

Table 3. Urine toxicology test results of sample group

First Admission		Anti-HCV (+)	Anti-HCV (-)	p
Opioids positive (N/%)	156 (63.9)	15(68.2)	141(65.6)	<0.0001
Other drug (amphetamines, cannabis etc.) positive	65 (26.6)	7(31.8)	58(27)	
Not tested	23 (9.4)	0(0)	16(7.4)	

Bold values indicate significance of p<0.05. SD: Standard Deviation

When drug urine tests are analyzed, 63.9 % of patients were positive for opioids and 26.6 % of them were positive for other drugs, especially for amphetamines, in admission to hospital. 23 patients were not tested for urine drugs due to not urinating, rejection of treatment and / or being discharged as hospitalized. Higher rates of substance positivity were detected in urine drug tests in patients infected with HCV, and the difference between groups was statistically significant. The comparison of drug urine test results is shown in Table 3.

Discussion

The present study aimed to reflect regional characteristics and the status of viral hepatitis and HIV in patients hospitalized with the diagnosis of OUD in Van, an eastern city of Turkey. It is expected that the results of our study will be beneficial in prevention, screening, clinical evaluation, and follow-up processes in terms of revealing the prevalence of viral hepatitis and HIV and associated clinical features opioid addicted patients in our country and the region.

The prevalence rate of anti-HCV positivity in opioid users ranges between 5.1-25 % and when only patients used opioids with injection included the rate rises to 44.9 % in studies which was conducted in our country (15,16). The rate of anti-HCV positivity was 9 % in our sample group. The heterogeneity of sample groups and the way of substance use may lead to different results. Anti-HCV (+) patients reported to use opioids by injection at the rate of 36.4 % currently and 77.3 % lifetime. Consistent with the literature the results of the present study indicate that intravenous substance use is one of the major factors that increases the risk of hepatitis C in substance-dependent patients.

Although drug use varies by gender, region, and drug type, it is significantly more prevalent among men than women globally (3). Women are underrepresented in addiction treatment, and the gender gap remains to be one of the fundamental limitations of scientific research in this field (17,18). Only 1.2% of our sample group was female. This result may indicate that opioid use is less frequent among women; however, it may also reflect difficulties in accessing treatment, social consequences of drug use, facing greater stigma and discrimination, and an unwillingness to receive treatment in mixed-gender clinics. There are limited gender-specific inpatient clinics providing treatment exclusively for female patients in our country, and this may lead to a reluctance to pursue inpatient treatment, especially in regions like Van, known for its religious conservativeness. There were no anti-HCV-positive women in the sample group (two women were anti-HCV negative, and one was not tested). Given that there were only three female patients, the difference in anti-HCV positivity between genders appears to stem from the small number of female patients.

In a study assessing relation between HCV infection and treatment adherence in patients with opioid dependence, anti-HCV (+) patients were found to use opioids for a longer time and this was associated with tolerance and increasing rates of using opioids with injection due to tolerance (9). In another research evaluated the results of anti-HCV test in 97525 patients, it was reported that anti-HCV seroprevalence increased with advancing age (19). Although there was no significant difference between groups with or without anti-HCV in age of starting to use any drug or opioids, the mean age of anti-HCV positive patients was significantly higher than patients without anti-HCV in our study. As the patient gets older, the risk of exposure and transmission, and hence the rate of HCV infection seems to increase.

Patients infected with HCV have a high prevalence of comorbidities and can be treated with several drugs (20). Consistent with the literature, we found that patients with HCV had more comorbid physical disorders and used any medication regularly. It was shown that people with HCV had a higher prevalence of comorbidity of mental and physical disorders compared to the general population, and people with substance use disorder were less likely to receive treatment for HCV (21). Considering the high risk of being infected with HCV and the low rates of accessing to treatment, the development and implementation of screening and treatment programs for drug users is crucial since treatment prevents and relieves the effects of comorbidity among patients with HCV.

Medication treatments for OUD are efficient in reducing opioid use, OUD-related symptoms, overdose, and transmission of infectious diseases (22). The results of our study show that patients with HCV were more often treated with buprenorphine naloxone replacement therapy. Naltrexone and buprenorphine naloxone are both safe for liver, but the maintenance dose requirements may be lower in patients with liver failure (23,24). At the time of the study conducted naltrexone was available in its implant form in our country, and since the duration of action is longer in its implant form, buprenorphine-naloxone may be recommended more by physicians and/or preferred more by patients.

The seropositivity of HBsAg, anti-HBs and anti-HBc IgG was 0.8 %, 35.2% and 10.2 % respectively in the present study. HBsAg positivity means that the hepatitis B virus is present. A reactive anti-HBc IgG test usually indicates a chronic infection or can be interpreted as a resolved infection. Patients have been vaccinated are anti-HBs positive in blood test. If anti-HBs and anti-HBc IgG is both positive, immunity is due to natural infection and patient has recovered from a prior hepatitis B (25). Vaccination protocol for hepatitis B was implemented routinely in 1998 and after vaccination HBV infection declined in our country (26). But as the mean age of our sample group was 31 at the time of the study (2018), the rate of patients who were vaccinated and was positive for anti-HBS isolated was below the rates excepted (27 %).

Coinfection with HBV and HCV is common because the transmission route of both viruses is similar (27). In our sample group, HBsAg was positive in only two patients, and both were seronegative for anti-HCV. The small number of patients with HCV may cause this result. Patients who were found to be HBsAg negative, anti-HBc IgG and anti-HBs positive were accepted as naturally immune and the rate of naturally immune patients were significantly higher in anti-HCV (+) group. These results indicate the increasing risk for coinfection with HBV in patients with HCV. Occult hepatitis B infection could not be excluded in patients with isolated anti-HBc IgG positive. Patients with dual HBV/HCV infection have a higher risk of advanced liver disease, cirrhosis, decompensated liver disease and hepatocellular cancer compared with mono-infected patients (28). Although liver function test results were within normal range in the majority of the sample group, ALT, GGT and fasting blood sugar levels were higher in patients with HCV in our study. Vaccination of individuals who are seronegative for hepatitis B will prevent possible HBV coinfections in patients with HCV as HBV coinfection is related with poor clinical outcome (27).

Although the difference between groups did not reach statistical significance, we found that poly-drug use was more common in patients with HCV. When the drug urine test result of patients was evaluated, consistent with the literature, we found that patients with HCV had more positive tests for opioids and other drugs, indicating a higher rate of opioid use among this group (29).

There is no HIV screening program for drug users, and HIV prevalence rates are hospital based in our country. 1567 new cases were reported to be HIV or AIDS in 2024, and the possible way of transmission is thought to be intravenous substance use in 0.2 % of these patients (30). The HIV seropositivity is reported to be 0.5 % in patients with substance use disorders and this rate increases to 1.3 % in intravenous drug users, according to Turkish Drug Report 2024 (4). HIV prevalence rates vary considerably between countries and regions (31). The absence of HIV positive patients in our study may be due to the small sample size, the sample consisting of patients using opioids mostly with inhalation, regional differences, and the lifestyle in the region as the major way of spreading HIV is high-risk sexual behaviors.

There are several limitations to the present study. The sample with a predominance of males and consisting of regional data; may result in poor generalizability. Serologic tests such as anti-HCV and HBsAg do not indicate the activity of the virus; however, due to the retrospective study design, only routine blood tests conducted could be analyzed.

The results of our study suggest that the number of female patients receiving treatment is much lower than the number estimated to be using illicit drugs. As female patients are underrepresented and under-treated, arrangements are needed to help opioid-dependent females access treatment programs. Older age and drug injection increase the risk of hepatitis C infection, highlighting the importance of screening and preventive approaches. Comorbid physical disorders are more prevalent in patients with HCV, leading to poor clinical outcomes; therefore, treating addiction along with additional physical and mental disorders, as well as vaccinating against diseases like hepatitis B, is crucial for this patient group. Understanding the local conditions regarding HBV, HCV, and HIV infections is important for preventing these infections and developing geographically relevant strategies.

In conclusion; the present study revealed that HCV infection is particularly increased in patients diagnosed with OUD, that this infection is concentrated in certain risk groups as anti-HCV positive individuals are male, older and have physical comorbidities, and that intravenous drug use history is the most important risk factor,

which points out the importance of harm reduction approaches. The results of our study are expected to provide insight for further studies on the prevention, screening, treatment, and elimination of viral hepatitis. Large multicenter trials are necessary to confirm and identify variables associated with viral hepatitis in patients with opioid use disorder.

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