Research Article (Araştırma Makalesi)

Two-Center Comparison of Viral Hepatitis A, B, C Seroprevalence among the 18-25 Age Group

18-25 Yaş Grubu arasındaki Viral Hepatit A, B, C Seroprevalansının İki Merkezli Karşılaştırılması

Evrim Gulderen KUSCU[1], Işıl Deniz ALIRAVCI[2], Özlem KIRISCI[3], Servan VURUCU[2]

[1] Kahramanmaraş Sütçü İmam University Faculty of Medicine Department of Infectious Diseases and Clinical Microbiology, Kahramanmaraş, Turkey
[2] Çanakkale Onsekiz Mart University Faculty of Medicine, Infectious Diseases and Clinical Microbiology, Çanakkale, Turkey
[3] Kahramanmaraş Sütçü İmam University Faculty of Medicine, Department of Microbiology, Kahramanmaraş, Turkey

Özet

Amaç: Viral hepatit, dünya çapında milyonlarca insanı etkileyen, akut-kronik enfeksiyon, karaciğer kanseri ve siroz nedeniyle binlerce ölüme neden olan viral bir enfeksiyona bağlı karaciğer iltihabıdır. Bu çalışma, Türkiye'nin doğu ve batı bölgelerinde bulunan iki üniversite hastanesi arasında 18-25 yaş grubunda, ayaktan polikliniğe başvuran hastalarda ve sağlık çalışanlarında viral hepatit A, B, C belirteçlerinin seroprevalans verilerini karşılaştırmayı amaçlamaktadır.

Gereç ve Yöntemler: Sütçü İmam Üniversitesi Tıp Fakültesi ve Onsekiz Mart Üniversitesi Tıp Fakültesi Hastanesine 01.01.2022-01.07.2022 tarihleri arasında ayaktan polikliniğe başvuran yaşları 18 ile 25 arasında değişen toplam 562 hastanın ve sağlık çalışanının verileri retrospektif olarak incelendi. HAV, HBV, HCV'ye ve HIV'e karşı gelişen serolojik belirteçlerin varlığı ELİSA yöntemi ile test edildi.

Bulgular: Anti-HAV IgG pozitifliği Çanakkale ve Kahramanmaraş için sırasıyla %25,5 ve %40,3 idi. Kahramanmaraş'ta anti-HAV seropozitiflik oranı Çanakkale'ye göre istatistiksel olarak anlamlı derecede yüksekti (P<0.001). Anti-HBs pozitifliği oranları Çanakkale ve Kahramanmaraş'ta sırasıyla %74,5 ve %75,4 olarak benzer bulundu (P=0.458). HBsAg pozitifliği Çanakkale'de %1,5 iken Kahramanmaraş'ta %0,8 olarak tespit edildi, iki şehir arasında anlamlı farklılık yoktu (P=0.810). Çanakkale'de bir (%0,5), Kahramanmaraş'ta dört (%1,1) hastada anti HCV pozitif bulundu. Kahramanmaraş'ta anti-HCV pozitifliği, Çanakkale'de anti-HIV pozitifliği daha yüksekti (P=0.03, P<0.001). 562 hastanın 171'i sağlık çalışanıydı. Sağlık çalışanlarında anti-HBs pozitifliğinin (%80,7) ve sağlık çalışanı olmayanlarda anti-HAV IgG pozitifliğinin (%38,4) daha yüksek olduğu tespit edildi (P=0.042, P=0.013). Anti-HCV ve anti-HIV pozitifliği açısından sağlık çalışanı olan ve olmayan arasında anlamlı fark yoktu.

Sonuç: Anti-HAV seropozitiflik oranlarının 18-25 yaş grubunda düşük olması bu bireyleri akut HAV enfeksiyonu açısından riskli hale getirmektedir. Özellikle Çanakkale'de anti-HAV pozitifliğinin düşük olması bu bölgede aşılamanın desteklenmesi için önem kazanmaktadır. Sağlık çalışanlarının hepatit hastalığına maruz kalma riskleri nedeniyle sağlık çalışanlarına da aşı ile önlenebilir hastalıklara karşı tarama yapmanın ve önlem almanın gerekli olduğu düşünülmüştür.

Anahtar kelimeler: Viral hepatit, Epidemiyoloji, Seroprevalans, Sağlık çalışanı, 18-25 yaş

Abstract

Objective: Viral hepatitis is inflammation of the liver due to a viral infection that affects millions of people worldwide, causing thousands of deaths due to acute-chronic infection, liver cancer and cirrhosis. This study is aimed to compare datas of the seroprevalence of markers for viral hepatitis A, B, C among 18-25 age group outpatient clinic patients and healthcare workers between the two University Hospitals from east and west zone of Turkey.

Material and Methods: The data of a total of 562 patients and healthcare workers, aged between 18 and 25, who applied to the outpatient clinic at Sütçü İmam University Faculty of Medicine and Onsekiz Mart University Faculty of Medicine Hospital between 01.01.2022 and 01.07.2022, were retrospectively examined. The presence of serological markers against HAV, HBV, HCV and HIV was tested with the ELISA method.

Results: Anti-HAV IgG positivity was 25.5% and 40.3% for Çanakkale and Kahramanmaraş, respectively. Anti-HAV seropositivity rate in Kahramanmaraş was statistically significantly higher than in Çanakkale (P<0.001). Anti-HBs positivity was found to be 74.5% and 75.4% for Çanakkale and Kahramanmaraş, which were similar to each other bulundu (P=0.458). HBsAg positivity was detected as 1.5% in Çanakkale and 0.8% in Kahramanmaraş. There was no significant difference between the two cities (P = 0.810). Anti-HCV was found to be positive in one (0.5%) patient in Çanakkale and in four (1.1%) patients in Kahramanmaraş. Anti-HCV positivity was higher in Kahramanmaraş and anti-HIV positivity was higher in Çanakkale (P=.03, P<0.001). It was detected that anti-HBs positivity (80.7%) was higher in HCWs and anti-HAV IgG positivity was higher in non-HCWs (38.4%) (P=.042, P=0.013). There was no significant difference between the 2 groups in terms of anti-HCV and anti-HIV positivity.

Conclusion: Due to the low anti-HAV seropositivity rates in the 18-25 age group, this makes this group more risky in terms of HAV infection. Especially due to the anti-HAV positivity in Çanakkale is low compared to Kahramanmaraş, it is recommended to support vaccination in this region. Since health care workers are at risk of having and transmitting hepatitis, it was found to be appropriate getting prevention measures by screening against vaccine-preventable diseases.

Keywords: Viral hepatitis, Epidemiology, Seroprevalence, Health care workers,18-25 years

Correspondence: Evrim Gulderen KUSCU, Kahramanmaraş Sütçü İmam University Faculty of Medicine Health Practice and Research Hospital, Infectious Diseases and Clinical Microbiology, Kahramanmaraş, Turkey

Phone: +905052754658 **e-mail:** evrmgulderen@yahoo.com

ORCID No (Respectively): 0000-0002-2335-2135; 0000-0002-4740-1579; 0000-0003-4784-8183; 0000-0001-8623-7639

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INTRODUCTION

Viral hepatitis has affected millions of people around the world. Therefore, it is a significant public health problem and distribution patterns of hepatitis viruses may differ regionally. An effective vaccination against hepatitis A and B is available. Despite this, viral hepatitis continues to be a serious health problem (1).

Hepatitis A virus infection, which is common in the world, is an enteric-transmitted disease. Although there are approximately 1.5 million cases per year, this number is thought to be ten times higher annually. These incidence rates are closely related to socio-economic status and access to safe drinking water. The incidence of HAV infection decreases as it is possible to have a high income level and access to clean drinking water (2). Acute hepatitis infection due to hepatitis A virus is usually asymptomatic or mild in children. Adults, on the other hand, develop illness with fever, malaise, fatigue and jaundice when infected with the hepatitis A virus. After infection, sero-conversion develops and long-term immunity is established (3). This is indicated by the positivity of Anti-HAV immunoglobulin G (IgG). If it is negative, it indicates that these people are susceptible to hepatitis A virus. Sero-epidemiological results are useful in the interpretation of HAV infection. HAV seroprevalence varies according to age, place of residence, environmental conditions and income status. Individuals living in high endemic areas are asymptomatic and mildly infected before the age of 10 and anti-HAV antibodies are positive, while those living in moderate endemic areas are usually infected at a later age (4). Individuals living in high endemic areas have asymptomatic and mild infection before the age of 10 and anti-HAV antibodies become pozitif, while those living in moderate endemic areas generally have the infection at a later age. Therefore, symptomatic disease is common and outbreaks may become a bigger problem. There are effective vaccines for hepatitis A that shorten the duration of epidemics and protect travelers to places where the risk of infection is high (5). Hepatitis A vaccine entered the childhood immunization schedule in our country at the end of 2012. It is administered to children born on or after March 1, 2011, as 2 doses at the end of 18 and 24 months (6).

HBV, HCV and HIV transmitted mainly via blood, body-fluid contact, and vertical transmission. Hepatitis B and hepatitis C virus can cause serious liver disease such as hepatocellular carcinoma (HCC) and end-stage liver disease associated with cirrhosis. 400 million people worldwide are living with chronic HBV infection. Every year, 500,000 people die from cirrhosis and HCC caused by chronic infections. 40,000 of these deaths are due to acute hepatitis B infection (7). There are more than 170 million people infected with HCV, which constitutes 3% of the world's population. While 20-30% of those who have hepatitis C virus infection recover spontaneously, chronic infection develops in 70-80%. 3-11% of these people whom develops chronic infection will face the risk of liver failure due to HCC and cirrhosis in the coming years. Hepatitis B virus infection is still seen as an important health problem in some regions of Eastern and Southeastern Anatolia, where economic income is low and social living conditions are not good (8). According to the studies carried out in different regions of Turkey have showed that HBsAg positivity is between 2.3% and 8.7%, anti-HCV positivity between 0.12% and 4.7%, anti-HIV positivity between 0% and 0.66% (9).

HIV infection is transmitted by perinatally, parenterally, close contact and sexual intercourse with infected people. HIV infection can progress with a wide clinical picture ranging from asymptomatic carrier to fatal diseases. Although it is rare in our country, the first case was reported in the world in the year 1981 and in Turkey in 1985. The most common age group is 20-49 years in our country. Despite all the developments in antiretroviral drugs and vaccine studies, it still has not been under control (10).

Health care workers (HCWs) are at risk of becoming infected because they work in risky areas and encounter faeces, blood and body fluids. For this reason, it is necessary to determine the immune status for HAV and HBV infection and to make the necessary vaccinations. This screening for HCV and HIV infection is important for early diagnosis and treatment as they work in risky places. The aim of this study is to compare the seroprevalence of Viral Hepatitis A, B, C and HIV among 18-25 age group in outpatients and HCWs who attended two University Hospitals, one in Southeastern Turkey, the other in Marmara region, together with the literature.

MATERIALS AND METHODS

In this study we retrospectively analyzed hepatitis A, B, C and HIV seropositivity of 18 to 25 aged outpatients who applied to Sütçü İmam University Medical Faculty Hospital and Onsekiz Mart University Hospital for any reason between 1 January 2022 and 31 June 2022. In blood samples obtained from 562 individuals, hepatitis B surface antigen (HBsAg), hepatitis B surface antibody (anti-HBs), hepatitis B core antibody (anti-HBc Ig G), HAV antibody (anti-HAV IgG), HCV antibody (anti-HCV) and HIV antibody (anti-HIV) were studied with Enzyme Linked Immunosorbend Assay (ELISA) (Abott Architect, USA). Age, gender, whether they were healthcare workers or not and vaccination results

of the patients were obtained retrospectively from the hospital information process. 171 of the 526 patients were HCWs who applied to the outpatient clinic for any reason. HCWs included nurses, medical students, dentistry students, health vocational high school intern students, hospital cleaners and doctors.

The statistical package program "Statistical Package for Social Sciences (SPSS) for Windows 21" version 25.0 was used in the analysis of the data. Chi-square test was used in the studies. In the representation of the descriptive statistics of the study, mean ± standard deviation (SD), minimum-maximum values for continuous numerical variables, number (n) and percentage (%) were used for categorical variables. Values with P<0.05 were considered statistically significant.

RESULTS

We examined the serological results of the 562 individuals aged between 18 and 25, 362 from Kahramanmaraş and 200 from Çanakkale during the study period. In total, anti-HAV IgG positivity was detected in 51 (25.5%) patients in Çanakkale, while it was detected in 146 (40.3%) patients in Kahramanmaraş (P<0.001). Anti-HAV seropositivity rate in Kahramanmaraş was statistically significantly higher than in Çanakkale. While HBsAg positivity rate was 1.5% (3/200) and anti-HBs positivity rate was 74.5% (149/200) in Çanakkale, they were 0.8% (3/362), 75.4% (273/362) in Kahramanmaraş. There was no significant difference between the two groups in terms of HBsAg and anti-HBs positivity (P=.458, P=.810). While anti HCV positivity and anti-HIV positivity were 0.5% (1/200), 3% (6/200) in Çanakkale, 1.1% (4/362), 0% (0/362) in Kahramanmaraş (P=.03, P<0.001). In our study, it was observed that the rate of anti-HCV seropositivity in Kahramanmaraş was higher than in Çanakkale. Anti-HIV positivity was higher Çanakkale than in Kahramanmaraş (P=0.03, P<0.001) **(Table 1)**.

When the data of 562 individuals in total were analyzed according to their status as HCWs, it was seen that 171 patients were HCWs, of which 63.2% (108) were female and 36.8% (63) were male. It was detected that anti-HBs positivity (80.7%) was higher in HCWs and anti-HAV IgG positivity was higher in non-HCWs (38.4%) (P=0.042, P=0.013). There was no significant difference between the 2 groups in terms of anti-HCV and anti-HIV positivity **(Table 2)**.

DISCUSSION

One of the most common infectious diseases in Turkey is viral hepatitis. HAV is transmitted orofecally, often in areas with poor sanitation and crowded living conditions (11). In recent years, the incidence of HAV infection decreased due to the improvement in wastewater, sewerage conditions and shifted to an older age group (12). Seroprevalence is highly variable due to living conditions and economic differences in Türkiye. It is located in the middle endemic region (13). Demiray

Table 1. Anti-HAV IgG, HBsAg, anti-HBs, anti-HCV and anti-HIV seropositivity results

	Çanakkale n=200		Kahramanmaraş n=362		Total n=562
	Count (n)	Percent (%)	Count (n)	Percent (%)	Count (n)
Anti-HAV IgG (+)	51	25,5	146	40.3	197
HBsAg (+)	3	1,5	3	0.8	6
Anti-HBs (+)	149	74.5	273	75.4	422
Anti-HCV	1	0.5	4	1.1	5
Anti-HIV	6	3	0	0	6

Table 2. Seroprevalence of Health Care Workers (HCWs)

	Anti HAV IgG (+)		HBsAg (+)		Anti-HBs (+)		Anti-HCV(+)		Anti-HIV(+)	
	Count (n)	Percent (%)	Count (n)	Percent (%)	Count (n)	Percent (%)	Count (n)	Percent (%)	Count (n)	Percent (%)
HCWs	47	27,5	0	0	138	80,7	0	0	1	0,6
Other	150	38,4	6	1,5	284	72,6	5	1,3	5	1,3

et al.12, in their review, suggested that the incidence of hepatitis A in Turkey has decreased in the last 15 years and continues to decrease in urban areas. They predicted that if this decline continues, it may become a low endemic region. Karadeniz et al.14 found the prevalence of total anti-HAV antibodies was 64.8% for all patients among the 3868 serum samples and determined seropositivity rates among the age groups were 55% for the 0-16 age group; 47% for the 17-30 age group; 73.5% for the 31-45 age group and 89% in patients older than 46 years in İstanbul (14). Ceyhan et al.5 detected anti-HAV IgG sero-positivity as the number of 1142 (64.4%) of a total of 1773 samples. They showed that the seroprevalence of HAV in Turkey is moderately endemic and varies according to the geographical region. They found a higher incidence in the eastern part of Turkey than in the western and central regions (5). They found sero-positivity in 20–24 years of age varies between %40 and over %90 from Central Anatolia to Southerneast Anatolia regions and detected the range %50 in Marmara region and over %90 in to Southerneast Anatolia (14). There are studies showing that the anti-HAV seroprevalence between the ages of 15-44 is between 77-96%. Europe has lower seroprevalence rates (28-56%) (5). Although hepatitis A seroprevalence varies considerably according to living areas, it can vary even within the same province. **Table 3** shows the rates of HAV seroprevalence by age groups in different studies conducted in Turkey. In our data Anti-HAV positivity was found at a rate of 25.5% in Çanakkale and 40.3% in Kahramanmaraş. This level was lower than the data in Turkey. Anti-HAV positivity may have been found to be low due to the selected age group. When Çanakkale and Kahramanmaraş were compared, the seropositivity rate was lower in Çanakkale and it was statistically significant. This situation can be attributed to the better socio-economic level and hygienic conditions in Çanakkale. A significant portion (40%) of the population of Kahramanmaraş is composed of people living in town far from the center. We thought that there were higher seropositivity rates due to worse hygiene and socio-economic conditions in these regions.

Since Turkey is in the middle endemic region, hepatitis A vaccine has been routinely implemented since 2012. Therefore, individuals under the age of 10 were vaccinated with routine hepatitis A vaccine. Unvaccinated individuals between the ages of 18-25 in both regions are at risk for hepatitis A virus infection, and that vaccination should be recommended for this age group as well.

Kaya et al. (23) examined HBV and HCV seroprevalence in outpatients of Diyarbakır Training and Research Hospital, a city in Southeast Turkey, during February 2010 and July 2011 and found 4472 (10.4%) positive for HBsAg of the 43131 patients and 323 positive for anti-HCV in (1.2%) of the 28276 patients (23). HBsAg positivity in Turkish population is between 1.7% and 21%. HBsAg positivity was reported lower in Western Provinces of Turkey than in Eastern Provinces (24). In studies conducted in Turkey, anti-HCV positivity in blood donors varies between 0.3% and 1.8% (25). In this study, HBsAg and anti-HCV positivity were found to be 1.5% and 0.5% in Çanakkale, 0.8% and 1.1% in Kahramanmaraş. HBsAg positivity and anti-HCV positivity in both regions were on average in Turkey. There was no significant difference between the two regions in terms of HBsAg positivity. Anti-HCV positivity was higher in Kahramanmaraş. The reason for the high level of anti-HCV positivity was a previous study suggesting that it was due to the detection of Anti-HCV positivity due to the use of common injectors in convict individuals who had intravenous drug habits in Kahramanmaraş prison (26).

According to WHO data, 2.8 million people in Europe are infected with HIV (27). It is reported that the number of cases in Turkey has increased over the years.

Table 3. Studies of seroprevalence of anti-HAV IgG of last 10 years in different age groups in Turkey

Study (ref.)	Year	Province	Sample size	Age groups	Seropositivity Rate
Düzenli et al.(15)	2021	Çorum	10458	21-30 years	75.8%
Yılmaz (16)	2020	Erzurum	25007	0-93 years	87.3%
Çeviker et al.(17)	2019	Samsun	2510	> 0 years	58.9%
Çavuş et al.(18)	2018	Bingöl	897	> 16 years	97.4%
Karadeniz et al.(14)	2016	İstanbul	3868	1-79 years	64.8%
Iraz et al.(19)	2015	İstanbul	787	>17 years	80%
Karaayak Uzun et al.(20)	2013	İzmir	3887	>18 years	85.2%
Karakaş et al.(21)	2012	Ankara	392	>25years	86%
Tosun et al.(22)	2011	10 centers	2107	23-51 years	91.1%

The number of patients was 3955 in 2018, 4153 in 2019, 2972 in 2020, and 3002 in 2021 (28). It is seen that positivity is found at different rates or not detected in studies on HIV seropositivity conducted in Turkey. While it was'nt detected any anti-HIV seropositive patient in the study of Ege et al., it was found 0.087% in the study of Dede et al., 0.007% in the study of Gürkan et al. in Ankara, and 0.11% in the study of Dinç et al. (29-31). Anti HIV positivity was not detected in Kahramanmaraş.

In our study, anti-HIV positivity was detected in 3% of 200 outpatients admitted to the university hospital in Çanakkale. This difference was statistically significant between the two provinces. Anti-HIV positivity in Çanakkale was higher than Turkey's data. We attributed this to the sexually active period between the ages of 18-25 and the high level of knowledge about the disease and the desire to consult a doctor in the same province. We have seen that patients in Kahramanmaraş do not apply to the hospital in their own home in case of suspicious contact, but apply to neighboring provinces due to their proximity to the surrounding provinces. This showed us the necessity of organizing studies to increase the level of education and knowledge. Although anti-HIV positivity is low in most of our provinces in our country, it still remains an important health problem in certain regions.

171 of 562 patients were HCWs. Anti-HAV Ig G positivity was higher in the non-HCWs. We thought that HCWs actually had knowledge about the transmission routes of infections and had less seropositivity because they were better able to comply with preventive measures. It would be appropriate to be vaccinated if there is a risk factor, since the disease is more severe in adults and there is a higher risk for fulminant hepatitis. Since HCWs are exposed to many factors in the hospital, it may be meaningful to provide education on the need for vaccination, to provide protection and to prevent transmission from individuals who have had a symptomatic or asymptomatic hepatitis A infection.

Anti HBs positivity in HCWs were 80.7%. This rate was significantly higher than the non-HCW group. We thought that it was due to the fact that the annual controls of the HCWs in these hospitals were made and they were vaccinated. HCWs should be protected from injuries and infections due to blood contact during patient care. For this reason, annual checks of hospital personnel are made against vaccine-preventable diseases and prophylaxis should be given. The association of HCWs and hepatitis C is another important step of infection control programs in hospitals. A meta-analysis of 44 studies conducted between 1989 and 2014 in a systematic review study by Westerman at al; HCV infection rate in HCWs was found to be 1.6% (1.03-2.42) (32). Various studies have been conducted on HCV seropositivity in our country, and some studies have not found anti-HCVpositivity in healthcare workers (33,34). In our study while anti-HCV positivity found 1.3% in non-HCW group, there were no anti-HCV positive detected in healthcare workers. Only one (0.6%) healthcare worker was anti-HIV positive. There was no significant difference in anti-HCV and anti-HIV positivity in HCW and non-HCW groups.

It is reported that the probability of HIV transmission is quite low even in HCWs working in units where HIV-positive patients are followed intensively. The risk of HBV, HCV and HIV transmission after percutaneous contamination with infected patient blood ranges are 6-30%, 3.5-10% and 0.18-0.46%, respectively (35). In a study conducted in the USA; between 1985 and 2013, 58 confirmed and 150 probable cases of occupationally acquired HIV infection among HCWs were reported to the CDC; Since 1999, only one confirmed case a laboratory technician who was exposed to a needle prick while working with a live HIV culture in 2008 has been reported (36). In a large-scale study, 9,552 health workers were examined and only one (0.01%) health worker was positive (37). In our study, anti-HIV positivity was detected in one (0.6%) health personnel.

As a result, health workers should definitely be screened before starting work for diseases that can be protected by vaccination in the hospital. And, if necessary, they should be protected by vaccination. Living standards in Turkey show regional differences. In the provinces, where there is a lack of information and sensitivity regionally, health professionals should also be conscious. The need to provide education for awareness and protection in society also applies to hepatitis and HIV infection. Hepatitis A, Hepatitis B vaccine between the ages of 18-25, sexually active and working groups should be decided according to the population risk, and protective measures to prevent and avoiding unnecessary of blood transfusions in the course will be beneficial for this age group.

Ethical Approval: This study was conducted in accordance with the Declaration of Helsinki. Ethics committee approval was received from Local Ethics Committee of Sütçü İmam University Clinic Research of Medicine with the decision number of 268 (date: 01/11/2022).

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