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Seroprevalence of Hepatitis A Virus, Hepatitis B Virus, and Hepatitis C Virus Among Human Immunodeficiency Virus-Infected Patients: A Single-Center Retrospective Cross-Sectional Study

İnsan İmmün Yetmezlik Virüsü (HIV) ile Enfekte Hastalarda Hepatit A Virüsü, Hepatit B Virüsü ve Hepatit C Virüsünün Seroprevalansı: Tek Merkezli Retrospektif Kesitsel Çalışma

Muhammet Rıdvan Tayşi, Yakup Gezer

Konya City Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Konya, Türkiye

ABSTRACT

Objectives: Human immunodeficiency virus (HIV) may adversely affect the course of viral hepatitis infections that share similar routes of transmission. This study aimed to evaluate the seroprevalence of hepatitis A virus (HAV), hepatitis B virus (HBV), and hepatitis C virus (HCV) among individuals infected with HIV.

Materials and Methods: This retrospective study included HIV-infected patients aged ≥18 years who were followed at the outpatient clinic between October 1, 2020, and September 1, 2024. Demographic characteristics and viral hepatitis serological markers [anti-HAV immunoglobulin G (IgG), hepatitis B surface antigen (HBsAg), anti-HBs, total anti-HBc, anti-HCV] were recorded for these patients.

Results: A total of 210 HIV-infected patients were included in the study; 86.7% were male, and the median age was 35 (18-73) years. HBV and HCV serological data were available for 196 patients. Positivity rates for anti-HBs, total anti-HBc, HBsAg, and anti-HCV were 51%, 18.4%, 2.6%, and 0.5%, respectively. Concomitant positivity for anti-HBs and total anti-HBc was observed in 15.3% of patients, whereas isolated total anti-HBc positivity was detected in only one patient (0.5%). Among 152 patients with available anti-HAV IgG data, 68.4% were seropositive. Anti-HAV IgG negativity was significantly associated with younger age, higher educational level, and men who have sex with men status ($p<0.05$).

Conclusion: This study indicates that HBV and HCV coinfections occur at a low frequency among individuals living with HIV, whereas susceptibility to HAV and HBV remains an important clinical concern. It also emphasizes the necessity of routine serological screening and vaccination against viral hepatitis during HIV follow-up.

Keywords: Hepatitis A virus, hepatitis B virus, hepatitis C virus, human immunodeficiency virus, seroprevalence

ÖZ

Amaç: İnsan immün yetmezlik virüsü (HIV), benzer bulaş yollarını paylaşan viral hepatit enfeksiyonlarının seyrini olumsuz yönde etkileyebilmektedir. Bu çalışmanın amacı, HIV ile enfekte bireylerde hepatit A virüsü (HAV), hepatit B virüsü (HBV) ve hepatit C virüsü (HCV) seroprevalansını değerlendirmektir.

Gereç ve Yöntemler: Bu retrospektif çalışmaya, 1 Ekim 2020 ile 1 Eylül 2024 tarihleri arasında poliklinikte takipli, ≥18 yaşındaki HIV ile enfekte hastalar dahil edildi. Hastalara ait demografik özellikler ve viral hepatit serolojik belirteçleri [anti-HAV immünoglobulin G (IgG), hepatit B yüzey antijeni (HBsAg), anti-HBs, total anti-HBc, anti-HCV] kaydedildi.

Bulgular: Çalışmaya toplam 210 HIV ile enfekte hasta dahil edildi; hastaların %86,7'si erkekti ve medyan yaş 35 (18-73) yıl olarak saptandı. HBV ve HCV serolojik verileri 196 hasta için mevcuttu. Anti-HBs, total anti-HBc, HBsAg ve anti-HCV pozitiflik oranları sırasıyla %51, %18,4, %2,6 ve %0,5 olarak bulundu. Hastaların %15,3'ünde eş zamanlı anti-HBs ve total anti-HBc pozitifliği saptanırken, izole total anti-HBc pozitifliği yalnızca bir hastada (%0,5) tespit edildi. Anti-HAV IgG verisi bulunan 152 hastanın %68,4'ü seropozitifti. Anti-HAV IgG negatifliği; genç yaş, yüksek eğitim düzeyi ve erkeklerle seks yapan erkek olma durumu ile anlamlı şekilde ilişkili bulundu ($p<0,05$).

Sonuç: Bu çalışma HIV ile yaşayan bireylerde HBV ve HCV koenfeksiyonlarının düşük sıklıkta olduğunu, buna karşın HAV ve HBV'ye duyarlılığın önemli bir klinik sorun olmaya devam ettiğini göstermektedir. Ayrıca HIV izleminde viral hepatitler açısından rutin serolojik tarama ve aşılama uygulamalarının gerekliliğini vurgulamaktadır.

Anahtar Kelimeler: Hepatit A virüsü, hepatit B virüsü, hepatit C virüsü, insan immün yetmezlik virüsü, seroprevalans

Address for Correspondence: Muhammet Rıdvan Tayşi, MD, Konya City Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Konya, Türkiye
E-mail: taysiridvan@gmail.com **ORCID ID:** orcid.org/0000-0002-2609-264X

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Introduction

The life expectancy and quality of life of individuals living with human immunodeficiency virus (HIV) have significantly improved with highly active antiretroviral therapy (ART) (1,2). However, due to similar routes of transmission, these individuals remain at risk for viral hepatitis infections (3,4). HIV's immunosuppressive effects, particularly in the presence of hepatitis B virus (HBV) or hepatitis C virus (HCV), may alter the disease course by increasing viral replication, leading to chronicity and reduced response to treatment. For these reasons, patients with such coinfections have higher rates of liver-related complications and mortality compared with those with HIV mono-infection (5,6). In coinfection with hepatitis A virus (HAV) and HIV, overall mortality is low. However, HIV infection may result in a longer duration of HAV viremia and more severe clinical manifestations (7). Considering these risks, screening HIV-positive individuals for hepatitis markers is of vital importance for appropriate clinical management, early intervention, and the determination of vaccination strategies. This study aims to evaluate the seroprevalence of HAV, HBV, and HCV among individuals infected with HIV.

Materials and Methods

This retrospective cross-sectional study included HIV-infected patients aged 18 years and older who were followed in the Infectious Diseases and Clinical Microbiology outpatient clinic at Konya City Hospital between 01.10.2020 and 01.09.2024. Demographic data (age, sex, and education level) and viral hepatitis serological markers [immunoglobulin G to HAV (anti-HAV IgG); hepatitis B surface antigen (HBsAg); antibody to hepatitis B surface antigen (anti-HBs); total antibody to hepatitis B core antigen (total anti-HBc); antibody to HCV (anti-HCV)] were recorded. HCV-RNA and HBV-DNA levels were recorded for patients positive for HBsAg, anti-HCV, or both.

The serological markers were analyzed by enzyme immunoassay. HBV-DNA and HCV-RNA levels were determined using the AltoStar reverse transcription-polymerase chain reaction kit (detection ranges: 20 IU/mL-10^7 IU/mL for HBV and 25 IU/mL-10^7 IU/mL for HCV). HIV infection was defined as the presence of reactive antigens and/or antibodies to HIV 1/2, confirmed by a rapid confirmatory test performed at a central public health laboratory (Geenius HIV-1/2 Supplemental Assay, Bio-Rad Laboratories, Redmond, WA, USA).

This study received approval from the Konya City Hospital Non-Interventional Clinical Research Ethics Committee (approval number: 2025/242, dated: 08.12.2025) and was conducted in accordance with the Declaration of Helsinki.

Statistical Analysis

Continuous variables were presented as mean ± standard deviation or median [minimum-maximum and interquartile range (25^{th}-75^{th} percentile)]. Non-parametric methods were used because the continuous variables did not follow a normal distribution according to the Shapiro-Wilk test. Categorical variables were reported as frequencies and percentages. For comparisons between groups, the Mann-Whitney U test was used for non-normally distributed continuous variables, and the chi-square test was applied for categorical variables. Statistical analyses were performed using IBM SPSS Statistics version 26.0 (IBM Corp., Chicago, IL, USA). A p-value <0.05 was considered statistically significant.

Results

During the specified years, 210 HIV-infected patients were followed up at our outpatient clinic. Of these, 182 (86.7%) were male, and the median age was 35 years (range, 18-73). Serological data for HBsAg, anti-HBs, total anti-HBc, and anti-HCV were available for 196 patients. Among these patients, anti-HBs, total anti-HBc, HBsAg, and anti-HCV were positive in 100 (51%), 36 (18.4%), 5 (2.6%), and 1 (0.5%) patients, respectively (Table 1). Both anti-HBs and total anti-HBc were positive in 30 patients (15.3%), whereas anti-HBs was positive and total anti-HBc was negative in 70 patients (35.7%). Isolated total anti-HBc positivity was present in one patient (0.5%). HBV-DNA levels were requested in all HBsAg-positive patients while on ART. HBV-DNA levels were below the detection limit in four of these patients, while one patient had a level of 164 IU/mL. The baseline HCV-RNA level of the patient with a positive anti-HCV test was 6,394,236 IU/mL.

Anti-HAV IgG serological data were available for 152 patients, and 104 of them (68.4%) were seropositive (Table 1). None of these patients had a history of vaccination against HAV. Anti-HAV negativity was significantly more common among younger patients

Table 1. Demographic characteristics of patients infected with human immunodeficiency virus and serological findings for hepatitis A, hepatitis B, and hepatitis C viruses

Variables	
Age (year)	
Mean ± SD	36.9±11.7
Median (min-max)	35 (18-73)
Male n (%)	182 (86.7)
Educational status n (%)	
Primary school	23 (28.7)
Secondary (middle) school	16 (20)
High school	21 (26.3)
University	20 (25)
MSM n (%)	32 (22.5)
Serological tests n (%)	
HBsAg (+)	5 (2.6)
Anti-HBs (+)	100 (51)
Total anti-HBc (+)	36 (18.4)
Anti-HCV (+)	1 (0.5)
Anti-HAV IgG (+)	104 (68.4)

Educational status information was available for 80 patients, MSM information for 142 patients, anti-HBs, total anti-HBc, HBsAg and anti-HCV test data for 196 patients, and anti-HAV IgG test data for 152 patients. Anti-HAV: Anti-hepatitis A virus, IgG: Immunoglobulin G, Anti-HBs: Antibody to hepatitis B surface antigen, Total anti-HBc: Total antibody to hepatitis B core antigen, Anti-HCV: Antibody to hepatitis C virus, HBsAg: Hepatitis B surface antigen, MSM: Men who have sex with men, SD: Standard deviation

(p<0.001), men who have sex with men (MSM) (p<0.001), and those with higher levels of education (p=0.002) (Table 2).

Discussion

This single-center study evaluated the seroprevalence of HAV, HBV, and HCV among HIV-infected patients followed in Türkiye. HBsAg and anti-HCV seroprevalence rates were 2.6% and 0.5%, respectively; these rates are known to vary considerably by geographic region, population characteristics, and predominant risk factors. Globally, approximately 8% of individuals living with HIV are reported to be coinfected with HBV (8,9,10). Studies from Türkiye have shown that the seroprevalence of HBsAg ranges between 3% and 7% (11,12,13). Regarding HCV, a global meta-analysis and systematic review reported an HCV coinfection prevalence of 6.2% among individuals living with HIV (14). In a multicenter study based in Istanbul, anti-HCV positivity was found to be 0.9% among HIV-infected individuals (15). Another nationwide multicenter study from Türkiye reported this rate as 0.5% (16). The HBV, HCV seroprevalence rates observed in our study are consistent with the prevalence of chronic viral hepatitis reported among HIV-infected individuals in Türkiye. The particularly low rates of HBV and HCV coinfections, compared with global data, are consistent with the fact that HIV transmission in Türkiye occurs predominantly through sexual contact and that intravenous drug use is relatively less common. In contrast, in countries where a higher seroprevalence of chronic viral hepatitis among HIV-infected individuals has been reported, this situation is generally attributed to the higher prevalence of injection drug use (10,11,12,13,14).

In our study, anti-HAV IgG positivity was 68.4% and anti-HBs positivity was 51%, indicating that approximately one-third of HIV-infected individuals were susceptible to HAV infection and approximately one-half were susceptible to HBV infection. These findings demonstrate that immunity against vaccine-preventable viral hepatitis is not sufficient among individuals living with HIV. It has been reported that HIV infection prolongs the duration of viremia associated with HAV and increases viremia levels, leading to more severe HAV-related liver abnormalities. In addition, HIV infection is associated with higher viremia levels for HBV, HBV reactivation, an increased likelihood of progression to chronic infection after acute infection, and an increased risk of cirrhosis and liver-related mortality (17,18,19). In line with these potential clinical outcomes, the Advisory Committee on Immunization Practices recommends evaluation of HAV and HBV serologies in all individuals living with HIV and routine vaccination of those found to be seronegative (20). These vaccination recommendations are also included in the guidelines of the Turkish Ministry of Health (21).

Table 2. Demographic characteristics of HIV-infected patients according to anti-HAV IgG serostatus

Variables	Anti-HAV IgG (-) (n=48)	Anti-HAV IgG (+) (n=104)	p
Male n (%)	46 (95.8)	90 (86.5)	0.083
Age (year) (mean ± SD)	27.4±5.3	40.3±11.5	**<0.001**
MSM n (%)	24/48 (50)	8/96 (8.5)	**<0.001**
Educational status n (%)			**0.002**
Primary school	2 (9.5)	16 (32)	
Secondary (middle) school	1 (4.8)	15 (30)	
High school	7 (33.3)	11 (22)	
University	11 (52.4)	8 (16)	

Anti-HAV: Anti-hepatitis A virus, IgG: Immunoglobulin G, HIV: Human immunodeficiency virus, MSM: Men who have sex with men, SD: Standard deviation

It is known that higher educational level reduces natural exposure to HAV during childhood due to improved hygiene conditions (22,23). In addition, studies have shown that childhood HAV exposure is lower in MSM populations; however, HAV transmission through sexual contact becomes more prominent in adulthood, and this group carries a higher risk for outbreaks (24,25). In our study, consistent with these findings, HAV susceptibility was significantly higher among younger individuals, individuals with higher education levels, and MSM. These data highlight the importance of evaluating anti-HAV IgG in these risk groups among HIV-infected individuals.

In our study, concomitant positivity for anti-HBs and total anti-HBc in 15.3% of patients indicated a past, resolved HBV infection. This serological distribution suggests that exposure to HBV among individuals living with HIV is not negligible. It has been reported that spontaneous reverse seroconversion, characterized by loss of anti-HBs and reappearance of HBsAg, may occur, particularly in HIV patients with CD4+ T lymphocyte counts below 200 cells/mm^3. Therefore, reassessment of HBV serological markers is recommended when unexplained elevations in liver enzymes or signs of liver disease develop in an HIV-infected patient who was previously anti-HBs positive (26,27). In studies reported from Türkiye, isolated total anti-HBc positivity was found to be 4.6% in a nationwide study conducted by Tozun et al. (13) and 8.2% in a single-center cohort of 1,394 HIV-infected individuals reported by Zerdali et al. (12). In our study, this rate was only 0.5%. Isolated total anti-HBc positivity is known to be an indicator of loss of anti-HBs levels after past HBV infection, false positivity, or occult HBV infection (28). In a study conducted in Taiwan with an average follow-up period of approximately 5 years, 41% of 179 patients with isolated total anti-HBc positivity—most of whom were receiving ART—became anti-HBs positive, while 4% developed HBsAg positivity (27). These findings support that isolated total anti-HBc IgG positivity in individuals living with HIV carries a risk of HBV reactivation and that careful follow-up is required in this patient group (29).

One of the main strengths of the present study is that it increases awareness of viral hepatitis among individuals living with HIV and demonstrates that comprehensive screening and effective vaccination strategies should be integral components of follow-up. The study contributes meaningfully to the literature by providing up-to-date, Türkiye-specific seroepidemiological data.

Study Limitations

The main limitations of this study are the limited availability of data and the risk of misclassification due to its retrospective design. The inability to access serological data for all patients limited sample integrity and narrowed the scope of subgroup analyses. Moreover, the single-center design limits the generalizability of the findings to other geographic and sociodemographic populations. Therefore, current multicenter studies including individuals from different regions of Türkiye and having diverse demographic characteristics are needed.

Conclusion

This study provides comprehensive and up-to-date data on the seroepidemiology of viral hepatitis among individuals living with HIV in Türkiye and demonstrates that, despite the relatively low prevalence of chronic HBV and HCV coinfections, susceptibility to vaccine-preventable hepatitis remains an important clinical and public health problem.

Ethics

Ethics Committee Approval: This study received approval from the Konya City Hospital Non-Interventional Clinical Research Ethics Committee (approval number: 2025/242, dated: 08.12.2025) and was conducted in accordance with the Declaration of Helsinki.

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Concept: M.R.T., Y.G., Design: M.R.T., Y.G., Data Collection or Processing: M.R.T., Y.G., Analysis or Interpretation: M.R.T., Y.G., Literature Search: M.R.T., Y.G., Writing: M.R.T., Y.G.

Conflict of Interest: No conflict of interest was declared by the authors.

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