Demographic and Prognostic Indicators in COVID-19 Patients with ESRD: A Single Center Retrospective Study

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Introduction

- Coronavirus 2019 (COVID-19) is a disease caused by severe acute respiratory syndrome coronavirus (SARS-CoV-2).
- The first reported case of COVID-19 in the United States was in January 2020 and has since become a pandemic spreading rapidly worldwide.
- However, there is limited data on the epidemiology and prognosis of COVID-19 in end stage renal disease (ESRD) patients on hemodialysis (HD).
- Aim: we describe our experience with 39 individuals who had ESRD on HD, who contracted SARS-CoV-2 and were admitted to our hospital.

Methodology

Study Design

- Retrospective Cohort Study

Inclusion Criteria

- ≥ 18 years old with ESRD on HD
- Confirmed COVID-19
- Admitted between 03/15/2020 and 05/25/2020

Exclusion Criteria

- Absence of above
- Were still inpatients on 5/25/2020

Analysis

- Demographic, clinical and laboratory data were reviewed and retrieved.
- Descriptive analysis, univariate and multivariate logistic regression methods
  - describe the demographic and to identify prognostic markers associated with mortality

Results

- Out of the 427 confirmed COVID-19 hospitalized patients, 39 ESRD patients on HD were included in this study.

	All Patients (n=39)	Survival (n=20)	Expired (n=19)	p-value
Laboratory Profile				
Complete Blood Profile				
WBC	7.16 ± 4.26	7.66 ± 4.75	6.63 ± 3.73	0.4585
ANC	5.50 ± 3.42	6.10 ± 4.23	4.87 ± 2.25	0.2686
ALC	0.63 ± 0.35	0.70 ± 0.36	0.57 ± 0.33	0.2630
Platelets	164.3 ± 80	177.4 ± 87.25	150.6 ± 71.3	0.3015
MPV	9.17 ± 1.05	9.01 ± 1.33	9.34 ± 0.65	0.3390
Inflammatory Markers				
Ferritin	4093 ± 8547	3599 ± 2177	15588 ± 14371	0.0011
D-dimer	4290 ± 6441	4407 ± 5380	4174 ± 7504	0.9130
CRP	8.67 ± 6.17	8.03 ± 8.22	9.36 ± 2.85	0.5074
LDH	790.1 ± 871.5	409.7 ± 209.3	1238 ± 1124	0.0026
Lymphocyte-Inflammatory Markers Ratio				
LFR	0.42 ± 0.39	0.54 ± 0.45	0.29 ± 0.25	0.0457
LDR	0.43 ± 0.52	0.50 ± 0.71	0.36 ± 0.21	0.4343
LCR	0.12 ± 0.15	0.18 ± 0.20	0.07 ± 0.05	0.0288
LLR (x1000)	2.30 ± 1.62	2.6 ± 1.64	1.99 ± 1.57	0.2417
Liver Profile				
AST	60.18 ± 95.25	38.80 ± 18.76	82.68 ± 133.2	0.1529
ALT	32.13 ± 28.45	28.15 ± 10.88	36.32 ± 39.34	0.3774
AST/ALT ratio	1.84 ± 1.14	1.44 ± 0.55	2.25 ± 1.43	0.0231
Total Protein	7.36 ± 0.80	7.40 ± 0.66	7.32 ± 0.93	0.7613
Albumin	2.85 ± 0.58	2.93 ± 0.65	2.76 ± 0.50	0.3641
Cardiac Profile				
Troponin	0.30 ± 0.62	0.18 ± 0.49	0.41 ± 0.72	0.2583
BNP	1984 ± 3061	1735 ± 1800	2296 ± 4223	0.6449
Miscellaneous				
NLR	13.06 ± 13.76	13.97 ± 16.87	12.09 ± 9.99	0.6478
PLR	215.6 ± 256	269.6 ± 335.3	158.8 ± 114.2	0.1799

Table 1: Non-parametric analysis of all prognostic markers.

(WBC – White blood count, ANC - Absolute neutrophil count, ALC - Absolute lymphocyte count, MPV – mean platelet volume, CRP – C-reactive protein, LDH – Lactate dehydrogenase, LFR – Lymphocyte-ferritin ratio, LDR - Lymphocyte-D-dimer ratio, LCR – Lymphocyte-CRP ratio, LLR - Lymphocyte-LDH ratio, AST – Aspartate transferase, ALT – Alanine transferase, BNP – Brain natriuretic peptide, NLR – Neutrophil-lymphocyte ratio, PLR – Platelet-lymphocyte ratio)

Results

	All Patients (n=39)	Survival (n=20)	Expired (n=19)	p-value
Clinical Characteristic and Demographics				
Age	63.92 ±13.3	62.95 ± 13.8	64.95 ± 13.1	0.6459
Gender				
Male	25 (64%)	12 (60%)	13 (68%)	0.5953
Female	14 (36%)	8 (40%)	6 (32%)	
Ethnicity				
Hispanic	11 (28%)	3 (15%)	8 (42%)	
African American	22 (56%)	12 (60%)	10 (53%)	0.0221
Caucasian	5 (13%)	4 (20%)	1 (5%)	
Others	1 (3%)	1 (5%)	0 (0%)	
BMI				
<30 kg/m2	19 (49%)	9 (45%)	10 (53%)	0.1039
≥30 kg/m2	20 (51%)	11 (55%)	9 (47%)	
Comorbidities				
HTN	36 (92%)	19 (95%)	17 (89%)	0.5300
DM	25 (64%)	13 (65%)	12 (63%)	0.9077
CAD/CHF	21 (54%)	10 (50%)	11 (24%)	0.4423
COPD	4 (10%)	4 (20%)	0 (6%)	0.0005
Need of Mechanical Ventilation	11 (28%)	1 (5%)	10 (53%)	<0.0001

Table 2: Demographic Analysis of all ESRD patients with COVID-19.

(HTN – Hypertension, DM – Diabetes mellitus, CAD – Coronary artery disease, CHF – Congestive heart failure, COPD – Chronic obstructive pulmonary disease)

Discussion and Conclusion

- COVID-19 patients with ESRD on HD are at a very high risk for mortality from SARS-CoV-2 infection
- A low AST/ALT ratio is independently associated with decreased mortality
- Mechanical ventilation had an increased mortality
- Larger prospective studies in this population may help us understand better of those prognostic markers and suggest how to intervene in order to decrease this catastrophic rate of mortality.