

Clinical-epidemiological characterization of patients with Covid-19 on hemodialysis

Caracterización clínico-epidemiológica de pacientes con Covid-19 en hemodiálisis

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ABSTRACT

Introduction: Covid-19 patients with chronic kidney disease on hemodialysis services have a higher risk of developing severe forms of the disease. **Objective:** To characterize clinically and epidemiologically the patients with covid-19 who were treated in the hemodialysis service at the Abel Santamaría Hospital, during the period between september 2020 and september 2021. **Methods:** A descriptive, cross-sectional study was conducted in patients with Covid-19 on hemodialysis. The universe consisted of 245 patients diagnosed with SARS-CoV-2 through the PCR-TR molecular test by taking nasopharyngeal swab and the sample was 123 positive patients who met the inclusion criteria. **Results:** Women between 55 and 64 years of age predominated, men between 25 and 34 years of age were the most infected, high blood pressure was the personal pathological history that had the greatest impact, the majority of infected patients were symptomatic, where fever and headache were the most common symptoms; the most frequent complications were cardiovascular disease and sepsis; the diagnosis was early in almost all cases; more than half of the patients in the study died from complications and other causes. **Conclusions:** The prognosis of patients on hemodialysis with covid-19 favors progression to the final stages with increased risk or mortality.

Keywords: Covid-19, Chronic Kidney Disease; Hemodialysis.

RESUMEN

Introducción: Los pacientes con COVID-19 con enfermedad renal crónica en los servicios de hemodiálisis tienen mayor riesgo de desarrollar formas graves de la enfermedad. **Objetivo:** Caracterizar clínica y epidemiológicamente a los pacientes con Covid-19 que se atendieron en el servicio de hemodiálisis en el Hospital Abel Santamaría, durante el periodo comprendido entre septiembre 2020 y septiembre 2021. **Métodos:** Se realizó un estudio descriptivo, de corte transversal, en pacientes con Covid-19 en hemodiálisis. El universo estuvo constituido por 245 pacientes diagnosticados para SARS-CoV-2 a través de la prueba molecular PCR-TR mediante la toma de exudado nasofaríngeo y la muestra fue de 123 pacientes positivos que cumplieron los criterios de inclusión. **Resultados:** Predominaron las mujeres comprendidas entre los 55 a 64 años, en los hombres el grupo de 25 a 34 años los que más se infectaron, la hipertensión arterial fue el antecedente patológico personal que más repercutió, la mayoría de los pacientes infectados fueron sintomáticos, donde la fiebre y la cefalea fueron los síntomas que más se encontraron; las complicaciones más frecuentes fueron las afecciones cardiovasculares y la sepsis, la oportunidad en el diagnóstico fue precoz en casi la totalidad de los casos, más de la mitad de los pacientes en estudio fallecieron por complicaciones y por otras causas. **Conclusiones:** El pronóstico de los pacientes en hemodiálisis con COVID-19 favorece a la progresión hacia los estadios finales con riesgo incrementado de la mortalidad.

Palabras clave: Palabras claves: Covid-19; Enfermedad Renal Crónica; Hemodiálisis.

INTRODUCTION

In December 2019, a new coronavirus capable of infecting humans and causing severe illness emerged in China. It was initially named the 2019 novel coronavirus (2019-nCoV), and later, the International Committee on the Taxonomy of Viruses designated it severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), whose close resemblance to SARS-CoV was determined. On February 11, 2020, the World Health Organization (WHO) announced that the disease associated with SARS-CoV-2 was officially designated coronavirus disease 2019 (COVID-19). (1)

The rapid spread of the disease led the World Health Organization (WHO) to declare it a public health emergency of international concern on January 30, 2020. Owing to the potential impact the virus could have on developing countries with less robust healthcare infrastructure, it was recognized as a pandemic on March 11. (2) The SARS-CoV-2 virus causes a condition (COVID-19) that in some cases progresses to acute respiratory distress syndrome (ARDS) with a fatal outcome. (2)

Coronavirus is transmitted primarily from person to person, including from someone who is infected but does not have symptoms. When people with COVID-19 cough, sneeze, breathe, sing, or speak, their breath may be infected with the COVID-19 virus. (3)

The virus spreads most commonly through small droplets of fluid that travel through the air between people in close contact. Many people with COVID-19 have no symptoms or only mild illness. However, for older adults and people with certain medical conditions, COVID-19 can lead to the need for hospital care or death. (3)

People of all ages are at risk of contracting this infection. However, patients aged 60 and older and patients with underlying medical conditions (obesity, cardiovascular disease, chronic kidney disease, diabetes, chronic lung disease, smoking, cancer, and who have undergone solid organ or hematopoietic stem cell transplants) are at increased risk of developing severe COVID-19. (4)

In Cuba, the first case was diagnosed on March 13, 2020. The Ministry of Public Health reported on three tourists from Italy who were in the city of Trinidad and, after three days in the country, developed respiratory symptoms. (5)

The clinical presentation of the disease spans a wide spectrum, ranging from asymptomatic or mild cases to severe pneumonia with respiratory failure. The infection progresses in phases: an initial phase of early infection or viral replication, a second phase of pulmonary invasion or pneumonia, and a third phase known as the hyperinflammatory and procoagulant phase. In this latter phase, small-vessel thrombosis is common, as are cardiac arrhythmias, septic shock, and multiple organ dysfunction. (6)

Acute kidney injury is relatively common in patients with COVID-19 infection, particularly critically ill patients; patients with chronic kidney disease are considered to be at high risk during the pandemic because of associated immunosuppression, making it important to detect SARS-CoV-2 infection in these patients, as well as in those on dialysis and kidney transplant recipients. Identifying kidney disease upon admission among patients with COVID-19 is highly important, as it has been shown to serve as an indicator for assessing survival and prognosis; several studies have established that acute kidney injury is directly associated with poor prognosis and mortality. This is due to the positive impact on survival resulting from the timely management of kidney injury in COVID-19-positive patients. (7)

The development of acute kidney injury in patients with COVID-19 has been associated with inflammation induced by the disease or the presence of SARS-CoV-2, or it may result from synergistic effects that cause kidney damage. Notably, acute kidney injury is closely linked to increased mortality and is generally reported in critically ill patients. The etiology of acute kidney injury in the context of COVID-19 infection appears to be multifactorial. (7)

Notably, the presence of preexisting kidney disease prior to infection represents a greater risk of patient deterioration. Patients on hemodialysis are highly vulnerable not only because of renal failure but also because the vast majority have multiple other comorbidities. (8)

In Cuba, few studies have been conducted on these patients, as is the case in the province of Pinar del Río. Given the above, the objective of our study was to clinically and epidemiologically characterize patients with COVID-19 who were treated in the hemodialysis unit at Abel Santamaría Hospital in the province of Pinar del Río during the period from September 2020 to September 2021.

METHODS

A descriptive, cross-sectional study was conducted on patients with COVID-19 who were receiving hemodialysis at Abel Santamaría Hospital in the province of Pinar del Río from September 2020 to September 2021.

The study population consisted of 245 patients, and the sample comprised 123 patients who tested positive for SARS-CoV-2 via the PCR-TR molecular test and met the inclusion criteria of being on hemodialysis, having tested positive via the PCR-TR molecular test during the study period, and having the necessary documentation.

The data were obtained from medical records and epidemiological surveys conducted by the Department of Hospital Epidemiology at Abel Santamaría Cuadrado Hospital and were entered into a database created in Microsoft Excel for this purpose.

Absolute and relative frequencies were used for statistical analysis. The data were processed using Microsoft Office 2016 and are presented in tabular form for better understanding.

RESULTS

Table 1 As shown in, in the study cohort of 123 patients treated in the hemodialysis unit, 63 were female, accounting for 51.2%; in terms of age, the 55–64 age group represented 29.3%, followed by the 45–54 age group at 28.5%. Notably, in the 25–34 years, 35–44 years, and 65 years and older age groups, males predominated, accounting for 70%, 58.8%, and 52%, respectively. In contrast, among women, 55–64 years of age predominated (58.3%).

Table 1. Distribution of COVID-19 patients by age and sex in the hemodialysis unit. Abel Santamaría Hospital, 2020–2021.

Age	Gender					
	Female	Male	Total			
	No	%	No	%	No	%
25–34	3	30	7	70	10	8.1
35–44	7	41.2	10	58.8	17	13.8
45–54	20	57.1	15	42.9	35	28.5
55–64	21	58.3	15	41.7	36	29.3
65 and older	12	48.0	13	52.0	25	20.3
Total	63	51.2	60	48.8	123	100.0

A personal medical history (Table 2) revealed that hypertension was the most common condition, affecting 21.1% of the patients (26 patients), followed by undetermined conditions (18.7%, 23 patients), obesity (16.3%, 20 patients), and diabetic kidney disease (10.6%, 13 patients).

Table 3 shows the clinical manifestations of patients with COVID-19 who were receiving hemodialysis; fever and headache were predominant in 120 patients who were diagnosed with COVID-19 (97.6%), followed by dry cough in 100 patients (81.3%), nasal congestion in 70 patients (56.9%), and other symptoms in 57 patients (46.3%).

Table 2. Distribution of patients with COVID-19 according to personal medical history in the hemodialysis unit. Abel Santamaría Hospital, 2020–2021.

Personal medical history	Total	
	No	%
Hypertension	26	21.1
Diabetes Mellitus	17	13.8
Heart disease	6	4.9
Obesity	20	16.3
Diabetic kidney disease	13	10.6
Nephroangiosclerosis	4	3.3
Chronic glomerulonephritis	11	8.9
Chronic tubulointerstitial nephritis	1	0.8
Obstructive uropathy	1	0.8
Vasculitis	1	0.8
Undetermined	23	18.7
Total	123	100

Table 3. Distribution of patients with COVID-19 according to their clinical manifestations in the hemodialysis unit. Abel Santamaría Hospital, 2020–2021.

Clinical manifestations	Total	
	No	%
Dyspnea	8	6.5
Fever	120	97.6
Dry cough	100	81.3
Nasal congestion	70	56.9
Nail-biting	50	40.7
Headache	120	97.6
Diarrhea	50	40.7
Fatigue	8	6.5
Muscle pain	5	4.1
Other	57	46.3

Cardiovascular conditions during the course of the disease were the most common complication, accounting for 32.4% (12 cases), followed by sepsis and respiratory system conditions, accounting for 27% (10) and 21.6% (8), respectively. (Table 4).

With respect to the timing of diagnosis among the hemodialysis patients studied during the selected period, 118 patients (95.9%) were diagnosed early, and only 5 patients were diagnosed late (4.1%) (Table 5).

Table 4. Distribution of COVID-19 patients by complications in the hemodialysis unit. Abel Santamaría Hospital, 2020–2021.

Complications	Total	
	No	%
Cardiovascular conditions	12	32.4
Sepsis	10	27.0
Respiratory system disorders	8	21.6
Central nervous system disorders	5	13.5
Dermatological and digestive system disorders	2	5.4
Total	37	100

Table 5. Distribution of patients with COVID-19 according to the timeliness of diagnosis in the hemodialysis unit. Abel Santamaría Hospital, 2020–2021.

Timeliness of diagnosis	Total	
	No	%
Early	118	95.9
Late	5	4.1
Total	123	100

Table 6 shows the status at discharge of patients infected with COVID-19 in hemodialysis units; of these, 60 patients (48.8%) recovered, 37 died from COVID-19-related complications, and 26 died from other causes (21.1%).

Table 6. Distribution of COVID-19 patients by condition at discharge from the hemodialysis unit. Abel Santamaría Hospital, 2020–2021.

Status upon discharge	Total	
	No	%
Cured	60	48.8
Died from complications	37	30.1
Died from another cause	26	21.1
Total	123	100

DISCUSSION

Patients with CKD on hemodialysis are at higher risk of contracting infectious diseases because of their impaired immune function, as well as, as discussed in this study, their high comorbidity. They therefore constitute a vulnerable group with regard to these types of diseases. (8)

The results correspond to the disease itself, which is treated in the department; although it can develop at any time, it becomes more pronounced as people age, as do their kidneys, leading to a loss of renal function, and risk factors also increase over time. On the other hand, the fact that in this study, men in the 25–34 age group had a higher risk of the disease could be due to noncompliance with preventive measures to avoid the disease, as well as to continuous and systematic exposure to risk factors in a greater proportion than women did.

In the present study, the age distribution differed from that reported in other studies, such as the one conducted at “Dr. Luis Díaz Soto” Central Military Hospital among patients on dialysis, where male patients predominated, accounting for 57.1%; 78% were over 45 years of age, with 6 (42.8%) patients between 45 and 64 years of age and 5 (35.7%) who were 65 years of age or older at the time of diagnosis. (8), as well as in a cohort study at a tertiary care hospital in Lima, Peru, where 50.9% were male (9).

In other studies, in Wuhan, China, the mean patient age was 63.2 years, and 57.3% (75) were men. (10)

Hypertension and diabetes mellitus are the leading causes of kidney damage; therefore, our results may correspond to the disease and its risk factors, since in Pinar del Río, hypertension is the primary cause of chronic kidney disease. In a study conducted in Mexico by Ramos Gordillo and colleagues, the most frequent etiology was diabetic nephropathy (64 cases; 40%), followed by undetermined etiology (46 cases; 29%) and nephroangiosclerosis (31 cases; 20%). (11)

Similar results were observed in a study conducted at a tertiary care hospital in Lima, Peru, where nearly half of the study patients had diabetes mellitus (45.9%) or hypertension (44.8%). (9)

A study in Wuhan revealed that 32% of patients with COVID-19 had underlying conditions, including diabetes, hypertension, and cardiovascular disease. (12)

The clinical manifestations are the same as those in the general population; however, the incidence of these manifestations is greater. The Spanish Society of Nephrology indicated that manifestations such as fever (75%), upper respiratory symptoms (69%), and dyspnea (42%) are similar to those in the general population (8)—symptoms that predominated in our study.

In a study conducted at the Ángeles Diagnostic Center (CEDIASA) in Mexico City, the most common symptoms were dyspnea, cough, fever, and muscle pain (11), similar to our study.

Patients receiving hemodialysis for end-stage chronic kidney disease (CKD) are at a higher risk of contracting COVID-19 than the general population is. Most of these patients are elderly and have associated comorbidities, as well as some degree of immunocompetence, which may be associated with poor survival outcomes. (13)

Early diagnosis among the hemodialysis patients studied during the selected period was evident in 95.9% of the sample. These results align with the surveillance system strictly established in the province's services, ensuring timely diagnosis of the disease to reduce transmission by requiring PCR testing for all patients starting treatment. From the outset, measures for protection, detection, isolation, and patient distribution were implemented to reduce the risk of transmission. It was recommended that families themselves transport patients to the hemodialysis center; they were provided with specific information on the symptoms of COVID-19 infection and instructed on the mandatory use of medical masks and frequent handwashing. Additionally, measures were implemented at the hospital level to reduce infection.

However, in a prospective study at a referral hospital in Barcelona that included all adult patients diagnosed with SARS-CoV-2, 66 nosocomial cases were found to have a delayed diagnosis, as the 28-day mortality rate was 33% (22 patients) (14); these findings differ from those of this study.

With respect to the discharge status of patients infected with COVID-19 in hemodialysis units, 48.8% recovered, 30.1% died from COVID-19-related complications, and 21.1% died from other causes. This demonstrates the high vulnerability of this patient group, where no established protective measures were sufficient to prevent them from becoming infected and suffering this outcome.

Similar results were reported in Peru, where an in-hospital mortality rate of 32.9% was observed. (9).

In a study conducted in Mexico regarding the clinical course of patients, of the 160 confirmed cases, 87 (55%) recovered, and 73 (45%) died. This represents a case fatality rate of 45%, which is somewhat higher than that in other published reports, which range from 20–35% (11); this result is similar to that reported in this study.

However, the mortality rate may be higher in this patient population, as demonstrated by a study conducted in Italy, in which 301 of 6,000 (5%) patients on hemodialysis tested positive for COVID-19, with a mortality rate of 22.3%. Therefore, it is necessary to consider other risk factors, such as advanced age, malnutrition, cardiovascular disease, diabetes, lung disease, and a compromised immune system, all of which can worsen health status. (15)

CONCLUSIONS

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