



Evaluating the Prevalence of HBV, HCV, and HIV in Hemodialysis Patients in North Cyprus

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Abstract

Background: Patients undergoing dialysis treatment and hemodialysis are at risk of viral infections due to inadequate cellular immunity.

Objectives: The aim of the study was to determine the prevalence of hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) in hemodialysis (HD) centers in North Cyprus.

Methods: The present study reviewed the health records of 140 patients in two dialysis units that represented all HD units in North Cyprus. Serological markers for HBV, HCV, and HIV were determined by the immunoenzymatic assay using commercial diagnostic kits (Architect i2000 SR, Abbott, USA). HCV RNA, HBV DNA, and HIV RNA were determined quantitatively using polymerase chain reaction (PCR).

Results: One hundred forty HD patients were included in the study, consisting of 39.3% (n = 55) female and 60.7% (n = 85) male patients. Five (3.6%) patients were anti-HCV positive, one (0.7%) patient was HBsAg positive, and one (0.7%) was anti-HIV positive. Anti-HCV and HBsAg were negative in all of the patients according to the PCR results. There were no significant differences between males (1.2%) and females (7.3%) in terms of anti-HCV positivity ($P = 0.078$), HBsAg seropositivity ($P = 0.607$), and anti-HIV seropositivity ($P = 0.607$).

Conclusions: The prevalence of HBV, HCV, and HIV infection in hemodialysis patients in North Cyprus is moderate to low. The main reason for the significantly lower rates compared to other areas could be effective protective measures and national vaccination.

Keywords: HBV, HCV, HIV, Hemodialysis, Cyprus, Seroprevalence

1. Background

The main treatment for chronic renal disease failure involves an invasive hemodialysis procedure (1). Therefore, patients undergoing dialysis treatment and hemodialysis are at risk of viral infections due to inadequate cellular immunity (2). Although hemodialysis has increased the durability of patients, it also has exposed the patients to certain viral infections (3). Hemodialysis (HD) patients are at greater risk of the hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) than healthy individuals (1).

The prevalence rate of HCV infection ranges between 5% and 60%, and different prevalence rates have been reported by different countries for HD patients (4). Seroprevalence rates of HCV infection reported among HD patients in the Middle East included 35% in Jordan, 12% in Iran, 19% in Saudi Arabia, and 23% in Turkey (5). The prevalence

rate of HBV infection in Tehran is between 0% and 58% (6); while in Turkey, it is 7.21% (7) to 50% (8). The prevalence of HCV infection was 0.5% (9) while it was 1.2% for HBV infection (10) in the general population of Cyprus. Cyprus is an island located in the eastern part of the Mediterranean Sea, at the south of Turkey. There are two communities living in the island, Turkish Cypriots and Greek Cypriots. Turkish Cypriots are Muslims by religion. In addition, North Cyprus is one of the destinations for casino tourism and entertainment, alongside its sunny beaches (11). There is no publication on the prevalence rate of viral infections among HD patients in Cyprus.

2. Methods

A retrospective study was conducted in two hemodialysis centers in Nicosia, North Cyprus, in 2018. The study

included hemodialysis patients who had attended the Department of Nephrology, Burhan Nalbantoglu Government Hospital and Department of Nephrology, Near East University, Nicosia, North Cyprus. The present study reviewed the health records of 140 patients in two dialysis units that represent all HD units in North Cyprus. Demographic information was collected from the hospital system. The 140 patients were investigated for HBsAg using an enzyme-labelled antigen test (total Abs) (Architect i2000 SR, Abbott, USA), for anti-HCV Abs (IgG) specific immunoglobulin using an HCV enzyme-labelled antigen test (Architect i2000 SR, Abbott, USA), and for anti-HIV Abs (IgG) using an enzyme-labelled antigen test (Architect i2000 SR, Abbott, USA).

The HBV DNA was extracted from the samples using a QIAamp DNA mini kit (QIAGEN, Germany) according to the manufacturer's procedure. Extracted HBVDNA was quantified by the real-time PCR method using a Rotor-Gene Q instrument (Artus, Germany). The assay detection limit was 3.8 IU/mL. The real-time PCR was performed with negative and positive controls using an initial denaturation at 95°C for 10 min and 45 cycles of 95°C for 15 s and 72°C for 30 s. The HCV RNA was extracted using Quiagen QIAamp Viral RNA mini extraction kit according to the manufacturer's instructions. The master mix was prepared by adding 14 μL of supermix reagent, 5 μL of magnesium solution, and 1 μL of IC-1R3. The real-time PCR was performed with negative and positive controls using an initial denaturation at 95°C for 15 s and 55°C for 20 s and 72°C for 30 s and the cycle was repeated 45 times. HIV RNA was detected and quantified by QIAasymply Rotorgene Q/artus HIV-1 QS-RGQ v1 (Qiagen GmbH, Hilden, Germany). Human EDTA plasma was used according to the manufacturer's instruction. The PCR program included an initial denaturation at 95°C for 30 s and 50°C for 60 s and 72°C for 30 s and the cycle was repeated 50 times.

2.1. Statistical Analysis

Statistical analysis was performed using SPSS version 18.0 (SPSS Inc, Chicago, IL, USA). Fisher's exact test was used to compare continuous variables and $P < 0.05$ was accepted as statistically significant.

3. Results

A total number of 140 patients (55 females, 85 males) with a mean age of 65.57 ± 14.03 years were recruited. According to the serological results, five (3.6%) patients were anti-HCV-positive, one (0.7%) patient was HBsAg positive, and one (0.7%) was anti-HIV-positive. [Table 1](#) summarizes the results of 140 HD patients in terms of the HBV, HCV, and

HIV results. Anti-HCV and HBsAg were negative in all of the patients according to the PCR results.

There were no significant differences between males (1.2%) and females (7.3%) in terms of anti-HCV positivity ($P = 0.078$), HBsAg seropositivity ($P = 0.607$), and anti-HIV seropositivity ($P = 0.607$) ([Table 1](#)). Longer duration on dialysis (in years) was not significantly associated with HBsAg and anti-HIV positivity ($P = 0.721$ and $P = 0.721$, respectively); however, it was associated with anti-HCV positivity ($P = 0.021$) ([Table 2](#)).

4. Discussion

The aim of the present study was to determine the seroprevalence of HBV, HCV, and HIV among HD patients in 2018. This is the first study to analyze the seroprevalence rate of viral hepatitis in HD patients in North Cyprus. To our knowledge, this study was also the first study of HBV, HCV, and HIV infection in hemodialysis patients in North Cyprus.

Studied reported that more than 240 million people are chronic HBV carriers and more than 780000 deaths occur every year ([12](#)). Various HBV seroprevalence rates have been reported in different geographical areas and the rate is estimated to be between 0.8 and 17.0% in HD patients ([11](#)). HBV was positive in 7% of the population in South-East Iran ([3](#)), 3.88% in Turkey ([13](#)), 6.2% in Cameroon ([14](#)), and 4.5% in Sudan ([15](#)). According to the World Health Organization (WHO) classifications and the Iranian Blood Transfusion Organization, Iran with a prevalence rate of approximately 3.0% HBsAg seropositivity is classified as intermediate for HBV infection ([16](#)). The general prevalence of HBV infection in Cyprus is indicated to be between 0.6% ([9](#)) and 1.2% ([10](#)). Our study results support the findings indicating the different seroprevalence rates of various geographical regions. In addition, similar prevalence rates were observed in the general population and HD population (0.7%) in North Cyprus.

HCV is a global health problem affecting over 170 - 200 million people. HCV is spread parentally or through intravenous drug use, and transfusion of blood products, and contamination during medical procedures especially in developing countries ([17](#)). The main risk factors for HCV infection among HD patients are sharing dialysis machines and/or dialysis equipment, blood transfusion ([4](#)), and deficient infection control in the hemodialysis unit ([3](#)). The prevalence of anti-HCV antibodies among HD patients was 13.5% to 31% in Italy ([18](#)), 10% to 42% in France ([19](#)), and 22.9% in Spain ([20](#)). Ashkani-Esfahani et al. indicated that the overall anti-HCV seroprevalence rate among HD patients in the Middle East countries was 25.3%, with 12% in Iran, 23% in

Table 1. The Frequency of Viral Infection in Hemodialysis Patients^a

Viral Markers	HD patients Positive for the Viruses Males	HD Patients Negative for the Viruses Males	HD Patients Positive for the Viruses Females	HD Patients Negative for the Viruses Females	P Value
HbsAg	1(0.7)	84(60)	0(0)	55(39.3)	0.607
Anti-HCV Abs	1(0.7)	84(60)	4(2.9)	51(36.4)	0.078
Anti-HIV Abs	1(0.7)	84(60)	0(0)	55(39.3)	0.607

^a Values are expressed as No. (%).

Table 2. Duration of Dialysis in Hemodialysis Patients^a

Viral Markers	HD Period 1-5 Years	HD Period > 5 Years	P Value
HbsAg	1(1)	0(0)	0.721
Anti-HCV Abs	1(1)	4(10.3)	0.021*
Anti-HIV Abs	1(1)	0(0)	0.721

^a Values are expressed as No. (%).

Turkey, 20% in Iraq, and 50% in Egypt (5). The seroprevalence of HCV was 14.2% in Iran in a high-risk population that depended on some factors such as socioeconomic status, level of education, history of imprisonment, job status, marital status, and the age at the first drug use. Afshari et al. also reported these factors to have significant associations with the HCV prevalence (21). Lankarani et al. indicated that interfamilial transmission was an important way for HCV spread (22). However, Fattah et al. reported that HCV was detected as 0.25% in a general population (23). These results show lower rates than our seroprevalence rate. Thus, we conclude that the seroprevalence of the viruses depends on the population structure. According to WHO, 36.9 million people lived with HIV in 2017. The estimated number of people living with HIV was 890 for Cyprus (24). The Health Ministry of North Cyprus reported that 68 HIV positive persons were living in North Cyprus. Our results support that HIV prevalence remains low in North Cyprus. In our study, anti-HCV Abs seropositive patients had received dialysis for more years when compared with HBsAg and Anti-HIV Abs positivity patients. Our findings are supported by other studies that reported the length of hemodialysis as a risk factor for HCV seropositivity (20, 25).

In conclusion, the prevalence of HBV, HCV, and HIV infection in HD patients in North Cyprus is low. However, the longer duration on dialysis was associated with anti-HCV Abs positivity. The main reason for the low prevalence rate among HD patients in North Cyprus might be educating people about viral infection transmission and national vaccination.

Footnotes

Conflict of Interests: None declared.

Ethical Considerations: The Ethics Committee of Near East University approved the study.

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