



# Hepatitis C Seropositivity and Distribution of HCV Genotypes

## Hepatitis C Virus Seropozitifliği ve Genotip Dağılımı

Hepatitis C Virus

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### Öz

**Amaç:** Hepatitis C virüsü (HCV) önemli bir halk sağlığı problemidir. Kronik hepatitis C enfeksiyonu şiddetli karaciğer hasarı (siroz) Karaciğer kanseri ve yetmezliğine neden olabilir. Çalışmamızda, Eğitim ve Araştırma Hastanesi'ne başvuran hastalarda anti HCV seropozitifliği ve genotip dağılımının retrospektif olarak incelemesi amaçlanmıştır. **Gereç ve Yöntem:** Ocak 2012-Eylül 2013 tarihleri arasında hastanemiz çeşitli kliniklerine başvuran hastaların gönderilen kan örnekleri ile kemilüminesans immunoassay (Advia Centaur CP cihazı) ve mikro-ELISA (Triturus Grifols) yöntemleri kullanılarak çalışıldı. Pozitif olduğu saptanan ve klinisyen tarafından HCV RNA ve genotipleme testi istenen örnekler AMPLICOR® ve COBAS® AMPLICOR HCV Testleri kullanılarak incelendi. Veriler retrospektif olarak değerlendirildi. Tekrarlanan örnekler analizden çıkarıldı. **Bulgular:** İncelenen 66030 kan örneklerinden 348'inin (%0,52) pozitif olduğu belirlendi. Pozitif olduğu tespit edilen hastaların 84'ü (%24,1) yabancı uyruklu idi. Genotipleme yapılan 45 kan örneğinin 38'inde (%84,4), 2'sinde (% 4,4) ve 5'inde (% 11,1); Genotip 1, Genotip 2 ve Genotip 3 olduğu saptandı. Genotip 3 olduğu tespit edilen hastalardan biri yabancı uyruklu idi. **Tartışma:** HCV enfeksiyonunun prevalansı dünya çapında yaklaşık %2,2-3, Türkiye'de HCV enfeksiyonu sıklığı %1 ile %2,4 arasında değişmektedir. Bölgemizde HCV enfeksiyonu sıklığının %0,52 olduğu tespit edildi ve Türkiye genel sıklığına göre daha düşük bulundu. Ülkemizde en sık rastlanan genotip Genotip 1 iken, diğer genotiplerde yurtdışından gelen insanlar ve göçmenler nedeniyle bir artış beklenmektedir.

### Anahtar Kelimeler

Anti HCV Seropozitifliği; Genotip

### Abstract

**Aim:** Hepatitis C virus (HCV) is an important public health problem. Chronic hepatitis C can lead to severe liver damage (cirrhosis), liver cancer and liver failure. Our study aimed to detect HCV seropositivity in patients presenting to Ümraniye Training and Research Hospital by investigating their anti-HCV test results retrospectively and to determine the distribution of genotypes in those patients for which HCV genotyping was performed. **Material and Method:** Blood specimens of patients presenting to our hospital between January 2012 and September 2013 and blood specimens sent from various clinics were studied by using chemiluminescent immunoassay (Advia Centaur CP device) and micro-ELISA (Triturus Grifols) methods. Blood specimens determined to be positive were sent for HCV RNA and genotyping by a clinician who used AMPLICOR® and COBAS® AMPLICOR HCV tests. Data were retrospectively analyzed. Repeat specimens were excluded from the analysis. **Results:** Three hundred and forty-eight (0.52%) of 66,030 blood specimens studied were determined to be positive. Eighty four (24.1%) of the patients determined to be positive were foreign nationals. Thirty-eight (84.4%), 2 (4.4%), and 5 (11.1%) of 45 blood specimens where genotyping was performed were determined to be Genotype 1, Genotype 2, and Genotype 3, respectively. One of the patients determined to be Genotype 3 was a foreign national. **Discussion:** The prevalence of HCV infection is approximately 2.2-3.0% worldwide and the frequency of HCV infection in Turkey varies between 1.0% and 2.4%. In our region, the frequency of HCV infection was determined in our study to be 0.52%, lower than the overall frequency of Turkey. While the most commonly determined genotype is Genotype 1 in our country, an increase is expected in the other genotypes due to people coming from abroad, including immigrants.

### Keywords

Anti HCV Seropositivity; Genotyp

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## Introduction

Worldwide 130–150 million people have chronic hepatitis C infection. Approximately 700000 people die each year from hepatitis C-linked liver diseases [1]. HCV can cause acute hepatitis, chronic hepatitis, cirrhosis, and hepatocellular carcinoma, been defined in 1989. The hepatitis C virus is most commonly transmitted through injecting drug use, the sharing of inadequate sterilization of medical equipment, especially syringes in healthcare settings and the transfusion of unscreened blood products.

In Turkey the primary transmission route of HCV is blood and blood products transfusion. A marked decrease occurred in this route of transmission following the introduction of routine screening of HCV antibodies by blood banks [2]. Phylogenetic analyses show that HCV has 6 major genotypes and more than 80 subtypes. HCV Genotype 1b is the most predominant genotype, accounting for 40–80% of all isolates all over the world. The most predominant genotype in Turkey is Genotype 1b (66.7–100%), followed by Genotype 1a (3.45–33.3%), and Genotype 4 (3.7%). Our study aimed to contribute to the literature on this subject by determining HCV seropositivity and the distribution of genotypes in our region.

## Material and Method

Blood specimens of the patients presenting to our hospital between January 2012 and September 2013 and the blood specimens sent from various clinics were studied by using chemiluminescent immunoassay (Advia Centaur CP device) and micro-ELISA (Triturus Grifols) methods. Following the instructions of the manufacturers, the results were interpreted as follows: the specimens with value below 1 S/CO were considered to be negative and the specimens with value  $\geq 1$  S/CO were considered to be positive. Blood specimens of the patients determined to be positive were sent for HCV RNA and genotyping by the clinician, who used AMPLICOR® and COBAS® AMPLICOR HCV tests. Data were evaluated statistically regarding seropositivity and the specimens were evaluated regarding distribution of genotypes.

## Results

Three hundred and forty-eight (0.52%) of 66030 patient (age range: 0–98 years) blood specimens sent to the microbiology laboratory of our hospital were determined to be anti-HCV positive. Eighty four (24.1%) of the patients determined to be positive were foreign nationals. Almost all of the foreign national cases were forensic cases and thus HCV RNA or genotyping study was not performed on the specimens of these patients. Clinical consequences of anti-HCV seropositivity are reported in Table 2. Thirty-eight (84.4%), 2 (4.4%), and 5 (11.1%) of 45 blood specimens genotyped were determined to be Genotype 1, Genotype 2, and Genotype 3, respectively.

## Discussion

The prevalence of HCV varies according to geographical region and age. The prevalence of HCV infection is estimated to be approximately 2.2–3.0% worldwide [3]. Japan, Taiwan, and Italy are among the countries with higher prevalence of HCV infection. The prevalence of HCV infection is less than 1.0%, the low-

est rate, in northern Europe [4]. The prevalence of HCV infection is as high as 14.7% of the general population in Egypt [5]. HCV prevalence rates are as follows in developed countries with lower prevalence rates and larger populations: Germany 0.6%, Canada 0.8%, France 1.1%, and Australia 1.1%. HCV prevalence rates were reported as follows in developed countries with higher prevalence rates and larger populations: United States of America 1.7%, Japan 1.5–2.3%, and Europe 1.03%, [4,6]. HCV prevalence rates in Turkey vary between 1% and 2.4% [7]. HCV prevalence rates in the studies performed in various regions of Turkey are reported in Table 1.

In our study, the HCV prevalence rate was found to be 0.52% in the general hospital population. It was determined to be lower than the overall HCV prevalence rate of Turkey. HCV is most commonly transmitted with a percutaneous exposure to infected blood. The predominant route for transmission of HCV differs from country to country. Although blood transfusions constitute the most important route of transmission, intravenous drug use is also an important route in developed countries. Transmission through sexual contact and vertical transmission are less commonly seen transmission routes. HCV positivity rates among hemodialysis patients in our country varies between 14% and 83%. Twenty-seven percent of cirrhosis and 25% of hepatocellular carcinoma (HCC) in the world is associated with HCV [4]. In the study performed by Okten [17], while hepatitis B virus (HBV) infection still maintains its importance in the etiology, the contribution of HCV has risen from 23% to 38.1% during the

Table 1. HCV Prevalence Rates Reported From Various Regions of Our Country

Province where the study performed	HCV prevalence rate	Reference
Hatay	0.4%	8
Artvin	0.9%	9
Kars	1.5%	10
Yozgat	0.3%	11
Siirt	0.6%	12
Batman	1.9%	13
Izmir	1.3%	14
Afyon	1.03–1.75%	15
Erzurum	1.2%	
Tokat	2.1%	
Sanliurfa	1.0%	

Table 2. Clinical Consequences of Anti-HCV Seropositivity

Patient group	Number of cases	Mean age	Number of cases/ Number of anti-HCV positive patients n:348	Number of cases/ Number of total patients n:66030
Acute viral hepatitis	8	71.6 $\pm$ 7.6	2.29%	0.012%
Chronic viral hepatitis (anti-HCV positive, HCV RNA positive)	177	54.8 $\pm$ 15.4	50.8%	0.26%
Anti-HCV positive, HCV RNA negative	20	46.9 $\pm$ 17	5.74%	0.030%
Anti-HCV positive, negative at confirmation	42	51.8 $\pm$ 19.4	12.06%	0.063%
Anti-HCV positive group, non-confirmed	17	49.4 $\pm$ 19.6	4.88%	0.025%
Foreign patient group	84	36.7 $\pm$ 10.1	24.1%	0.12%

last decade. Similarly, the contribution of HBV in the etiology of cirrhosis decreased from 56.6% to 45.9% and the contribution of HCV rose from 25.2% to 45.9%. Certainly, the development of diagnostic tests for hepatitis C is great [17]. The sensitivity of third-generation EIA tests in detection of anti-HCV is over 99% in patients with chronic hepatitis. However, even if clinically suspected, anti-HCV negativity or false positives are confirmed by HCV RNA testing, required for planning and follow-up treatment. The HCV RNA test, which quantitatively determines viremia, is the current gold standard [18,19]. In our study, HCV RNA results and clinical outcomes are summarized in Table 2. HCV has 6 genotypes. Subtypes of some genotypes were also determined in our study. While some HCV genotypes are widely distributed across the world, others are limited to certain geographical regions. Genotype 1 is highly prevalent worldwide [20]. Genotype 2 dominates in western Africa, Genotype 3 in southern Asia and parts of Scandinavia, Genotype 4 in central and northern Africa, Genotype 5 in southern Africa, and Genotype 6 in South east Asia [20]. Genotypes 1, 2, and 3 are the more dominant genotypes usually seen in Europe, North America, China, Japan, and Australia. There are more significant differences in subtype distributions. While Genotype 1a is commonly determined in northern Europe and North America, Genotype 1b is the predominant genotype in Japan and, southern and eastern Europe. Genotype 1 is determined at a rate of 71.0% in the U.S. and Genotype 2 is less prevalent than Genotype 1 overall in the world. Genotype 3 shows different distribution in various countries and it is found especially in Scottish blood donors, Southeast Asian countries, and in young patients. While there are also Genotypes 1 and 2, Genotype 4 is the predominant genotype in Middle Eastern countries, Egypt, and central African countries. HCV Genotypes 5 and 6 are seen in a more restricted region [4]. Response of Genotype 1 to treatment is poor compared to Genotypes 2 and 3 [20,21]. Unfortunately, the most commonly determined genotype in HCV cases in our country, Turkey, is Genotype 1b with a rate of 68.0-94.0% [22,23,24]. Also in our study, 38 (84.4%), 2 (4.4%), and 5 (11.1%) of 45 blood specimens genotyped were determined to be Genotype 1, Genotype 2, and Genotype 3, respectively. Our study was found to be consistent with other studies performed. However, our genotyping study was not performed for the foreign nationals' samples. Because of the recent increase in the number of people coming from abroad and the increase in immigrants, an increase is also expected in the other genotypes in Turkey generally and in our region.

### Competing interests

The authors declare that they have no competing interests.

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