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Research Article

Epidemiological Characteristics of COVID-19 Patients Admitted to Intensive Care Unit with and without Cardiac Disease: Report from Somalia

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Abstract

Introduction: Coronavirus Disease-2019 (COVID-19) had discovered in Wuhan, and Mar 11, 2020, World Health Organization (WHO) declared it an outbreak pandemic. This study aims to investigate the clinical characteristics, morbidities, management, and outcomes of COVID-19 Infected patients admitted to the intensive care unit (ICU) with or without cardiac disease in Somalia.
Method: We conducted a retrospective observational study of laboratory 48 confirmed patients with severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) admitted to an ICU from April23 to Jun 28, 2020.

Results: 48 patients of COVID-19 infected patients with and without cardiac disease, the mean age was 62.15±13.9 years, ranging from 19 to 80 years. 64.6% were male, while diabetic-(58.3%) and hypertension-(31.2%) were the most common comorbidities. The most clinical presentations were dyspnea-(79.2%) and fever-(63.3%). Among diseased cardiac patients, 46.7%administered invasive mechanical ventilation was, while 29.2% received noninvasive ventilation, higher than those without cardiac disease. In addition, of 30 patients with cardiac disease, 20-(66.7%) have COVID-19 complications, while 10-(55%) of 18 patients with no cardiac disease have COVID-19 complications. According to the outcome, 18-(60%) out of 30 COVID-19-infected patients with cardiac disease patients in the ICU died compared to those with non-cardiac disease, about 11-(61.1%) patients.

Conclusion: This study identified that the patients suffering from cardiac diseases were more severe than those without cardiac conditions, according to the need for invasive ventilation, complications, and outcome.

Keywords: *Covid-19; Intensive Care Unit; Pneumonia; Diabetic; Cardiac Disease*

Introduction

Coronavirus Disease-2019 (COVID-19) was discovered in Wuhan, China, in December 2019 and described as acute viral pneumonia recently found in humans (1). On 11 March 2020, due to the increasing number of COVID-19 cases outside of China, the World Health Organization (WHO) declared an outbreak pandemic(2). On admission, 20–51% of patients had reported having at least one comorbidity, with diabetes (10–20%), hypertension (10–15%), and other vascular diseases (including the cardiac and brain) (7–40%) being most common (1,3). Systemic inflammation, coagulation activation, endothelial dysfunction, Renal failure, myocardial injury, and multiorgan failure were the most severe complications of severe COVID-19 (2,4,5,6). Previous studies suggest that 5–20% of patients with *SARS-CoV-2* develop a critical illness characterized primarily by acute respiratory distress syndrome (7,8). In China, among the COVID-19 infected, 5-32% required ICU care (1,9). More than 3 million people worldwide have become infected with Severe acute respiratory syndrome coronavirus 2 (*SARS-CoV-2*), resulting in more than 215 000 deaths, with geographical mortality rates ranging from less than 1% to 12% (10). Primary studies from China, Italy, and the United state-reported overall mortality ranging from 23% to 62% in critically ill patients with COVID-19 (8,11,12,13). By 17 April 2020, 116 confirmed cases were reported in Somalia, with 2 (1.7%) recovered cases and 5 (4.3%) deaths. Until now, the reported cases were mainly among adults, with no pediatric patients (14).

In this study, we investigated the clinical characteristics, morbidities, management, and outcomes of COVID-19 Infected patients admitted to the intensive care unit (ICU) with and without cardiac disease in Somalia.

Method

We conducted a retrospective observational study of laboratory 48 confirmed patients with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) admitted to an ICU with or without cardiac disease in the De Martino Public Hospital from April23, to May 28, 2020, with outcomes observed until Jun 28, 2020. The study had conducted in a tertiary hospital

that has 20 ICU beds. From the anticipation of the COVID-19 pandemic in Somalia, this is the only hospital nominated as a COVID-19 center in Somalia, and critically ill patients with SARS-CoV-2 in their catchment areas have transferred to this hospital. Two or more healthcare workers reviewed all the medical records of confirmed COVID-19 cases. The socio-demographic characteristics, comorbidities, history of cardiovascular disease (heart failure, myocardial infarction, Percutaneous coronary intervention (PCI), coronary artery bypass grafting (CABG), cardiomyopathy, valvular heart disease, and congenital heart disease), history of exposure, clinical manifestations (symptoms and signs), laboratory and radiological findings, treatment guidelines, and outcomes collected from medical records.

Any cardiovascular disease (CVD) patients were considered in the cardiac patient group. In contrast, those with no history of CVD were considered the non-cardiac patients' group. Different researchers performed double-checked the data to avoid errors. The diagnostic criteria for acute respiratory distress syndrome (ARDS), acute cardiac damage, acute renal impairment, and acute liver injury had based on the corresponding guidelines (15, 16). The criteria for discharge were based on the clinical guidelines for the diagnosis and treatment of novel coronavirus infection by the Chinese National Health Commission (Trial Version 5). They were grouped into severe and non-severe COVID-19 (17), according to the protocol of WHO guidance (18). All patients were confirmed by a throat swab sample obtained from the upper respiratory tract and defined as a positive result of real-time reverse transcriptase-polymerase chain reaction (RT-PCR) assay following the Centers for Disease Control and Prevention (CDC) guidelines. The study has been reviewed and approved by the Medical Ethical Committees of Mogadishu Somalia Turkey Training and Research Hospital. In agreement with the declaration of Helsinki with or without cardiac disease, the institutional review board (IRB) allowed the patient consent waiver to review their medical records in this retrospective study where the participants could not contact. There was no confidential risk to the participants, and all personality descriptions were excluded from the datasheet (anonymization).

All continuous variables were determined, the normality of distribution was determined by performing the Kolmogorov-Smirnov test, the normally distributed variables were described as the means ± standard deviation, and the skewed distributed variables were expressed as the median. We compared the normally distributed continuous variables and skewed distributed variables. We did not perform a formal sample size calculation for the study because the primary objective was to investigate the initial clinical characteristics, comorbidities, management, and outcomes of COVID-19 Infected patients admitted to the intensive care unit (ICU) with and without cardiac disease. All statistical analyses were performed using IBM SPSS version 23.0.

Results

Between April 23, to June 28, 2020, 443 patients were admitted to Di Martino Public Hospital with confirmed COVID-19 pneumonia, of whom 53 were admitted to the ICU. Still, five patients who had cardiac arrest immediately after admission died and were excluded because of incomplete data. Overall, 48 COVID-19-infected patients were admitted to ICU with or without cardiac disease.

Table 1 shows that the mean age of COVID-19 patients admitted to the ICU was 62.15±13.9 years, ranging from 19 to 80 years among 48 patients. 31 (64.6%) of the patients were males, and 17 (35.4) were females. 31% of the patients had a history of exposure to a positive patient. Most COVID-19 patients (91.7%) admitted to the ICU with or without the cardiac disease had at least one comorbidity. Diabetic (58.3%) and hypertension (31.2%)were the most common comorbidities, followed by Chronic kidney disease and Chronic obstructive pulmonary disease (COPD).

Table 1: Baseline characteristics of COVID-19 Infected patients admitted to ICU.

Variable		Total N=48 (%)	With cardiac diseaseN=30 (%)	Without cardiac disease, N=18(%)
Age (mean, ±SD, years)		62.15±13.9	65.2±13.3	59.1±14.5
Gender	Male	31 (64.6%)	19 (63.3%)	12 (66.7%)
	Female	17 (35.4%)	11 (36.7%)	6 (33.3%)
History of Exposure	Unknown exposure	27 (56%)	17 (56.7 %)	10 (55.6%)
	Exposure to positive patients	15 (31%)	10 (33.3%)	5 (27.8%)
	No Exposure	6 (13%)	3 (10%)	3 (16.7%)
Comorbidity	Diabetes mellitus	28 (58.3%)	14 (46.7%)	14 (77.8%)
	Hypertention	15 (31.2%)	9 (30%)	6 (33.3%)
	Chronic kidney failure	10 (20.8%)	6 (20%)	4 (22.2%)
	Chronic obstructive pulmonary disease	8 (16.7%)	5 (16.7%)	3 (16.7%)
	Hemorrhagic or ischemic stroke	6 (12.5%)	4 (13.3%)	2 (11.1%)
	Chronic Liver Disease	6 (12.5%)	4 (13.3%)	2 (11%)
	Malignancy	2 (4.17%)	2 (6.7%)	0 (0%)
	No comorbit	4 (8.3%)	2 (6.7%)	2 (11.1%)

The most clinical presentations were dyspnea (79.2%), Fever (66.7%), Cough (50%), Fatigue and myalgia (45.8%), and Altered level of conscious (35.4%) (Table 2).

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Table 2: Initial clinical manifestations of COVID-19 Infected patients admitted to ICU

Variable	Total N=48 (%)	With cardiac diseaseN=30 (%)	Without cardiac disease, N=18(%)
Dyspnea	38 (79.2%)	24 (80%)	14 (77.8%)
Fever	32 (66.7%)	19 (63.3%)	13 (72.2%)
Cough	24 (50%)	13 (43.3%)	11 (61.1%)
Fatigue and myalgia	22 (45.8%)	12 (40%)	10 (55.5%)
Altered level of conscious	17 (35.4%)	8 (26.6%)	9 (50%)
Loss of Taste	14 (29.2%)	7 (23.3%)	7 (38.9)
Loss of smell	13 (27.1%)	6 (20%)	7 (38.9)
GIT Symtoms	11 (23%)	5 (16.6%)	6 (33.3)
Headache	9 (18.8%)	4 (13.3%)	5 (27.8)
Others	8 (16.7%)	3 (10%)	5 (27.8)

Among 48 patients admitted to the ICU, about 23 (47.9%) patients had required endotracheal intubation and mechanical ventilation, while 14 (29.2%) patients needed noninvasive ventilation, and 11 (22.9%) patients treated with high-flow oxygen therapy >15 L/min (Table 3). More than two-thirds of patients admitted to the ICU who required endotracheal intubation and mechanical ventilation were those older than 65 and had at least one comorbid disease.

Corticosteroids were administered to most patients (83.3%). In comparison, 72.9% of the patients received inhaled bronchodilators, more than half of the patients (66.6%) received antibiotics, and 56.3% received enoxaparin. 50% of the patients had been administered vasopressors, 45.8% administered oseltamivir, and 16.7% received renal replacement therapy.

Common complications among the total 48 subjects included ARDS (14%), thrombo-embolism (12.5%), Arrhythmia (12.5%), shock (10.4%), and acute kidney injury (AKI) (8.3%).

For the primary outcome, nearly two-thirds (60.4) of patients died in the intensive care unit, while 20.8% were still in the ICU and required further management. After successful management, 14.5% of the patients were transferred to the non-ICU inpatient. Fortunately, only 2 (4.1%) lucky patients were discharged to the home on foot.

Compared with non-cardiac diseased patients with COVID-19 those admitted to the ICU, cardiac diseased were older (64·6 [SD 11·2] vs. 51·9 [12·9]) and were more likely to have chronic medical illnesses (28 (93.3%) patients vs. 16 (88.9%) patients; table 1).

Among all the diseased cardiac patients, 23 patients (46.7%) received invasive mechanical ventilation, and 14 patients (29.2%) received noninvasive mechanical ventilation, which was significantly higher than those patients who did not have a cardiac disease (Table 3).

In addition, of 30 patients who have cardiac disease, 20 (66.7%) patients have COVID-19 complications. 5 (26.7%) of them developed ARDS, 5 (16.7%) developed thrombo-embolism, and 4 (13.3%) patients developed Arrhythmia. While 10 (55%) of 18 patients with no cardiac disease have developed COVID-19 complications (Table 3).

We also analyzed the outcome of 30cardiac disease patients in the ICU (Table 3). Of these patients, 29of them (60.4%) died, 10 (20.8%) were still in ICU, and 7 (14.5%)had symptomatic relief and were transferred to the non-ICU inpatient ward. In contrast, the remaining patients were discharged from the hospital. The non-cardiac patients had better outcomes than those with cardiac disease (Table 3).

Table 3: Management and Outcome of COVID-19 Infected patients admitted to ICU

Variable		Total N=48 (%)	With cariac disease N=30 (%)	Without cardiac disease, N=18(%)
Management				
Respiratory Support	Invasive Mechanical Ventilator	23 (47.9%)	14 (46.7%)	9 (50%)
	Noninvasive Mechanical Ventilator	14 (29.2%)	9 (30%)	5 (27.8%)
	Use of high-flow oxygen therapy >15 L/min	11 (22.9%)	7 (23.3%)	4 (22.2%)
Pharmacologic therapy	Steroids (Dexamethasone and Hydrocortisone)	40 (83.3%)	24 (80%)	16 (88.9%)
	Inhaled Bronchodilators	35 (72.9%)	20 (66.6%)	15 (83.3%)
	Antibiotics	32 (66.6%)	18(60%)	14 (77.8%)
	Enoxaparin 0.6	27 (56.3%)	15(50%)	12 (66.7%)
	Vasopressors	24 (50%)	14(46.6%)	10 (55.6%)
	Oseltamivir	22 (45.8%)	13 (43.3%)	9 (50%)
	Renal Replacement Therapy	8 (16.7%)	4 (13.3%)	4 (22.2%)
Complications				
ARDS		7 (14.6%)	4 (13.3%)	3 (16.7%)
Thrombo-Embolism		6 (12.5%)	4 (13.3%)	2 (11.1%)
Arrhythmia		6 (12.5%)	4 (13.3%)	2 (11.1%)
Shock		5 (10.4%)	3 (10%)	2 (11.1%)
Acute Renal Injury		4 (8.3%)	3 (10%)	1 (5.5%)
Outcome				
Dead		29 (60.4%)	18 (60%)	11 (61.1%)
Still in ICU		10 (20.8%)	6 (20%)	4 (22.2%)
Transfer out of IPD (non-ICU)		7 (14.5%)	4 (13.3%)	3 (16.7%)
Discharged from hospital		2 (4.1%)	2 (6.7%)	0 (0%)

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Discussion

This study represents the first and most comprehensive study of patients admitted to ICU with COVID-19-related critical illness reported to date in Somalia. COVID-19 is a pandemic disease that hit hard throughout the globe, yet no known treatment available at the time.

This study included a total of 48 COVID-19 infected patients admitted in the intensive care unit with or without cardiac disease in Di Martino Hospital that is the only hospital nominated as COVID-19 center in Somalia between 23 April 2020 to 28Jun 2020.

the mean age of COVID-19 patients admitted to the ICU was 62.15±13.9 years, ranging from 19 to 80 years among 48 patıents. A total of 31 (64.6%) of the patients were males and a 31% of the patients had a history of exposure to a positive patient. Most of the COVID-19 patients (91.7%) admitted to the ICU with or without cardiac disease had at least one comorbidity.

In the present study, the majority of patients admitted to the ICU because of acute hypoxemic respiratory failure that required respiratory support.

We identified that the patients suffered from cardiac disease were more severe than those having no cardiac disease according to the need of invasive ventilation, complications and outcome.

About 10.8% of the total patients admitted to the hospital due to COVID-19 were admitted to the ICU. 23 (47.9%) out of 48patients admitted to the ICU were required endotracheal intubation and 14 (29.2%) patients were managed invasive mechanical ventilation. Of these patients who underwent mechanical ventilation, 15 (25%) patients died, 4 (12.5%) patients remain in ICU, and 3 (10.4%) patients transferred to non-ICU inpatients. Noninvasive mechanical ventilation had initiated in 14 (22.9%) patients, while 11 (27.08%) patients had required high-flow oxygen therapy >15 L/min.

Similarly to the present study, the use of noninvasive ventilation reported as 19% in Washington State, US, 42% in Wuhan, and 62% in Wuhan, China (note, this value included patients receiving high-flow nasal cannula) (20,19,1).

In the present study, the number of patients required invasive mechanical ventilation higher than that recently reported for other ICU patients: 42% (Wuhan, China) and 47% (Wuhan, China) (8,19), while another study in Washington State had reported about 71% of patients admitted to ICU had required invasive mechanical ventilation that is much more than when compared to our study (20).

In our study, among half of the patients admitted to the intensive care unit died due to acute respiratory distress syndrome (ARDS) and other COVID-19 complications. This higher rate of death was related to delayed seek for the medical care of the patients due to some cultural issues, short coverage of proper and adequate intensive care units, and lack of experience with the use of mechanical ventilators and other invasive facilities in our country. Similar studies in Wuhan, Lombardy, and Seattle had shown a higher mortality rate between 50-80%for critically ill COVID-19 infected patients admitted to the ICU (8, 11, 12).

In contrast to preveouse studies (21,22), in our study the rate of thrombo-embolic events was higher in patients with cardiac disease whem compaired non-cardiac disease.

Complications and Mortality rate of cardiac patients were higher compared with those of non-cardiac patients admitted in ICU for COVID-19 pneumonia (37.5% vs. 23% for mortality and 58% vs. 29.2% for overall complications). Similar findings were reported from Italy, China and USA (22,23,24).

The main limitation of our study is the retrospective study that can lead to miss some other specific information regarding cardiovascular complications. Also relatively small size of our study group was another major limitation. Long-term observation and prospective study design on the effectiveness of treatments specific for the patients who have or have no cardiac disease are needed.

In conclusion, this study represents the first description of critically ill patients infected with SARS-CoV-2 admitted to ICU with or witout cardiac disease in Somalia. Complications and Mortality rate of cardiac patients were higher compared with those of non-cardiac patients admitted in ICU for COVID-19 pneumonia (37.5% vs. 23% for mortality and 58% vs. 29.2% for overall complications).The study identified that the patients suffered from cardiac disease were more severe than those having no cardiac disease according to the need of invasive ventilation, complications and outcome.

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