



# What is the Current Situation of HBV, HCV and HIV Seroprevalence Among Syrian Refugees? Patients Evaluated Preoperatively Over Ten Years

Suriyeli Mültecilerde HBV, HCV ve HIV Seroprevalansında Mevcut Durum Nedir? On Yıllık Bir Süre Boyunca Preoperative Olarak Değerlendirilen Hastalar

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## ABSTRACT

**Objectives:** Migration can change the demographic dynamics of host populations in terms of communicable diseases in destination countries. This is a potential public health challenge for the health authorities. Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections can lead to the development of chronic liver diseases, cirrhosis and hepatocellular carcinoma, whereas human immunodeficiency virus (HIV) infection can lead to the development of serious opportunistic diseases. The aim of this study was to evaluate the seroprevalence of HBV, HCV and HIV in Syrian refugees and Turkish patients who were evaluated preoperatively in our hospital.

**Materials and Methods:** Hepatitis B surface antigen (HBsAg), hepatitis B surface antibody (anti-HBs), hepatitis B core antibody, anti-HCV and anti-HIV results of Syrian refugee and Turkish patients who applied to surgical clinics approximately 2011-2021 were retrospectively reviewed.

**Results:** The study comprised 54,446 patients: Turkish patient group (n=20569) and Syrian refugee patient group (n=33877). The Syrian refugee patients had a significantly higher HBsAg seropositivity rate and a significantly lower anti-HBs seropositivity rate than the Turkish patients (p=0.002 and p<0.001, respectively). The anti-HCV and anti-HIV seropositivity rates were similar. The annual preoperative prevalence of HBsAg seropositivity in the Syrian refugee patients tended to significantly decrease gradually from 2011 to 2021 (p<0.001 for ≤30 and p=0.001 for >30 years old).

## ÖZ

**Amaç:** Göç, hedef ülkelerdeki bulaşıcı hastalıklar açısından ev sahibi popülasyonun demografik dinamiklerini değiştirebilir. Bu, sağlık otoriteleri için potansiyel bir halk sağlığı sorunudur. Hepatit B virüsü (HBV) ve hepatit C virüsü (HCV) enfeksiyonları kronik karaciğer hastalıkları, siroz ve hepatosellüler karsinom gelişimine neden olurken, insan immün yetmezliği virüsü (HIV) enfeksiyonu ciddi fırsatçı hastalıkların gelişmesine neden olabilir. Bu çalışmanın amacı, hastanemizde preoperatif olarak değerlendirilen Suriyeli mülteciler ve Türk hastalarda HBV, HCV ve HIV seroprevalansını değerlendirmektir.

**Gereç ve Yöntemler:** 2011-2021 yılları arasında cerrahi kliniklere başvuran Suriyeli mülteci ve Türk hastaların hepatit B yüzey antijeni (HBsAg), hepatit B yüzey antikoru (anti-HBs), hepatit B çekirdek antikoru, anti-HCV ve anti-HIV sonuçları retrospektif olarak incelendi.

**Bulgular:** Çalışma 54,446 hastadan oluşuyordu: Türk hasta grubu (n=20569) ve Suriyeli mülteci hasta grubu (n=33877). Suriyeli mülteci hastalarda Türk hastalara göre anlamlı düzeyde daha yüksek HBsAg seropozitiflik oranı ve önemli ölçüde daha düşük bir anti-HBs seropozitiflik oranı vardı (sırasıyla; p=0,002 ve p<0,001). Anti-HCV ve anti-HIV seropozitiflik oranları benzerdi. Suriyeli mülteci hastalarda HBsAg seropozitifliğinin yıllık preoperatif prevalansı 2011 yılından 2021 yılına kadar kademeli olarak önemli ölçüde azalma eğilimindeydi (<30 yaş için; p<0,001 ve >30 yaş için; p=0,001).

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**Conclusion:** Although HBV seroprevalence gradually decreases and HCV and HIV seroprevalence is low; screening, information and treatment programs should be given due importance because of the serious disease potential and preventable conditions with precautions. Additionally, preoperative screening of refugee patients coming for major surgery may be important for the safety of healthcare professionals.

**Keywords:** Anti-HIV, hepatitis B, hepatitis C, prevalence, Syrian refugees, Turkey

**Sonuç:** HBV seroprevalansı giderek azalmasına ve HCV ve HIV seroprevalansının düşük olmasına rağmen; ciddi hastalık potansiyeli ve tedbirlerle önlenebilir durumlar nedeniyle tarama, bilgilendirme ve tedavi programlarına gereken önem verilmelidir. Ek olarak, majör cerrahi için gelen mülteci hastaların cerrahi öncesi taranması sağlık çalışanlarının güvenliği için önemli olabilir.

**Anahtar Kelimeler:** Anti-HIV, hepatit B, hepatit C, prevalans, Suriyeli mülteciler, Türkiye

## Introduction

Migration is recognized as an independent social determinant of health. Large-scale migration can contribute to a change in the demographic dynamics of host populations in terms of communicable diseases in destination countries. Current mass movement from high or medium prevalence regions is a potential public health challenge for health authorities in countries with low prevalence of infectious diseases (1).

The Syrian civil war, which has been ongoing since 2011, led to the biggest refugee crisis since World War II. 3.658 million refugees were reported in Turkey in September 2019 (2,3). Refugees bring many infectious diseases that endanger the health of both themselves and the host population (4). Infections caused by hepatitis B virus (HBV) and hepatitis C virus (HCV) lead to the development of chronic liver diseases, cirrhosis and hepatocellular carcinoma, while human immunodeficiency virus (HIV) infection can lead to the development of serious opportunistic infections. According to the World Health Organization (WHO), an estimated number of 500 million people live with chronic viral hepatitis, making HBV and HCV one of the most virulent infectious diseases worldwide (5,6). At least 1.3 million deaths per year can be attributed to chronic liver disease caused by HBV and HCV (6,7). Also, viral hepatitis is largely responsible for the global increase in liver cancer.

More than 90% of the Syrian refugee population live in the community and mostly in big provinces such as Istanbul, Gaziantep, Hatay and Şanlıurfa. Hatay province hosts 435,953 Syrian refugees (8). Our city, which is close to the war zone, is at a higher risk of infectious diseases compared to other regions, as there are many applications for emergency and elective operations to our institution, which is a third level training and research hospital. In order to minimize the risk of occupational contamination, every patient may be potentially infected and there is a need to take protective measures accordingly. In addition, it is important to know the current prevalence of these diseases in establishing appropriate health policies for refugees. The aim of this study is to compare the seroprevalence of HBV, HCV and HIV between Syrian refugees and Turkish patients who were evaluated preoperatively in our hospital.

## Materials and Methods

This study was approved by the Non-Interventional Clinical Research Ethics Committee of Hatay Mustafa Kemal University (approval number: 22/04/2021-05). Hepatitis B surface antigen

(HBsAg), hepatitis B surface antibody (anti-HBs), hepatitis B core antibody immunoglobulin G (anti-HBc IgG), hepatitis C virus antibody (anti-HCV) and human immunodeficiency virus antibody (anti-HIV) results of Syrian refugees and Turkish patients of all age groups who applied to Hatay Mustafa Kemal University Health Practice and Research Hospital between 2011-2021 to be operated in surgical clinics were retrospectively screened and a comparison was made between the two groups. Serum samples were tested for HBsAg, anti-HCV, anti-HIV, anti-HBc IgG, and anti-HBs using commercial immunoenzymatic assays (Abbott Architect i2000SR, Illinois, USA). Anti-HIV reactivity was always confirmed by a western blot assay, which identifies both HIV-1 and HIV-2 strains. The demographic data of the patients were analyzed retrospectively from the hospital electronic information system and patient files. Duplicate records were removed.

Patient characteristics were determined as age, gender, race and year of admission to the hospital. Patients with positive HBsAg but with normal alanine aminotransferase and aspartate transaminases levels and negative HBV-DNA were accepted as HBV carriers. Patients with HBsAg and anti-HBc IgG negative but positive for anti-HBs were considered vaccinated. Detection of anti-HBc IgG positivity alone was accepted as isolated anti-HBc IgG positivity. Patients who were found to be negative for all three parameters (HBsAg, anti-HBs and anti-HBc) were considered to have never encountered hepatitis B.

## Statistical Analysis

All analyses were carried out using SPSS, version 23 software (SPSS Inc, Chicago IL, USA). The Shapiro-Wilk normality test was used to examine normality of distribution. Categorical variables were presented as frequencies (percentages) and compared with chi-square test. Non-normally distributed continuous variables were presented as median with interquartile range (25<sup>th</sup> and 75<sup>th</sup> percentiles) and compared with the Mann-Whitney U test between the groups.

## Results

The study is comprised of 54,446 patients, divided into two groups: Turkish patient group (n=20569) and Syrian refugee patient group (n=33877). The median age of the patients was 41 (28-59) years and 44.8% (n=24396) were male. The epidemiological characteristics and preoperative seroprevalance of HBV, HCV, HIV serological markers in the Syrian refugee and Turkish patients are shown in Table 1.

Although the Syrian refugee patients were significantly younger than the Turkish patients, Syrian refugee patients had a significantly higher HBsAg seropositivity rate and a significantly lower anti-HBs seropositivity rate than the Turkish patients ( $p < 0.001$ ,  $p = 0.002$  and  $p < 0.001$ , respectively). The anti-HBc, anti-HCV and anti-HIV seropositivity rates were similar between the two groups ( $p = 0.258$ ,  $p = 0.457$  and  $p = 1.000$ , respectively) (Table 1).

The comparisons of seropositivity of HBV markers between two groups according to age are shown in Table 2. Syrian refugee patients 15-year-old or younger and in the 16-30 age group had a significantly higher rate of HBsAg seropositivity than the Turkish patients in the same age groups ( $p = 0.007$  and  $p = 0.002$ , respectively). However, the rates of HBsAg seropositivity between two groups were similar in other age groups (Table 2).

The annual preoperative prevalence of HBsAg seropositivity in the Syrian patients (both in 30-year-old or younger and in over 30-year-old patients) tended to significantly decrease gradually from year 2011 to year 2021 ( $p < 0.001$  and  $p = 0.001$ , respectively). However, no significant changes were seen in the prevalence of HBsAg seropositivity in the Turkish patients in the same age groups ( $p = 0.910$  and  $p = 0.483$ , respectively) (Figure 1). Although anti-HCV seropositivity was similar between Syrian refugee and Turkish patients in <15, 16-30, 46-60 and >60 age groups, it was significantly higher in Syrian refugee patients in the 31-45 age group ( $p = 0.037$ ) (Table 3).

## Discussion

Millions of people around the world emigrate from their homeland due to economic, political and war reasons. Hatay, a border city that has received heavy immigration due to the Syrian civil war that started in 2011, and many people who were injured in the war applied to our hospital due to the need for urgent surgical operations. It is important to determine the infectious disease prevalence of our city due to migration and patient transfers. To the best of our knowledge, this is the first preoperative hepatitis serology study conducted in Syrian refugee patients from Hatay.

The Center for Disease Control and Prevention recommends screening for HBV infection in people from countries with an HBsAg prevalence greater than 2%. Turkey is a moderately endemic country for HBV with a prevalence of 4% (2-8%) (9). Vaccination against HBV in Turkey started in 1998 and vaccination rates reached 98% in 2016 (10). Vaccination against HBV in Syria started in 1991 and the pre-war vaccination rate reached 83% in 2008 (11,12). Also, Syria is one of the moderately endemic countries for HBV (13).

It is well known that the HBsAg seropositivity increases with age. In the current study, although the Syrian refugee patients were significantly younger than the Turkish patients, Syrian refugee patients had a significantly higher HBsAg seropositivity rate (2.3% versus 1.9%). This finding is consistent with results from earlier studies conducted in the general patient population of

**Table 1.** Comparison of epidemiological characteristics and preoperative seroprevalance of HBV, HCV, HIV serological markers in the Turkish and Syrian patients (n=54446)

	Turkish patients (n=20569)	Syrian patients (n=33877)	p-value
Age, years	42 (28-59)	41 (28-58)	<b>&lt;0.001</b>
Gender, male	9268 (45.1)	15128 (44.7)	0.360
HBsAg, positive	397 (1.9)	789 (2.3)	<b>0.002</b>
Anti-HBc, positive	216 (36.6)	323 (33.8)	0.258
Anti-HBs, positive*	7512 (42.5)	12231 (40.8)	<b>&lt;0.001</b>
Anti-HCV, positive	223 (1.1)	390 (1.2)	0.472
Anti-HIV, positive	1 (0)	1 (0)	1.000

Continuous data are expressed as median and interquartile range (IQR)=25<sup>th</sup>-75<sup>th</sup> percentile. Categorical data are expressed as number (n) and percentages (%). Statistically significant values are shown in bold. \*:  $\geq 10$  mIU/mL. HBsAg: Hepatitis B surface antigen, anti-HBc: Anti-hepatitis B core antigen, anti-HBs: Anti-hepatitis B surface antigen, HCV: Hepatitis C, HIV: Human immunodeficiency virus, HBV: Hepatitis B virus

**Table 2.** Comparison of preoperative seroprevalance of HBV serological markers in the Turkish and Syrian patients by age

Age group, years	Positive HBV serological markers								
	HBsAg			Anti-HBc			Anti-HBs*		
	Turkish patients (n=20569)	Syrian patients (n=33877)	p-value	Turkish patients (n=20569)	Syrian patients (n=33877)	p-value	Turkish patients (n=20569)	Syrian patients (n=33877)	p-value
15	2 (0.1)	21 (0.7)	<b>0.007</b>	3 (15.0)	3 (6.3)	0.349	1086 (70.0)	2027 (70.7)	0.613
16-30	32 (0.7)	100 (1.4)	<b>0.002</b>	28 (26.7)	23 (13.9)	<b>0.009</b>	2505 (66.0)	3939 (59.8)	<b>&lt;0.001</b>
31-45	95 (1.8)	184 (2.0)	0.283	39 (36.1)	55 (31.3)	0.398	994 (22.9)	1607 (20.9)	<b>0.013</b>
46-60	134 (3.0)	240 (3.5)	0.215	50 (37.0)	81 (37.3)	0.956	1131 (30.0)	1753 (29.0)	0.313
60 +	134 (2.8)	244 (3.2)	0.181	96 (43.2)	161 (46.0)	0.518	1796 (42.7)	2905 (42.6)	0.853

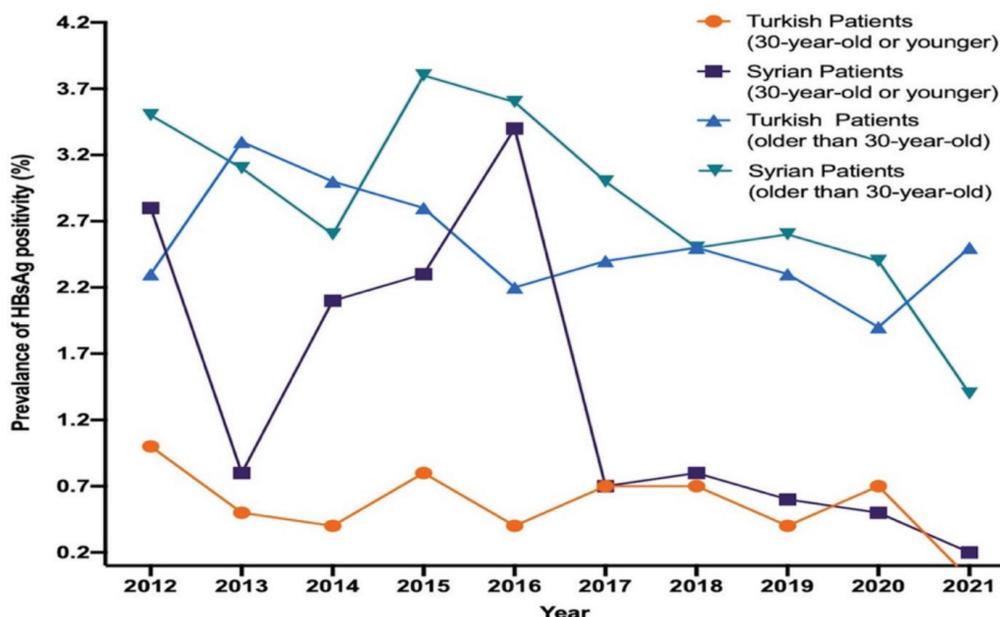
Continuous data are expressed as median and interquartile range (IQR)=25<sup>th</sup>-75<sup>th</sup> percentile. Categorical data are expressed as number (n) and percentages (%). Statistically significant values are shown in bold. \*:  $\geq 10$  mIU/mL. HBsAg: Hepatitis B surface antigen, anti-HBc: Hepatitis B core antigen, anti-HBs: Anti hepatitis B surface antigen

Syrian refugees, have reported rates ranging from 2.3% to 5.7% (14,15,16). When evaluated according to age groups, HBsAg seropositivity was significantly higher in Syrian refugee patients under the age of 15 and in the 15-30 age group. There was no difference in other age groups. This may be due to the fact that refugee children who came to Turkey missed a large number of vaccination periods due to the collapse of the vaccination system in their country of origin (17,18).

In the present study, the annual preoperative prevalence of HBsAg seropositivity in Syrian refugee patients (both  $\leq 30$  and  $>30$  years old) tended to gradually decline significantly from 2011 to 2021. However, there was no significant change in the prevalence of HBsAg seropositivity in Turkish patients in the same age group during the same period. This may be due to the collapse of the vaccination system in the country of origin during the first period of war and migration and more crowded living environments such as camps. In the later period, it can be attributed to the inclusion of all Syrian refugee children in the national vaccination program and the improvement of

socioeconomic conditions (such as free access to health and treatment, children's education, work permits and free access to vocational training) (17,19,20).

Anti-HBs seropositivity was significantly lower in Syrian refugee patients compared to Turkish patients (40.8% and 42.5%, respectively). However, no difference was found between Syrian refugee and Turkish patients in terms of anti-HBs seropositivity under the age of 15. This may be due to the fact that all Syrian refugee children who arrived in Turkey are included in the national vaccination program (19). According to the data of the Turkish Ministry of Health, the number of Syrian refugee children vaccinated was reported as 59,743 in 2014, 100,244 in 2015, 148,172 in 2016 and 269,085 in 2017 (19). Anti-HBs seropositivity was lower in Syrian refugee patients compared to Turkish patients in the 16-30 age ( $p < 0.01$ ) and 31-45 age ( $p = 0.013$ ) groups. This was attributed to the poor socioeconomic conditions in the war zone and the absence of vaccination tracking (17,18). No significant difference was found between Syrian refugee and Turkish patients over the age of 46. In accordance with this study, Özkaya et al. (15)



**Figure 1.** Annual trends of preoperative prevalence of HBsAg seropositivity

HBsAg: Hepatitis B surface antigen. Figure was plotted with Prism 8.0 (GraphPad Software, La Jolla, CA, USA)

Age group, years	Positive HCV serological marker		
	Anti HCV		
	Turkish patients (n=20569)	Syrian patients (n=33877)	p-value
<15	2 (0.1)	2 (0.1)	1.000
16-30	18 (0.4)	37 (0.5)	0.493
31-45	17 (0.3)	51 (0.6)	<b>0.037</b>
46-60	44 (1.0)	59 (0.9)	0.411
60 +	142 (3.0)	239 (3.2)	0.545

Continuous data are expressed as median and interquartile range (IQR)=25<sup>th</sup>-75<sup>th</sup> percentile. Categorical data are expressed as number (n) and percentages (%). Statistically significant values are shown in bold. HCV: Hepatitis C virus

found a significant difference in anti-HBs seropositivity between Syrian refugees (34.9%) and Turkish patients (43.4%).

According to WHO data, Syria is among endemic areas with a low anti-HCV seropositivity rate (21). Consistent with this, anti HCV seropositivity was 1.2% in Syrian refugee patients and 1.1% in Turkish patients in this study. There was no significant difference between Syrian refugee and Turkish patients in terms of anti-HCV seropositivity. Anti-HCV seropositivity was significantly higher in Syrian refugee patients aged 31-45 ( $p=0.037$ ). However, it was similar to Turkish patients in other age groups. Consistent with this study, Özkaya et al. (15) reported 1.8% anti-HCV seropositivity. In another study, Aşgin and Satılmış (14) reported it as 1%. Tümtürk and Yeşil (16) found 2.46% in a study they conducted on a small population (244 Syrian refugees). In a meta-analysis, Chemaitelly et al. (22) reported the anti-HCV seropositivity rate as 48.8-75% in hemodialysis patients, 21% in drug users and 20.5% in hemophilia patients in the Syrian population. These high rates may be due to the presence of serious risk factors in patients.

Syria has very low HIV prevalence (23). In this study, 1 HIV (+) patient was identified in 33,877 Syrian refugee patients and only 1 in 20,569 Turkish patients. Inci et al. (24) did not find any anti HIV (+) patients among 300 Syrian refugees in their study. In another study conducted by Tümtürk and Yeşil (16), they did not find any anti HIV (+) patients among 244 Syrian refugees.

### Study Limitations

We have some limitations in this study. This study was conducted on Syrian refugee patients, who had a high population, but had preoperative anesthetic evaluation in a single center. Therefore, multi-center studies are needed as our results may not reflect the serological data of all Syrian refugees. Since this study was retrospective, the medical history and risk factors of the patients could not be obtained.

In this study, information on HBV, HCV and HIV seroprevalence of high population of Syrian refugees who came for emergency and elective surgical operations from the ongoing Syrian civil war since 2011 was presented. In the Syrian refugee population, HBsAg seroprevalence was high and anti HBsAg seroprevalence was low. However, due to the vaccination studies conducted in Turkey, especially in the pediatric age group in Syrian refugees, HBsAg seroprevalence has gradually decreased and anti-HBs seroprevalence has increased gradually in the 10-year period. HCV and HIV rates are very low in both Turkish and Syrian populations.

### Conclusion

As a result, although HBV seroprevalence decreases gradually and HCV and HIV seroprevalence is low, due attention should be paid to screening, information and treatment programs due to the serious disease potential and preventable conditions. In addition, healthcare professionals' strict adherence to standard protection measures, training, vaccination against HBV and preoperative screening of refugee patients coming for major surgery may be important for the safety of healthcare professionals.

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### Ethics

**Ethics Committee Approval:** This study was approved by the Non-Interventional Clinical Research Ethics Committee of Hatay Mustafa Kemal University (approval number: 22/04/2021-05).

**Informed Consent:** Retrospective study.

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: M.S.Ç., T.B., M.Ç., Concept: M.S.Ç., T.B., M.Ç., Design: M.S.Ç., T.B., M.Ç., Data Collection or Processing: M.S.Ç., T.B., M.Ç., Analysis or Interpretation: M.S.Ç., T.B., M.Ç., Literature Search: M.S.Ç., T.B., M.Ç., Writing: M.S.Ç., T.B., M.Ç.

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