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Experience of COVID 19 disease on 159 Ecuadorian chronic dialysis patients

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Abstract

Aim: In December 2019, first Covid-19 disease cases were reported. The pandemic spread with 42,039,763 cases and 1,141,223 deaths worldwide with 156,451 confirmed cases and 12,500 deaths in Ecuador. The aim of this work is to share characteristics and clinical outcomes of 159 dialysis patients in Quito during pandemic.

Materials and methods: Observational-prospective-unicenter study. Fifty-six consecutive patients (35%) presented COVID19 symptoms and followed since April to 30 September 2020. Positive nasopharyngeal PCR testing confirmed diagnosis. Low oxygen saturation (LOS) classified disease as severe, moderate if symptoms without LOS and asymptomatic if no symptoms. Hospital-stay, time disease, mortality, contagious rate data were collected.

Results: Thirty-seven patients (23.3%) tested positive. Patients with LOS at presentation and hospitalized were older when compared with those without LOS (61.6 ± 11.9 vs 48.9 ± 11.9 years; p=0.02) and non-hospitalized (60.3 ± 12.7 vs 51.4 ± 15.6 years; p=0.02). Ten died (27%), mortality was significative in patients with previous pulmonary disease (p=0.01), LOS (p=0.03), hospitalization (p=0.01), and severe disease (p=0.03). Median hospital stay was 7 days (3-13), time disease was 17 days (6-25) and 10 days (6-22) until death.

Conclusion: COVID-19 disease has increased mortality and health care demand in dialysis patients. Mortality was inferior to other series, and significative when previous pulmonary pathology, low oxygen saturation, hospitalization and severe disease were present.

Introduction

In December 2019 the first patients with Covid 19 disease were reported in Wuhan- China [1,2]. On February 29, 2020 the Ecuadorian Government reported the first case of COVID 19 in a 70-year-old woman who arrived from Spain to Guayaquil together with her sister and both died of the disease [3]. Then the pandemic spread throughout the country and the world at great speed, producing a big mortality especially in large urban centers in Italy, Spain, USA. In October 2020, John Hopkins University reports 42,039,763 cases in the world with 1,141,223 deaths and for Ecuador a total of 156,451 confirmed cases with 12,500 deaths, with a case-fatality ratio of 7.99% one of the highest in the continent [4].

"Menydial Kidney Clinic" is a private dialysis unit that has provided hemodialysis (HD) and peritoneal dialysis (DP) treatments for 40 years ago in Ecuador serving to 730 patients living in different cities throughout the country and who had to face the pandemic with low social resources adding another comorbidity to the ones known of end stage renal disease (ESRD) [5,6] which probably has worsen the prognosis of dialysis patients significantly.

The aim of this work is to share clinical outcomes, population characteristics, clinical presentation, public health demand of dialysis patients at "Menydial" and how we faced the pandemic in Quito-Ecuador where there were a total of 159 patients (157 on HD, 2 on PD) followed during 6 months of pandemia [7,8].

Materials and methods

In this observational, prospective, uni-center study, with a total of 159 patients, 56 consecutive ESRD patients on dialysis at "Menydial Nephrologic Clinic" (35%) were identified as "suspicious of COVID-19 infection" if presented any of the symptoms linked with COVID-19 disease [9] at home, before, during or after their dialysis session and were followed between April 2020 until 30 September 2020. Confirmation of COVID-19 disease was made exclusively based on positive PCR testing on nasopharyngeal swabs. Demographics, clinical data, comorbidities (hypertension, ischemic heart disease, diabetes, pulmonary disease, immunocompromised status) hospital stay, time until death since initiation of symptoms and time until negative PCR were collect in confirmed disease patients from medical center record system (Nefrosoft®) and analyzed with SPSS statistics® 24.0 version. Complementary tests: chest x-ray, basic hemogram with platelet count, lymphocyte count, ferritin level, C reactive protein, and oxygen saturation were obtained in all patients and recorded for analysis. Severity of disease was classified as severe if patient presented with low oxygen saturation (LOS), below 90%, moderate if one or more symptoms were present without LOS and asymptomatic if no symptoms present. Continuous variables with normal distribution were expressed as mean with standard deviation or were indicated as median and interquartile range if asymmetric. P-value was calculated with T student test in continuous variables with normal distribution, chi square and Fisher´s exact test for qualitative variables, U-Mann-Whitney for

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those continuous asymmetric variables. Study was approved by ethics committee of the center.

Results

A total of 159 patients received dialysis therapy in the study center. Demographics and baseline characteristic of population in the medical center are described in Table 1.

COVID-19 disease incidence was 23.2% (37/159). Fifty-six patients (35%) presented COVID19 symptoms from which 37 patients (64%) tested positive on PCR swabs, 19 were male (51%) and 36 (98%) on HD. Baseline characteristics, co-morbidities, clinical presentation, disease severity, hospital stay, time disease, PCR payment, clinical outcomes and most frequent symptoms are described at Table 2. A remarkable 32% of patients presented gastrointestinal symptoms (diarrhea, abdominal pain/cramps).

Complementary tests were obtained in all of the studied population and the most frequent findings were: Lymphopenia in 25 patients (68%), abnormal chest X ray in 24 patients (65%), LOS in 23 patients (62%) with a median value of 87% (80-91%). Complementary tests findings in confirmed population are described in Table 3. Lymphopenia was not more frequent in positive PCR population (p=0.38) neither in those who died vs those who survived (p=0.16).

Patients who had LOS and those who needed hospitalization where older when compared with patients with moderate disease (61.6 ± 11.9 vs 47.8 ± 15.3 years; p=0.001), normal oxygen saturation (61.6 ± 11.9 vs 48.9 ± 11.9 years; p=0.02) and with those who didn´t need hospitalization (60.3 ± 12.7 vs 51.4 ± 15.6 years; p=0.02), differences were notable when age was above 55 years old.

Median hospital stay was 7 days (3-13 days) with no differences when compared for gender (p=0.26), age (p=0,07) presence/absence of LOS (p=0.94), abnormal chest x-ray (p=0.14), lymphopenia (p=0.27) and severe disease presentation (p=0.94).

Ten patients died during the study (27%), 7 were male (p=0.18), 9 died at hospital and one at home. Three patients returned to hospital before 7 days after discharged, two of them died. There was significative difference in mortality in patients with previous pulmonary disease (p=0.01), LOS at presentation (p=0.03), hospitalization (p=0.01) and severe disease presentation (p=0.03). Studied variables and p-values are expressed in Table 4.

Time until death was 10 days (6-22), hospital stay 7 days (3-13) and time until negative PCR was 17 days (6-25). Eleven patients (29.7%)

Table 1. Demographic and baseline characteristics of total population in HD center

Population studied (N=159)	Results
Age	56 (± 15.5 years)
Sex	
-Male	88 (55%)
BMI	24.5 (± 3.93 Kg/m^2)
Etiology of CKD	
-Diabetes mellitus	29%
-Hypertension	17%
-Others	54%
Co-Morbidites	
-Hypertension	88%
-Diabetes mellitus	29%
-Pulmonary disease	16%
-Ischemic heart disease	17%
Vascular Access	
-Catheter	15%
-Native fistula	72%
-Prosthetic fistula	13%
Dialysis Modality	
-HD	157
-DP	2

HD: Hemodialysis; DP: Peritoneal dialysis; BMI: Body mass index; CKD: Chronic Kidney disease.

Table 2. Demographic features and outcomes in dialysis patients with confirmed COVID 19 disease

Patients characteristics (n=37)	Results
Age	56 (± 14.6 years)
Sex	
Male	19 (51%)
BMI	23.9 (± 3.9 Kg/m^2)
Dialysis Modality	
-HD	36 (98%)
-DP	1 (2%)
Co-morbidities	
-Hypertension	35 (95%)
-Diabetes Mellitus	10 (27%)
-Pulmonary disease	20 (54%)
-Ischemic heart disease	4 (11%)
-Immunocompromised	8 (22%)
Clinical presentation	
-Asymptomatic	1 (2%)
-Mild	13 (35%)
-Severe	23 (63%)
Most frequent symptoms	
-Myalgia	30 (81%)
-Fever	28 (76%)
-Cough	27 (73%)
-Joint pain	18 (49%)
-Odinophagia	17 (46%)
-Gastrointestinal symptoms	12 (32%)
Patients referred to the Hospital	26 (70%)
Outcomes	
-Recovered	27 (73%)
-Death	10 (27%)
Contagious rate center	23/100 patients
PCR payment	
-Public	9 (24%)
-Private	15 (41%)
-Both	13 (35%)
Time until negative PCR*	17 (6-25) days
Time until death*	10 (6-22) days
Hospital stay*	7 (3-13) days

*Values expressed as median and interquartile range. BMI: Body mass index; HD: Hemodialysis; DP: Peritoneal dialysis; PCR: Polymerase chain reaction test.

Table 3. Complementary tests findings in dialysis patients with confirmed COVID 19 disease

Complementary tests (n=37)	Results
Pathological chest X-ray	24 (65%)
Laboratory	
-Lymphopenia (<1000 mm^3)	25 (68%)
-Lymphocytes count x 10^3 per L	895 (678-1258)
-Platelet count x 10^3 per L	177 (142-243)
-Ferritin levels, ng/ml	2000 (1755-2387)*
-C reactive protein, mg/L	24.3 (4.59-77.51)*
Oxygen saturation ≤ 90%, n (%)	23 (62%)*
Mean saturation value, (%)	87 (80-94)*

*Values expressed in median and interquartile range.

Table 4. Studied variables in dialysis patients with confirmed COVID-19 disease and p-values

Mortality	p-value
Age	0.21
Sex	0.18
Severe disease presentation	0.03
Previous pulmonary pathology	0.01
Low oxygen saturation (<90%)	0.03
Hospitalization needed	0.01
Lymphopenia	0.16
HTA	0.9
Previous ischemic heart disease	0.29
Previous diabetes	0.28
Previous inmunocompromised status	0.23
Abnormal chest x ray at presentation	0.05
Age > 55 years old	
Severe disease at presentation	0.001
Low oxygen saturation at presentation	0.001
Hospitalization	0.02

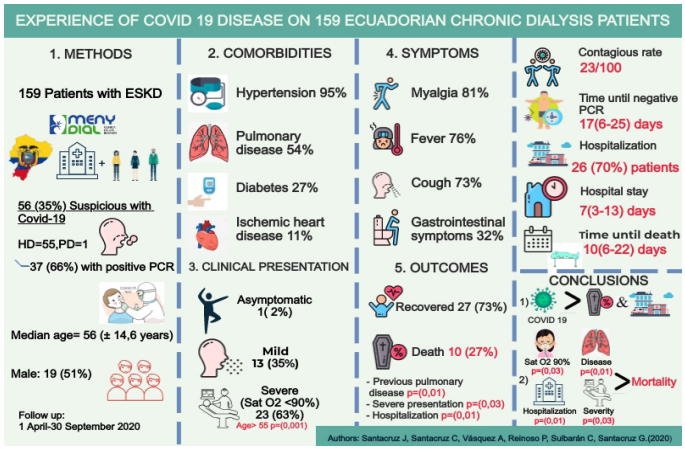

Figure 1. Visual abstract of investigation

had previous contact with symptomatic people. Forty-eight patients, between suspicious and those with confirmed disease, received dialysis sessions at isolation room with the peak reached in July with 20 patients (42%) followed by August with 11 (23%), June with 9 (19%), September with 4 (8%), April and May with 2 (4%) patients each. Figure 1 shows visual abstract.

Discussion

This study highlights clinical presentation, public health demand, population characteristics and outcomes of dialysis patients with suspect and confirmed COVID 19 disease in a private nephrological care center of a development country during the COVID 19 pandemic outbreak. COVID-19 disease incidence in chronic dialysis patients is highly variable among different countries, for example in one HD center in Madrid-Spain is as high as 41.1% [10] or as low as 16% in other series reported in Wuhan-China [11]. Prevalence in our center was 23% and it was difficult to compare with other local and south American data due to lack of reports. Clinical presentation was similar as other series reported with a similar percentage of asymptomatic patients as in other studies [12,13] and a remarkable 32% of patients with gastrointestinal symptoms at presentation, something that was reported with less frequency in other studies [14,15] and must be taken in count when identifying possible suspicious patients as a general measure for diminishing COVID 19 transmission. Mortality was inferior to other series reported [13,16], in part due to younger population in our center and by all measures taken to face pandemic like continuous medical assessment, immediate isolation if clinical suspicion or ambulatory symptomatic contact, continuous follow-up with phone calls, frequent complementary tests if needed and avoidance of shared transportation to treatment. Majority of deaths were in July when contagious peak reached to our unit and to our city indicating that public health services saturation may have an important role in mortality [17]. By that time we had to face an exponential grow of suspected cases and the need of creating an isolation room capable enough to support the space demand and the accomplishment of all bio-security measures without any disturbance to the non-suspicious patients. Now, we conclude that each patient will need least 2 weeks of isolation, some cases more, something to notice when organizing time, shifts and staff for that area. To note, there were no differences in contagious rate between gender, but mortality was more frequent in males (with no statistical significance). In our series we noted that mortality was more common in patients with low oxygen saturation at presentation, previous pulmonary pathology, hospitalization needed and severe disease at presentation (common in patients older than 55 years old), these findings must encourage a more special care to this population. Pathological chest X-Ray finding at presentation may have an influence in mortality and there was not any complementary test strong enough to predict outcome being the most common finding lymphopenia as reported in other series [18].

COVID 19 disease is known to collapse health care system [19] with a median hospital stay of 7 days (even more in those with more severe disease or complications) in this series and up to 25 days of disease (time until negative PCR), complicating the use of health resources to other patients due to prolonged isolation time of hospital services.

Measures to prevent and diminish contagious spread were taken immediately. Conscious of Spanish experience, where there were more than 65.000 health caregiver contaminated with the disease during the pandemic outbreak [20], protective personal equipment, N95 masks, facial shields, and general measures to prevent contagious spread were distributed to all center workers constantly, where we had a 17.5% of dialysis room workers contaminated. Also, quaternary ammonium was spread daily at the end of dialysis service in the entire center.

Local limitations (south American development country) were important during pandemic outbreak. The prolonged waiting time for definite PCR results with public health system, taking up to 15 days in some cases, difficulted a quick diagnosis confirmation and unnecessarily prolonging patients stay at isolation room, forcing the use of private laboratories to process PCRs due to their efficiency and speed in swabs processing (mean time 72 hours) even though most of time patients had very low social incomes and didn´t have resources to afford them with the clinic having to pay for them. Because of local mobility restrictions by quarantine mobilization to and from dialysis sessions was provided by the center and most of the patients received shared transportation with other dialysis fellows. In some cases, it facilitated contagious spread being impossible to solve this transportation problem due to patient´s low economical resources and strong mobility restrictions imposed by the Ecuadorian state.

Limitans of the study were a small sample size and to ignore different treatment strategies used at hospitals and its results on survival. Strengths of the study are a homogenous sample, clinical and complementary reliable data collection.

Conclusion

COVID-19 disease increases mortality and health care demand in dialysis patients especially when public health system saturation is present. Previous pulmonary pathology, low oxygen saturation, hospitalization and severe disease at presentation influenced in mortality, which is inferior to other series reported. Local limitations may have a role in contagious spread specially if shared transportation to and from sessions pointing that home-based therapies (PD, domiciliary hemodialysis) must be strengthened by local authorities to diminished COVID-19 in this population. Immediate isolation in suspicious patients and a quick diagnosis confirmation by PCR nasopharyngeal swabs are critical to organize medical and human resources which could be difficulted in a weak public health system.

Disclosures

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References

1. http://wjw.wuhan.gov.cn/front/web/showDetail/2019123108989
2. Wang D, Hu B, Hu Chang, Zhu F, Liu X, et al. (2020) Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus–Infected Pneumonia in Wuhan, China. *JAMA* 323: 1061-1069.
3. https://www.elcomercio.com/actualidad/salud-confirma-primer-caso coronavirus.html
4. https://coronavirus.jhu.edu/data/state-timeline
5. https://kdigo.org/wp-content/uploads/2017/02/KDIGO_2012_CKD_GL.pdf
6. Zhou F, Yu T, Du R, Fan G, Liu Y, et al. (2020) Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet* 395: 1054–1062. [Crossref]
7. Price-Haywood EG, Burton J, Fort D Seoane L (2020) Hospitalization and mortality among black patients and white patients with Covid-19. *N Engl J Med* 382: 2534-2543.
8. Ma Y, Diao B, Lv X, Zhu J, Liang W, et al. (2020) 2019 novel coronavirus disease in hemodialysis (HD) patients: report from one HD center in Wuhan, China. *MedRxiv* (In press).
9. Aydin K., Parmaksiz E, Sert S (2020) The clinical characteristics and course of COVID-19 in hemodialysis patients. *Hemodial Int* 24: 534-540.
10. Albalate M, Arribas P, Torres E, Cintra M, Alcázar R, et al. (2020) High prevalence of asymptomatic COVID-19 in hemodialysis: learning day by day in the first month of the COVID-19 pandemic. *Nefrologia* 40: 279-286. [Crossref]
11. W-j, Ni Z-y, Hu Y, Liang W, Ou C, et al. (2020) Clinical characteristics of 2019 novel coronavirus infection in China. *N Engl J Med* 382: 1708-1720.
12. Xiong F, Tang H, Liu L, Tu C, Tian J, et al. (2020) Clinical characteristics of and medical interventions for COVID-19 in hemodialysis patients in Wuhan, China. *J Am Soc Nephrol* 31: 1387-1397.
13. Goicoechea M, Cámara LAS, Macías N, de Morales AM, Rojas AG, et al. (2020) COVID-19: clinical course and outcomes of 36 hemodialysis patients in Spain. *Kidney Int* 98: 27–34. [Crossref]
14. Ferrey AJ, Choi G, Hanna R.M, Chang Y, Tantisattamo E, et al. (2020) A case of novel coronavirus disease 19 in a chronic hemodialysis patient presenting with gastroenteritis and developing severe pulmonary disease. *Am J Nephrol* 51: 337-342. [Crossref]
15. Pan L, Mu M, Yang P, Sun Y, Wang R, et al. (2020) Clinical Characteristics of COVID-19 Patients with Digestive Symptoms in Hubei, China: A descriptive, cross-sectional, multicenter study. *Am J Gastroenterol* 115: 766-773.
16. Trivedi M, Shingada A, Shah M, Khanna U, Karnik ND, et al. (2020) The impact of COVID-19 on maintenance haemodialysis patients: The Indian scenario. *Nephrology* 25: 929-932.
17. https://www.gestionderiesgos.gob.ec/wpcontent/uploads/2020/11/INFOGRAFIANACIONALCOVID19-COE-NACIONAL-08h00-02112020.pdf
18. Huang C, Wang Y, Li X, Ren L, Zhao J, et al. (2020) Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 395: 497-506.
19. https://www.salud.gob.ec/actualizacion-de-casos-decoronavirus-en-ecuador/
20. https://www.mscbs.gob.es/