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Original Article

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Peritoneal Dialysis or Hemodialysis for Patients Starting Dialysis in the COVID-19 Pandemic?

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ABSTRACT

Background: Coronavirus disease 2019 is a life-threatening disease, especially in patients with kidney failure. In this study, we aimed to investigate whether there is a difference in the frequency of coronavirus disease 2019 in hemodialysis and peritoneal dialysis patients and to contribute to the process of deciding on the type of dialysis in patients who will start dialysis treatment.

Methods: We included patients who had at least 3 months of dialysis treatment between March 11, 2020, and November 30, 2020. Demographic characteristics and comorbidities were recorded.

Results: In our study, 130 dialysis patients, 75 of whom were male, were evaluated. The mean age of the patients on dialysis was 54.8 ± 14.7 years. Twenty-eight (22%) of 130 dialysis patients were peritoneal dialysis patients. The mean age of peritoneal dialysis patients was 54.1 ± 14 years. A total of 102 (78%) patients were hemodialysis patients. The mean age of hemodialysis patients was 54.9 ± 14.9 years. The most common accompanying disease in all patients was hypertension (62%). Among the patients who received dialysis treatment in our center, the number of patients diagnosed with coronavirus disease 2019 was 16 (12%). Coronavirus disease 2019 was detected in 16% (16/102) of hemodialysis patients, whereas it was not detected in peritoneal dialysis patients ($P = .002$).

Conclusion: The frequency of coronavirus disease 2019 was significantly higher in hemodialysis patients. Peritoneal dialysis appears to be more advantageous in patients who will start dialysis during the pandemic period.

Keywords: COVID-19, hemodialysis, oxygen support, peritoneal dialysis

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INTRODUCTION

At the end of 2019, the virus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) caused coronavirus disease 2019 (COVID-19). The rapid spread, incurability, and fatal course of the SARS-CoV-2 infection created a wide impact.

COVID-19 is transmitted mainly through droplets. Droplets spread from sick people through coughing and sneezing and can also be transmitted by touching mucous membranes of the mouth, nose, or eyes after coming into contact with the hands of others.

Uremia caused by the chronic renal failure may change the immune response against viral diseases by causing inflammation and immunosuppression at the molecular level.[1] Hemodialysis (HD) and peritoneal dialysis (PD) are 2 common forms of dialysis. The question of choosing the most appropriate dialysis method for PD or HD is still a matter of debate.

Various studies have shown that PD is equivalent to HD and in some cases even better.[2,3] Although data on clinical features of COVID-19 in patients undergoing PD and HD are limited, COVID-19 has a poor prognosis in dialysis

patients.[4-10] Therefore, the management of COVID-19 prevention methods is urgent and critical for dialysis patients. In our study, we aimed to reveal the difference in the frequency of COVID-19 in PD and HD patients followed in our center and to contribute to the process of deciding on the type of dialysis of patients who will start dialysis treatment during the COVID-19 outbreak.

METHODS

Patients who received regular dialysis treatment in our center were evaluated in terms of the frequency of the diagnosis of COVID-19 between March 11, 2020, and November 30, 2020. Patients who did not receive dialysis treatment regularly and had dialysis for <3 months were not included in the study. All dialysis patients were informed about the pandemic by their responsible nurses. Patients were trained by the responsible nurse in case of symptoms consistent with COVID-19. Temperature of all patients was measured before entering the HD center. During the dialysis session, patients and staff were informed about wearing masks and hand hygiene. Nurses responsible for PD patients contacted the patients by phone on a weekly basis and provided appropriate information.

A real-time reverse transcriptase-polymerase chain reaction test (rRT-PCR) was performed to diagnose SARS-CoV-2 in all patients with symptoms of COVID-19, and a computerized chest tomography was performed. The presence of ground-glass opacities, crazy-paving patterns, and consolidation areas were defined as the findings of COVID-19. Dialysis patients with the positive rRT-PCR test for SARS-CoV-2 and/or typical pulmonary tomography findings for COVID-19 were diagnosed with COVID-19. Patients with suspected COVID-19 or diagnosed with COVID-19 underwent HD in rooms and sessions reserved for COVID-19.

Demographic characteristics of the patients (gender and age), chronic diseases (diabetes mellitus (DM), hypertension (HT), asthma, chronic obstructive pulmonary disease, congestive heart failure, coronary vascular diseases (myocardial infarction and angina pectoris), documented coronary heart disease), and patients diagnosed with COVID-19 were enrolled.

This study was approved by the local institutional review board and waived the requirement for informed consent.

MAIN POINTS

- COVID-19 disease threatens the health and life of patients with comorbidities, especially patients with kidney failure.
- Uremia caused by chronic renal failure may alter the immune response against viral diseases by causing immunosuppression.
- Management of COVID-19 prevention methods is urgent and critical for dialysis patients. In patients who will start dialysis for the first time during the COVID-19 epidemic, PD seems to be the dialysis method that can be preferred.

Statistical Analysis

The data were analyzed using SPSS version 21.0 (IBM Corp., Armonk, NY, USA). *P* value <.05 was accepted as the statistical significance limit. Numerical variables were given as mean ± standard deviation for normally distributed variables and as median (minimum-maximum) for skew-distributed continuous variables. Categorical variables are shown as frequencies. Chi-square test was used to evaluate categorical data.

RESULTS

In our study, 130 dialysis patients, 75 (58%) male and 55 (42%) female, were studied. The mean age of the patients on dialysis was 54.8 ± 14.7 years. Twenty-eight (22%) of 130 dialysis patients were PD patients. The most common comorbidities were HT (80 patients, 62%) and DM (43 patients, 33%) in all dialysis patients. The mean dialysis duration in patients who underwent HD was 40.6 ± 53.6 months. The mean dialysis duration in PD patients was 86.4 ± 64.7 months. During the 9-month period in which our study was planned, the mean follow-up time for HD patients was 7.9 ± 1.8 months, and for PD patients, it was 9 months.

In our center, 12% (16/130) of the patients who received dialysis treatment were diagnosed with COVID-19. The average age of the 16 patients infected with COVID-19 is 55.3 ± 16 years, 10 (63%) men and 6 (37%) women. All of the patients diagnosed with COVID-19 had findings consistent with COVID-19 on chest CT and 69% (11/16) of them had positive rRT-PCR tests for SARS-CoV-2. All HD patients diagnosed with COVID-19 were hospitalized in the pandemic clinic and received treatment. All of the patients diagnosed with COVID-19 were HD patients (16/102). None of the PD patients were diagnosed with COVID-19 (*P* = .002). Thirteen percent (2/16) of patients diagnosed with COVID-19 have died. When examining the patients with and without COVID-19 diagnosis, it was seen that the presence of COVID-19 diagnosis was not related to age and gender.

In the patient group included in our study, there were no patients performing home HD and no patients staying in the nursing home.

The demographic characteristics of the study population are detailed in Table 1.

DISCUSSION

COVID-19 is a disease that affects the whole world and has no definitive treatment. It has high mortality, especially in end-stage renal disease patient population.[4,5] Therefore, avoiding contamination in COVID-19 infection becomes much more important in patients with end-stage renal disease.

In this study, we presented data on 130 patients who received regular dialysis treatment in our center during the first 9 months of the pandemic.

Table 1. Characteristics of Patients Classified According to Dialysis Types

Parameters	All Dialysis Patient, n = 130	Hemodialysis Patients, n = 102	Peritoneal Dialysis Patients, n = 28	*P*
Demographic features				
Age	54.8 ± 14.7	55.9 ± 14.9	54.1 ± 14	.77
Sex				.01
Female, n (%)	55 (42)	37 (37)	18 (64)	
Male, n (%)	75 (58)	65 (63)	10 (36)	
Hypertension, n (%)	80 (62)	73(72)	7 (25)	
Diabetes mellitus, n (%)	43 (33)	43 (38)	4 (14)	
COVID-19, n (%)	16 (12)	16 (16)	0	.02

Data are given as mean ± standard deviation.

In our study, the mean age of all dialysis patients was 54.8 ± 14.7 years. The mean age was similar in HD patients, PD patients, and HD patients infected with COVID-19 (55.9 ± 14.9, 54.1 ± 14, and 55.3 ± 16, respectively). The mean age of the patients in our study can be compared with studies conducted in HD patients infected with COVID-19 (between 57 and 66).[8-10] More than half (63%) of the patients infected with COVID-19 in our study are men. The distribution of gender varies according to studies.[11,12] The most common comorbid diseases were HT and DM, in accordance with other studies.[4,5]

We planned to investigate how the type of dialysis affects the distribution of COVID-19 in dialysis patients. Consistent with the literature, we found that the frequency of COVID-19 was significantly lower in patients who underwent PD.[13,14]

Patients on HD usually go to dialysis centers 2 or 3 times a week. They contact other patients and healthcare professionals in the dialysis room for 3/4 hours a week. In addition, COVID-19 is a source of transmission in public transportation vehicles used to reach the HD center. On the contrary, PD patients can apply PD treatment at home, at work, or in any other clean place.[15] Contact, which is very effective in the spread of COVID-19, is minimized by PD. It is also possible to remotely inform treatment follow-up and pandemic via weekly telephone or video conference applications.

Regarding the clinical course and outcome, the mortality rate in our HD patient group infected with COVID-19 was 13%. In the general population, the overall mortality rate of COVID-19 has been reported at about 3.2%.[16] In studies conducted in HD patients infected with COVID-19, mortality rates are between 16% and 24%.[4,5] Our results can be compared with these studies. Although the data are limited, studies of HD patients strongly indicate that the mortality rate is much higher in HD patients. Therefore, the choice of dialysis type is very important in patients with end-stage renal disease. Considering that the exact time when the COVID-19 pandemic will end is not known, it may be wise to refer patients with end-stage renal failure who will begin dialysis treatment during the pandemic process to PD.

The low number of patients studied should be stated as a limitation. In the literature, the number of studies conducted with HD and PD patients with COVID-19 and the number of patients in these studies is low in other studies. However, despite the small number of patients, clinicians interested in managing this patient group should be informed.

In conclusion, considering the prevalence of COVID-19 in HD patients, PD appears to be the preferred dialysis method for patients new to dialysis treatment during the COVID-19 outbreak.

Ethics Committee Approval: Ethics committee approval was received for this study from the Kartal Lütfi Kırdar City Hospital Ethics Committee (Approval Date: January 27, 2021; Approval Number: 514/194/43).

Informed Consent: Informed consent was not obtained due to the retrospective design of the study.

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