



HBV, HCV and HIV Seroprevalence in Hemodialysis Patients Admitted to a Tertiary Care Hospital in Mogadishu, Somalia

Mogadişu Somali'de Bir Üçüncü Basamak Hastanesine Başvuran Hemodiyaliz Hastalarında HBV, HCV ve HIV Seroprevalansı

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Abstract

Hemodialysis (HD) patients are a special group of patients who are at high risk for infection and related complications. Blood-borne viruses associated with chronic diseases such as hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) are important causes of morbidity and mortality in HD patients. Immunodeficiency of the patients, weak protective efficacy of vaccines (HBV etc.), invasive vascular procedures, long-term dialysis applications and device-related contaminated blood contact risk, need for blood transfusion, medical practices associated with the risk of nosocomial transmission are some of the factors associated with an increased risk of infection transmission in HD patients. In addition to standard precautions to prevent infection transmission, some additional practices specific to HD patients have been recommended. HBV vaccination, patient isolation (special staff and use of separated rooms, devices, and equipment) in case of indication, precautions to be taken during catheter application (selection of catheter location, catheter care, skin antisepsis, and performing the procedures under appropriate and sterile conditions), monitoring patients for infection markers (before dialysis and at recommended intervals), taking into account inadequate antibody production and the long incubation period of viral infections are some examples of preventive procedures specific to HD patients. In this study, the prevalence of HBV, HCV and HIV infections in HD patients treated in a tertiary care hospital in Somalia was investigated. A total of 744 HD patients, 419 (56.3%) males and 325 (43.7%) females, were included in the study. The mean age of the patients was 50.81±17.62 (range 7-91) and the median age was 53. 660 of the patients were tested for anti-HBs (386 positive patients; 58.5%), 718 for HBsAg (63 positive patients, 8.8%), 720 for anti-HCV (19 positive patients, 2.6%), and 599 for anti-HIV (one positive patient 0.17%). Seropositivity rates were found to increase with age in HD patients, in line with the prevalence of viral agents in the population. In 718 patients tested for HBsAg, the positivity rates in men and women were 10.8% (44/406) and 6.1% (19/312), respectively, and the seropositivity rate was significantly higher in men ($p=0.026$). Anti-HCV seropositivity (2.6%) was approximately twice and significantly higher in HD patients than the hospital general prevalence (1.41%) ($p=0.005$). Emergency responses to injuries related to ongoing conflict across the country, invasive procedures performed outside the hospital and under unsuitable conditions, lack of molecular diagnostic tests for viral

infections in identifying seronegative cases, patients apply to various centers with different capabilities for dialysis procedures and irregular patient follow-up records, missing hemodialysis sessions due to economic or other reasons high prevalence of HBV, and lack of trained and specialized personnel draw attention as problems specific to the region.

Keywords: Hemodialysis, Somalia, HBV, HCV, HIV.

Özet

Hemodiyaliz (HD) hastaları enfeksiyon bulaşı ve ilişkili komplikasyonlar için yüksek risk altında olan özel bir hasta grubudur. Hepatit B virusu (HBV), hepatit C virusu (HCV) ve insan immünyetmezlik virusu (*human immunodeficiency virus*, HIV) gibi kan yolu ile bulaşan ve kronik hastalıklarla ilişkili viral etkenler HD hastalarında önemli morbidite ve mortalite nedenleridir. Hastaların immün yetmezliği, aşılardan (HBV gibi) zayıf koruyuculuğu, invaziv vasküler girişimler, uzun süreli diyaliz uygulamaları ve cihaz ilişkili kontamine kan teması riski, kan nakli gereksinimi, nozokomiyal bulaş riski ile ilişkili tıbbi uygulamalar bu hastalarda artmış enfeksiyon bulaş riski ile ilişkili faktörlerden bazılarıdır. Enfeksiyon bulaşının önlenmesi için standart önlemlere ek olarak HD hastalarına özel bazı ek uygulamalar önerilmiştir. HBV aşılması, endikasyon varlığında hasta izolasyonu (özel personel ve ayrı oda, cihaz ve ekipman kullanılması), kateter uygulaması sırasında alınacak önlemler (kateter yerinin seçimi, kateter bakımı, cilt antisepsisi ve işlemlerin uygun ve steril koşullarda gerçekleştirilmesi), hastaların yetersiz antikör üretimi ve viral enfeksiyonların uzun sürebilen inkübasyon süreleri de dikkate alınarak diyaliz öncesinde ve önerilen aralıklarla enfeksiyon belirteçleri (marker) için izlenmesi HD hastalarına özel koruyucu prosedürlere örnek verilebilir. Bu çalışmada Somali'de yerleşik bir üçüncü basamak hastanesinde tedavi gören HD hastalarında HBV, HCV ve HIV enfeksiyonlarının sıklığı araştırıldı. Çalışmaya 419'u (%56.3) erkek ve 325'i (%43.7) kadın olmak üzere toplam 744 HD hastası dahil edildi. Hastaların yaş ortalaması 50.81 ± 17.62 (aralık 7-91) ve ortalama yaşı 53 idi. Hastaların 660'ı anti-HBs (386 pozitif hasta; %58.5), 718'i HBsAg (63 pozitif hasta %8.8), 720'si anti-HCV (19 pozitif hasta, %2.6) ve 599'u anti-HIV (bir pozitif hasta %0.17) için test edilmişti. HD hastalarında viral etkenlerin toplumdaki prevalansına uygun olarak yaşla birlikte artan oranlarda seropozitiflik bulundu. HBsAg için test edilen 718 hastada erkek ve kadınlarda pozitiflik oranları sırası ile %10.8 (44/406) ve %6.1 (19/312) olup, seropozitiflik oranı erkeklerde anlamlı derecede daha yüksekti ($p=0.026$). Anti-HCV seropozitifliği (%2.6) ise HD hastalarında hastane genelindeki prevalansa (%1.41) göre yaklaşık iki kat ve anlamlı derecede daha yüksekti ($p=0.005$). Ülke genelinde devam eden çatışmalarla ilişkili yaralanmalara yapılan acil müdahaleler, hastane dışında ve uygun olmayan koşullarda yapılan invaziv işlemler, seronegatif olguların belirlenmesinde viral etkenler için moleküler tanı testlerinin yokluğu, hastaların diyaliz işlemleri için imkan ve kabiliyetleri farklı çeşitli merkezlere başvurması ve hasta izlemi ve kayıtlarının düzensiz olması, hastaların ekonomik veya diğer nedenlerle hemodiyaliz seanslarını kaçırmaması, yüksek HBV prevalansı, eğitilmiş ve uzman personel eksikliği bölgeye özgü sorunlar olarak dikkat çekmektedir.

Anahtar Kelimeler: Hemodiyaliz, Somali, HBV, HCV, HIV.

Introduction

Hemodialysis (HD) patients are more susceptible to infectious diseases because they are immunosuppressed due to chronic kidney disease (CKD) [1]. In these patients, blood-borne viruses; Hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) infections are important causes of morbidity and mortality [2-4]. Some of the factors that increase the risk of infection in HD patients are following [3,5-11]; HD requires invasive vascular access, increased risk of indirect contamination because of many patients undergoing HD in the same

environment, patients being immunosuppressed increases their susceptibility to infections, frequently and long-term exposure to infectious agents associated with hospitalizations in short intervals and long-term dialysis procedures, frequent contact with healthcare workers who constantly move between patients and machines, the preparation of medications in patient care areas, non-compliance with recommended practices for infection control, need for surgical interventions, deterioration of skin integrity due to catheters, dialysis fluids, reuse of some of the dialysis equipment, misdiagnosis of seronegative

patients due to inadequate antibody response and newly acquired asymptomatic infections, weak protective efficacy of HBV vaccines associated with immunodeficiency, irregular and incomplete records in patient follow-ups, inadequacy of training given to healthcare personnel, patients and their relatives, and lastly deficiencies in disinfection and sterilization procedures. Despite all infection control measures taken to prevent the transmission of such infections in HD centers, it is also reported that hospital-acquired HBV, HCV, and HIV infections may develop in HD patients.

This study aimed to reveal the prevalence rates and patient characteristics of HBV, HCV, and HIV infections in patients with CKD receiving HD.

Material and Method

The study was conducted after obtaining approval from Ethics Committee of Somalia Turkey Recep Tayyip Erdogan Education and Research Hospital, date: 05.12.2019, decision no: 186, number: MSTH/2727, and the study carried out in accordance with the tenets of the Declaration of Helsinki.

Study population and design

In this study, patient's data and serological test results were obtained and evaluated retrospectively from the hospital electronic information management system over the period between November 2015 and November 2019. The positivity rates of HBV, HCV and HIV serological markers in patients admitted to the hospital for HD treatment in a four-year period and the distribution of positive patients according to demographic parameters such as age and gender were investigated. The results were compared with data reported from the hospital in the same period [12-14].

Serological tests

HIV serological tests were performed using the Architect HIV Ag/Ab Combo Reagent Kit (Abbott Diagnostic, Germany) on the Architect I 2000 SR (Abbott Diagnostics, USA) system. Anti-HBs, HBsAg and anti-HCV tests were performed using the Architect Kits (Abbott Diagnostics, Germany) on the Architect I 2000 SR system (Abbott Diagnostics, USA).

Statistical analysis

Frequency, mean, and standard deviation values were calculated. Comparisons between groups were performed using the chi-square and/or Fisher's exact probability test. A p value of <0.05 was considered statistically significant (at the 95% confidence interval). All data analyzed using SPSS v. 22.0 (IBM SPSS Statistics Version 22.0., IBM Corp., Armonk, New York, USA).

Results

The study group consisted of 744 HD patients; mean age is 50.81 ± 17.62 years, median age is 53, and distribution range is 7-91. Of the HD patients, 419 (56.3%) were male and 325 (43.7%) were female. 660 of the patients were tested for anti-HBS, 718 for HBsAg, 720 for anti-HCV, and 599 for anti-HIV.

Anti-HBS seropositivity was found to be 58.5% (386/660) in HD patients, while HBsAg seropositivity in HD patients was found to be 8.8% (63/718) (Table 1), this rate was similar to general hospital data (8.1%) and slightly higher ($p=0.517$). HBsAg seroconversion was detected in four patients (two men, aged 57 and 66, and two women, aged 24 and 51), representing 0.56% (4/718). This rate was more than twice as high as general hospital data (0.24%, 273/115,946), but this rate was not significantly higher ($p=0.093$). In 718 patients tested for HBsAg, the positivity rates in men and women were 10.8% (44/406) and 6.1% (19/312), respectively, and the seropositivity rate was significantly higher in men ($p=0.026$).

Anti-HCV seropositivity in HD patients was found to be 2.6% (19/720) (Table 2), which was approximately twice and significantly higher than general hospital data (1.41%) ($p=0.005$). Seroconversion was detected in two HD patients (0.28%, 2/720; a 61-year-old woman and a 38-year-old man), this rate was significantly higher ($p<0.001$) than general hospital data (0.004%, 4/102,601). In 720 patients tested for anti-HCV, the positivity rates in men and women were 2.7% (11/406) and 2.5% (8/314), respectively, and anti-HCV seropositivity rates were similar ($p=0.888$).

Anti-HIV seropositivity was found in only one (a 52-year-old woman) of the HD patients (Table

3) (0.17%, 1/599). When the patient data were examined, it was determined that anti-HIV seroconversion developed in the patient during

the follow-up period, and the seroconversion (0.17%) rate was significantly higher than general hospital data (0.005%, 4/82,954) (p=0.035).

Table 1. HBsAg seropositivity according to age groups in study population (2015-2019).

	< 1 age		1-15 age		16-45 age		46-65 age		>65 age		Total	
	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n
HD	0 (0.0)	0	1 (7.7)	12	24 (9.7)	223	23 (7.7)	276	15 (9.4)	144	63 (8.8)	655
T	9 (0.8)	1,050	152 (1.7)	8,662	5,081 (7.1)	66,004	2,901 (12.9)	19,654	1,262 (10.2)	11,171	9,405 (8.1)	106,541
p	1.000		0.203		0.118		0.008		0.764		0.093	

HD; Hemodialysis patients. T; Total (all patients who were screened for HBsAg between November 2015 and November 2019).

Table 2. Anti-HCV seropositivity according to age groups in study population (2015-2019).

	< 1 age		1-15 age		16-45 age		46-65 age		>65 age		Total	
	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n
HD	0 (0.0)	0	1 (8.3)	11	3 (1.2)	243	8 (2.7)	292	7 (4.3)	155	19 (2.6)	701
T	14 (1.4)	994	11 (0.1)	7,952	273 (0.4)	62,964	507 (2.6)	19,075	642 (5.9)	10,169	1,447 (1.4)	101,154
p	1.000		0.018		0.093		0.920		0.386		0.005	

HD; Hemodialysis patients. T; Total (all patients who were screened for anti-HCV between November 2015 and November 2019).

Table 3. Anti-HIV seropositivity according to age groups in study population (2015-2019).

	< 1 age		1-15 age		16-45 age		46-65 age		>65 age		Total	
	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n	Positive n (%)	Negative n
HD	0 (0.0)	0	0 (0.0)	10	0 (0.0)	216	1 (0.4)	242	0 (0.0)	130	1 (0.2)	598
T	4 (0.4)	953	9 (0.2)	5,990	200 (0.4)	54,050	49 (0.4)	13,948	7 (0.1)	7,744	269 (0.3)	82,685
p	1.000		1.000		1.000		0.578		1.000		1.000	

HD; Hemodialysis patients. T; Total (all patients who were screened for anti-HIV between November 2015 and November 2019).

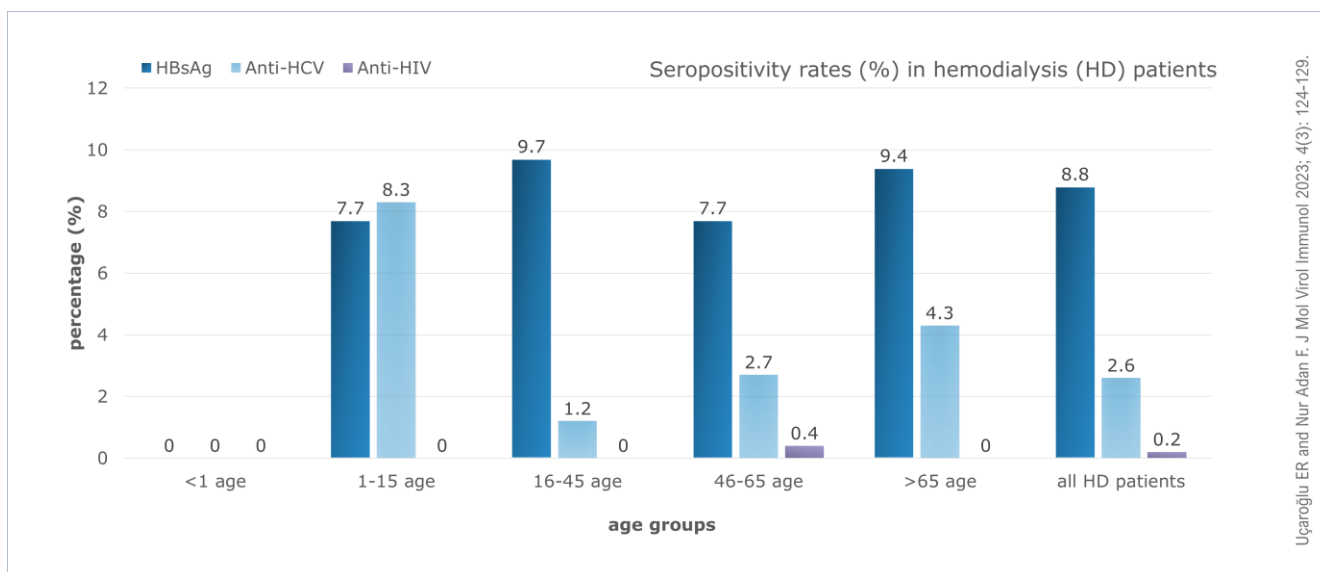


Figure 1. Distribution of HBsAg, anti-HCV, and anti-HIV seropositivity in hemodialysis patients by age groups.

Discussion

Information on the prevalence of CKD and infection rates is limited in Somalia [5,11]. In a rare study conducted in Somalia and including 135 patients, among the dialysis-related factors associated with hospital readmission, the most common reason was reported to be uremic complication due to missed HD session in 40% of the cases (n=54), and the second most common cause was vascular access/catheter infection, which occurred in 20% of the patients (n=27) [5]. In a study conducted in our hospital on 220 patients in 2021 [11], the prevalence of HBV was found to be 7.3% (n=16) and the prevalence of HCV was 3.2% (n=7). In this study, HBV, HCV, and HIV seroprevalence was investigated in HD patients over a 4-year period and the results were compared with current literature data obtained from our hospital and general data from Türkiye.

In a study conducted in Türkiye [2], anti-HBS seropositivity was found to be 44.3% in HD patients and it was stated that this situation was due to vaccination, while in our study, anti-HBS seropositivity in HD patients was found to be 58.5% (386/660). In the mentioned study, 80 (40%) of the HD patients were female and 121 (60%) were male, and the average age was reported as 51.16±16.28 (range 17-93) [2]. These data were very similar to our study group, where 419 (56.3%) of the HD patients were male and 325 (43.7%) were female, and the mean age was 50.81±17.62 (range 7-91). However, considering the HD patients in our study group were generally middle age and elderly, the prevalence of chronic HBV in Somalia was higher than in Türkiye (4.57% vs 8.1%, [12,15]), and HBV vaccination programs have just begun to become widespread in the Somalia; we can say that a significant portion of the high rate in our patients is due to previous infections.

In Türkiye, HBsAg seropositivity was reported to be 3.9% in HD patients in 2016 [16]. In our study, we found this rate to be much higher in Somalia, at 8.8% (63/718), and this rate was similar to general hospital data (8.1%), but slightly higher (p=0.517). Among 718 patients tested for HBsAg, the positivity rates in men and women were 10.8% (44/406) and 6.1%

(19/312), respectively, and the seropositivity rate was significantly higher in men (p=0.026).

HCV infection is common in HD patients and is associated with increased morbidity and mortality [3]. HCV infection is more common among people with CKD than in the general population, and because HCV infection has been shown to be an independent risk factor accelerating the adverse progression of CKD, it has been recommended that all patients be screened for HCV during the initial CKD evaluation [1]. The prevalence of HCV in the HD population has been determined to vary from 4% in Belgium to 20% in the Middle East [3]. According to 2016 data in Türkiye, anti-HCV positivity was reported as 5.2% in HD patients [16], this rate is approximately 4 times higher than the anti-HCV prevalence rate estimated at 1-1.6% in Türkiye [17,18]. In our study, anti-HCV seropositivity was found to be 2.6% (19/720) in HD patients, which was approximately two times and significantly higher than general hospital data (1.41%) (p=0.005). The high HCV prevalence may occur as a result of the high regional prevalence as well as nosocomial transmission in HD units [1,3]. Although it is not possible to confirm HD-related transmission with certainty, we observed the anti-HCV seroconversion in two HD patients (0.28%, 2/720), this rate was significantly higher (p<0.001) than general hospital data (0.004%, 4/102,601).

HIV virus is an infection agent that has a lower risk of transmission to HD patients. In a study investigating the seroprevalence of HBV, HCV and HIV in HD patients in Türkiye, data from 96 patients were examined, but no anti-HIV seropositivity was found [19]. In our study, there was one positive patient who developed HIV seroconversion among 599 patients.

Limitations of the study include the possibility of missing seronegative patients due to the absence of molecular diagnostic tests and possible statistical errors associated with the comparison of very large and very small rates. The important risks were as follows; limitations in diagnosis and treatment opportunities [13,14], emergency responses to injuries related to ongoing conflict across the country [20], invasive procedures

performed outside the hospital and under unsuitable conditions, missed HD sessions (insufficient information, incorrect social beliefs high costs of each HD session) [5].

Conclusion

Our study data revealed that the high prevalence of HBV (Figure 1) and the absence of

molecular diagnostic tests are significant risks for HD patients in Somalia. In order to minimize the infection transmission risk associated invasive vascular procedures and isolate patients in the presence of indication, it is important to screen patients with appropriate diagnostic methods and record patient data regularly.

Conflict of interest: The authors declare that there is no conflict of interest. The authors alone are responsible for the content and writing of the paper. **Financial disclosure:** There is no financial support to this study.

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