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Orijinal Araştırma / Original Article

# Retrospective Analysis of Hepatitis B and Hepatitis C Viruses and HIV Infections in Patients Presenting to the General Surgery Clinic and Evaluated Preoperatively

## Genel Cerrahi Kliniğine Başvuran ve Ameliyat Öncesi Değerlendirilen Hastalarda Hepatit B, Hepatit C Virüs ve HIV Enfeksiyonlarının Retrospektif Analizi

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## Abstract

**Aim**: Hepatitis B (HBV), Hepatitis C (HCV) and Human Immunodeficiency Virus (HIV) infections are important parenterally transmitted infections. The aim of this study is to determine the seroprevalence of HBsAg, anti-HBs, anti-HCV and anti-HIV in patients with preoperative preparation.

**Material and Method:** Anti-HBs, HBsAg, anti-HCV, anti-HIV tests with chemiluminescent enzyme immune-assay method in a total of 900 patients applied to the General Surgery Clinic and were evaluated preoperatively by Abbott Architect i1000 immunoassay analyzer (Abbott Diagnostics, Illinois, USA) operated according to the manufacturer's instructions. Anti-HBs titer above 10 IU/mL, serum optical density/"cut-off" control optical density (S/Co) ≥1 in HBsAg, anti HCV and anti-HIV tests were accepted as positive. HBV-DNA and HCV-RNA tests were performed with real-time PCR method.

**Results**: Anti-HBs test was found to be reactive in 34.11% and nonreactive in 65.89%. HBsAg positivity was 1.0% (9/900), and anti-HCV positivity was 0.33% (3/900). Anti-HIV positivity and HBsAg-anti-HCV association were not detected. Six patients with HBsAg positivity and one patient with anti-HCV positivity were found incidentally during preoperative examinations.

**Conclusion**: As a result of these data, it can be concluded that cost-effective serological tests for HBV and HCV infections performed in the preoperative period are extremely important in the detection of asymptomatic patients. Preoperative screening is important in terms of early diagnosis of patients before complications such as cirrhosis and HCC develop, enabling treatment, as well as enabling healthcare professionals to increase infection control measures while intervening with infected patients, to be more careful in terms of percutaneous injuries, and to reduce the risk of transmission.

**Keywords**: Preoperative preparation, hepatitis B (HBV), hepatitis C (HCV), HIV, seroprevalence

## Öz

**Amaç**: Hepatit B (HBV), Hepatit C (HCV) ve İnsan Bağışıklık Yetmezliği Virüsü (HIV) enfeksiyonları parenteral yolla bulaşan önemli enfeksiyon etkenleridir. Bu çalışmanın amacı, preoperatif hazırlık yapılan hastalarda HBsAg, anti-HBs, anti-HCV ve anti-HIV seroprevalansını belirlemektir.

**Gereç ve Yöntem**: Genel Cerrahi Kliniğine başvuran ve ameliyat öncesi değerlendirilen toplam 900 hastada anti-HBs, HBsAg, anti-HCV, anti-HIV testleri kemilüminesan enzim immun-assay (KMIA) yöntemi ile Abbott Architect i1000 (Abbott Diagnostics, Illinois, USA) cihazında üretici talimatlarına göre çalışıldı. Anti-HBs titresi 10 IU/mL üzeri olması, HBsAg, anti HCV ve anti-HIV testlerinde serum optik yoğunluk/"cut-off" kontrol optik yoğunluk (S/Co) ≥1 olması pozitif olarak kabul edildi. HBV-DNA ve HCV RNA testleri gerçek zamanlı (real-time) PCR yöntemi ile çalışıldı.

**Bulgular**: 900 hastanın (ortalama yaş= 51.8±16.5) 501'i kadın (%55.7), 399'u erkek (%44.3) hastalardan oluşmakta idi. Anti-HBs testi hastaların %34.11'inde reaktif, %65.89'unda nonreaktif olarak saptanmıştır. HBsAg pozitifliği %1.0 (9/900), anti-HCV pozitifliği %0.33 (3/900) olarak belirlenmiştir. Anti-HIV pozitifliği ve HBsAg-anti-HCV birlikteliği saptanmamıştır. HBsAg pozitifliği saptanan altı hasta ve anti-HCV pozitifliği olan bir hasta preoperatif tetkikler sırasında tesadüfen saptanmıştır.

**Sonuç**: Sonuç olarak asemptomatik hastaların saptanmasında preoperatif dönemde yapılan HBV ve HCV enfeksiyonlarına yönelik maliyeti düşük serolojik testlerin son derece önemli olduğu sonucuna varılabilir. Preoperatif tarama hastaların siroz, hepatosellüler karsinom (HCC) gibi komplikasyonlar gelişmeden erken dönemde tanı konması, tedaviye olanak sağlaması açısından önemli olduğu kadar, sağlık çalışanlarının da enfekte hastaya müdahale ederken enfeksiyon kontrol önlemlerini artırması ve perkütan yaralanmalar açısından daha da dikkatli olunmasına, bulaş riskinin azalmasına olanak sağlamaktadır.

**Anahtar Kelimeler:** Preoperatif hazırlık, hepatit B (HBV), hepatit C (HCV), HIV, seroprevelans

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## INTRODUCTION

Hepatitis C (HCV) and Hepatitis B virus (HBV) infections are important public health problems worldwide due to their serious risks such as chronic hepatitis, cirrhosis, and hepatocellular carcinoma (HCC). It is estimated that 80 million (64-103 million) people are HCV-viremic around the world and the prevalence of HCV RNA is 1.1% (0.9-1.4%).[1] The number of HCV-infected individuals in Turkey is 1.0–1.3 million and the prevalence of HCV is approximately 1.0%.[2] 75-80% of individuals exposed to HCV develop chronic infection. The risk of developing cirrhosis in patients with chronic HCV infection is between 2-5% annually.[3]

In 2016, approximately 292 (251–341) million people were identified as infected with chronic hepatitis B virus (HBV), which corresponds to a prevalence of 3.9% (3.4-4.6%).[4] In terms of HBV infection, Turkey is among the moderately endemic (2-7%) regions, which include the Mediterranean, Eastern Europe, and Latin America.[5] Among the factors contributing to the development of HCC in Turkey, HCV comes first (49% of cases), followed by HBV (26%), alcohol (19%), and other factors (11%).[6] Hepatocellular carcinoma (HCC) is the third leading cause of cancer-related death. HCC has a poor prognosis and low survival rate, due to its low resectability rate, high recurrence rate after resection, and poor response to conservative treatment.[7]

In 2016, World Health Organisation (WHO) adopted a global hepatitis strategy to eliminate viral hepatitis as a public health threat by 2030, targeting a 90% reduction in hepatitis B and hepatitis C cases and a 65% reduction in deaths.[8] Therefore, comprehensive studies including prevention, screening, and treatment of HBV and HCV infections are required to achieve these goals.[8,9]

The availability of HBV vaccines is important in preventing HBV infection. Direct-acting antivirals (DAAs), highly effective in the treatment of HCV infection, make a significant contribution to the elimination of the disease.[9] However, protection and prevention strategies, as well as diagnosis of these infectious diseases, are very important. It is worrying that only 12 out of 194 countries were able to meet the WHO 2030 elimination targets as of June 2018. Reducing healthcare-associated transmission remains an important preventative measure in elimination programs. Recognizing viral hepatitis as a health priority and prevention, screening and diagnostic programs are extremely important to achieve the WHO 2030 elimination targets.[8,9]

Prior to surgery, HBsAg, anti-HCV, and anti-HIV screening are frequently performed. Because these infections are likely to be asymptomatic in the beginning, the probability of detection by chance in screening is high. This study aims to determine the seroprevalence of HBsAg, anti-HBs, anti-HCV, and anti-HIV in patients in the preoperative preparation stage and to analyze it together with the results of the molecular test in patients with positivity. In addition, we aimed to investigate whether the patients with reactivity were previously informed about this condition, whether it was detected during the preoperative examination, possible transmission route, treatment, and follow-up information.

## MATERIAL AND METHOD

This study was carried out with the approval of Balikesir University Non-Interventional Research Ethics Committee (Date:24/03/2021 and Decision no:2021/89). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. HBV, HCV, and HIV infections were investigated in a total of 900 patients who presented to the General Surgery Clinic and were evaluated preoperatively. Repeated results of the same patient were not included. Anti-HBs, HBsAg, anti-HCV, and anti-HIV serological test results were evaluated retrospectively. Molecular test results, medical histories, risk factors for transmission, disease treatment, and follow-up information of patients with reactivity were analyzed via their file records.

Anti-HBs, HBsAg, anti-HCV, anti-HIV tests were performed using the chemiluminescent enzyme immune-assay (CMIA= "Chemiluminescent Microparticle Immunoassay") method on the Abbott Architect i1000 (Abbott Diagnostics, Illinois, USA) device according to the manufacturer's instructions. Anti-HBs titer above 10 IU/mL and serum optical density/"cut-off" control optical density value (S/Co) ≥1 in HBsAg, anti-HCV, and anti-HIV tests were considered positive. HBV-DNA and HCV-RNA tests were performed with the real-time PCR method.

### Statistical Analysis

The data obtained in the study were recorded to the SPSS 22.0 (SPSS INC, Chicago, IL, USA) program and statistical analyzes were conducted. Categorical variables were given as percentages and mean±standard deviation.

## RESULTS

A total of 900 patients (mean age= 51.8±16.5, age range= 18-88) were included in the study. 501 patients (55.7%) were female (mean age= 50.3±15.9) while 399 (44.3%) were male (mean age= 53.7±17.1). Anti-HBs test was found to be reactive in 34.11% and nonreactive in 65.89% of the patients. HBsAg positivity was found as 1.0% (9/900) and anti-HCV positivity was 0.33% (3/900). Anti-HIV positivity and HBsAg, anti-HCV association were not detected (**Table 1**).

**Table 1.** Anti-HBs, HBsAg, anti-HCV, anti-HIV test results

| Serological parameters | Positive n (%) | Negative n (%) |
|---|---|---|
| HBsAg | 9 (1.0) | 891 (99.0) |
| Anti-HCV | 3 (0.33) | 897 (99.67) |
| Anti-HIV | - | 900 (100.0) |
| Anti-HBs | 307 (34.11) | 593 (65.89) |

Eight of the HBsAg positive patients had an S/Co value of ≥10, while one patient had a <10. The HBV DNA PCR test of the patient with HBsAg S/Co: 1.36 was found to be negative, which was evaluated as false positive. Two of the patients with HBsAg reactivity were registered patients and HBV was transmitted to one of them after giving birth and to the other from her partner. The other six patients were identified as a result of preoperative examinations (**Table 2**).

**Table 2.** Analysis of S/Co values of HBsAg positive patients

| HBsAg (+) (n=9) | S/Co | Mean±SD | Minimum - Maximum |
|---|---|---|---|
| 8 patients | ≥10 | 3186±2279.53 | 108 - 5945 |
| 1 patient | <10 | 1.36 | 1.36 |

SD: Standard deviation, S/Co: serum optical density/"cut-off" control optical density

While two of the anti-HCV positive patients had an S/Co value of ≥10, one patient had <10 (**Table 3**). One of the patients with anti-HCV reactivity was operated on due to rectal cancer, but detailed information could not be reached because he died. HCV RNA positivity was also detected in a patient with anti-HCV positivity. A patient in whom positivity was found incidentally one year ago and source of transmission was unknown is being followed up by the Gastroenterology department due to HCV infection. HCV RNA was negative in a patient with anti-HCV positivity (S/C:6.29). Anti-HCV positivity in this patient was determined during preoperative examinations.

**Table 3.** Analysis of S/Co values of anti-HCV positive patients

| Anti-HCV (+) (n=3) | S/Co | Mean±SD | Minimum - Maximum |
|---|---|---|---|
| 2 patients | ≥10 | 13.23±2.58 | 11.40 - 15.06 |
| 1 patient | <10 | 6.29 | 6.29 |

SD: Standard deviation, S/Co: serum optical density/"cut-off" control optical density

## DISCUSSION

Infections are one of the most important occupational risk factors to which healthcare professionals are exposed. HBV, HCV, and HIV infections, which are especially at risk of parenteral transmission, are the leading causes. These agents can be transmitted by contact with infected blood and body fluids of patients with impaired skin and mucous membranes (10).

In our country, serological tests for HBV, HCV, and HIV infections are performed preoperatively for patients who will undergo surgical intervention. In a study examining the results of 37675 patients in our country, HBsAg positivity was determined as 3.27% and anti-HCV positivity was determined as 0.65% (11). In 3731 patients whose serological markers were investigated prior to septoplasty, HBsAg positivity was found to be 3.6%, anti-HCV positivity was 0.3%, and anti-HIV positivity was 0.2% (12). In the study of Erbay et al. (13), 0.6% of 25424 patients who underwent surgical intervention were anti-HCV-positive. To be brief, in different studies conducted in our country, preoperative HBsAg seropositivity rates ranged between 0.25-7.7% (11,12,14-16). In our study, HBsAg positivity was 1.0%, which was consistent with studies conducted in our country. Anti-HCV positivity was between 0.3-2.3 in literature (11-16). In our study, anti-HCV positivity was determined as 0.33%, which was in line with the data of our country. Anti-HIV positivity was reported between 0.0-0.2 in studies (12,14-16). However, no anti-HIV positivity was found in our study.

Centers for Disease Control and Prevention (CDC) emphasizes that HBV infections can be easily diagnosed with cost-effective serological tests even in the asymptomatic period. Thus, advanced liver diseases such as cirrhosis and HCC can be prevented with early initiation of treatment (17). Similarly, DAAs, which are new generation HCV drugs, are very effective in HCV elimination, so it is extremely important to detect and treat the disease with screening tests at an early stage before complications develop (9). The success of antiviral drugs (especially DAAs) is very high and they are effective in approximately 95% of people with HCV infection. However, the delay or lack of diagnosis also reduces the rates of access to treatment. The fact that the vaccine, which provides a great advantage in preventing HBV infections, does not exist for HCV infections suggests that medical treatment is very important to prevent this infection. At this point, early diagnosis is critical (9,18). In our study, two of the patients with HBsAg positivity were registered patients and six were found incidentally during preoperative examinations. One of the patients with anti-HCV positivity was also diagnosed with preoperative examinations during the scans. Accordingly, it can be concluded that the tests for HBV and HCV infections that are performed in the preoperative period are extremely important in the detection of asymptomatic patients.

There is a direct relationship between the prevalence of infection in the community and the risk of transmission. Therefore, the risk of infection is higher in healthcare professionals in underdeveloped and developing countries (19). The risk of exposure is even higher, especially among healthcare professionals working in surgical departments. Screening for HCV, HBV, and HIV infections raises the awareness of healthcare professionals working in the surgical departments, ensures that the surgical procedure is reviewed, and allows more intensive infection control measures (such as face shield-visor, double gloves) (20,21). Preoperative screening is thought to be cost-effective in countries with high HCV and HBV seroprevalence (21-24).

## CONCLUSION

Although our study was conducted retrospectively, it is worth emphasizing the importance of preoperative screening for HBV, HCV, and HIV infections. Therefore, a considerable number of patients were diagnosed by chance and were referred for follow-up or treatment. Preoperative screening is very important in terms of early diagnosis of patients

before complications develop and enabling the treatment. Additionally, it helps to increase infection control measures when intervening with infected patients, to be more careful in terms of percutaneous injuries, and to reduce the risk of transmission.

## ETHICAL DECLARATIONS

**Ethics Committee Approval**: This study was carried out with the approval of Balikesir University Non-Interventional Research Ethics Committee (Date:24/03/2021 and Decision no:2021/89).

**Informed Consent:** Because the study was designed retrospectively, no written informed consent form was obtained from patients.

**Referee Evaluation Process**: Externally peer-reviewed.

**Conflict of Interest Statement**: The authors have no conflicts of interest to declare.

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**Author Contributions:** All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

## REFERENCES

1. Gower E, Estes C, Blach S, Razavi-Shearer K, Razavi H. Global epidemiology and genotype distribution of the hepatitis C virus infection. J Hepatol 2014;61:45-57.
2. Tozun N, Ozdogan O, Cakaloglu Y, Idilman R, Karasu Z, Akarca U, et al. Seroprevalence of hepatitis B and C virus infections and risk factors in Turkey: a field-work TURHEP study. Clin Microbiol Infect 2015;21:1020-6.
3. Lingala S, Ghany MG. Natural history of hepatitis C. Gastroenterology Clinics of North America 2015; 44: 717–34.
4. Razavi-Shearer D, Gamkrelidze I, Nguyen MH, Chen DS, Van Damme P, Abbas Z, Polaris Observatory Collaborators. Global prevalence, treatment, and prevention of hepatitis B virus infection in 2016: a modelling study. Lancet Gastroenterol Hepatol 2018;3(6):383–403.
5. Madihi S, Syed H, Lazar F, Zyad A, Benani A. A Systematic Review of the Current Hepatitis B Viral Infection and Hepatocellular Carcinoma Situation in Mediterranean Countries. Biomed Res Int. 2020 Jun 10;2020:7027169.
6. Yapali S, Tozun N. Epidemiology and viral risk factors for hepatocellular carcinoma in the Eastern Mediterranean countries. Hepatoma Res 2018;4:24
7. Petruzziello A. Epidemiology of hepatitis B virus (HBV) and hepatitis C virus (HCV) related hepatocellular carcinoma. Open Virol J 2018;12:26-32.
8. WHO. Global health sector strategy on viral hepatitis 2016–2021. Geneva: World Health Organization, 2016.
9. Spearman CW, Dusheiko GM, Hellard M, Sonderup M. Hepatitis C. Lancet. 2019;394(10207):1451-1466.
10. Beltrami EM, Williams IT, Shapiro CN, Chamberland ME. Risk and management of blood-borne infections in health care workers. Clinical Microbiology Reviews. 2000;13(3):385-407.
11. Pehlivanoğlu F, Kart Yaşar K, Şengöz G. Ameliyat olmak üzere başvuran hastalarda hepatit B ve hepatit C seroprevalansı. Viral Hepatit Dergisi. 2011; 17(1): 27-31.
12. Onerci Celebi O, Araz Server E, Hamit B, Yiğit Ö. The seroprevalence of hepatitis B, hepatitis C, and human immunodeficiency virus in patients undergoing septoplasty. Braz J Otorhinolaryngol. 2018; 84(1): 34-9.
13. Erbay K, Hızel K, Özdil T. Importance of anti-HCV screening before invasive procedures. Klimik Derg. 2019; 32(3): 229-32.
14. Karaayak Uzun B, Er H, Güngör S, Pektaş B, Demirci M. Seropositivity of HBsAg, anti-HCV and anti-HIV in preoperative patients. J Clin Exp Invest. 2013;4(4):449-452.
15. Sayhan, H. Preoperative Seroprevalence of HbsAg, Anti-HCV, and Anti-HIV in Patients Apply to Anesthesia Clinic. Van Medical Journal. 2015; 22(2):80-83.
16. Akpınar O, Akpınar H. Preoperative seroprevalence of HBsAg, Anti-HCV, Anti-HIV in patient with dental surgery under general anesthesia. Sdü Sağlık Bilimleri Enstitüsü Dergisi 2018;9(2): 37-41.
17. Weinbaum CM, Williams I, Mast EE, et al. Recommendations for identification and public health management of persons with chronic hepatitis B virus infection. MMWR Recommendations and reports: Morbidity and mortality weekly report Recommendations and reports. 2008;57(Rr-8):1-20.
18. Hepatitis C guidance: AASLD-IDSA recommendations for testing, managing, and treating adults infected with hepatitis C virus. Hepatology (Baltimore, Md). 2015;62(3):932-54.
19. Board S. Risks to health care workers in developing countries. N Engl j Med. 2001; Aug 16;345(7):538-41.
20. Azap A, Ergönül Ö, Memikoğlu KO, et al. Occupational exposure to blood and body fluids among health care workers in Ankara, Turkey. American Journal of Infection Control. 2005;33(1):48-52.
21. Dresing K, Pouwels C, Bonsack S,et al. HCV, HBV and HIV infections: risk for surgeon and staff. Results and consequences of routine screening in emergency patients. Chirurg. 2003;74(11):1026-33.
22. Buti M, Domínguez-Hernández R, Casado MÁ, Sabater E, Esteban R. Healthcare value of implementing hepatitis C screening in the adult general population in Spain. PloS one. 2018;13(11):e0208036.
23. Ledesma F, Buti M, Domínguez-Hernández R, Casado MÁ, Esteban R. Is the universal population Hepatitis C virus screening a cost-effective strategy? A systematic review of the economic evidence. Revista Española de Quimioterapia. 2020;33(4):240-248.
24. Weber P, Eberle J, Bogner JR, Schrimpf F, Jansson V, Huber-Wagner S. Is there a benefit to a routine preoperative screening of infectivity for HIV, hepatitis B and C virus before elective orthopaedic operations? Infection. 2013;41(2):479-83.