

Original Article

Clinical characters of COVID-19 patient in a Saudi intensive care unit: A single-center experience

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ABSTRACT

Objectives: Address and assess the clinical characteristics and outcomes of COVID-19 patients admitted to the intensive care unit (ICU) of King Saud Hospital Unaizah/Qassim, Saudi Arabia.

Material and Methods: A single-center observational retrospective study in King Saud Hospital, including 82 critically ill COVID-19 patients admitted to the ICU, confirmed by positive polymerase chain reaction testing of nasopharyngeal specimens.

Results: The study was conducted on 82 COVID-19 patients from April to October 2020. The mean patient age was 58.48 years. Males were more affected by the virus, accounting for 74% of admissions. Hypertension was our patients' most common chronic disease (45%). Most (82.9%) of the patients presented with a cough. Leukocytosis, high ferritin, lactate dehydrogenase (LDH), and D-Dimer were associated with an increased risk for mortality. Tocilizumab was associated with good outcomes among our patients.

Conclusion: In this retrospective study, hypertension and being male are more common factors for disease severity. Patients improved with early intervention with tocilizumab and antibiotics, and in most cases, non-invasive ventilation was associated with good outcomes.

Keywords: COVID-19, Clinical feature, Intensive case, Qassim region, Outcomes, Tocilizumab

INTRODUCTION

The coronavirus disease 2019 (COVID-19) outbreak caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) initially started in Wuhan, China, and was quickly distributed worldwide, becoming a pandemic. The first registered case in Saudi Arabia was on March 2, 2020; a citizen came from Iran through Bahrain.^[1,2] Many studies have characterized COVID-19, which differs according to demographic features, comorbidities, and hospital admission time.

The clinical features presented in patients with COVID-19 infection worldwide include fever, cough, pneumonia, organ dysfunction, and acute respiratory distress (ARDS).^[3]

The Ministry of Health in Saudi Arabia established many protocols to improve the outcomes for COVID-19 patients.^[2] The studies done in 2020 show that patients' symptoms range from flu-like symptoms to respiratory failure and the need for ICU admission.^[1,4-6] In this study, we provide the clinical

characteristics of patients in ICU in the first wave of SARS-CoV-2 infection and laboratory parameters in the ICU setting and treatment outcomes according to the Ministry of Health Protocol.

MATERIAL AND METHODS

This single-center observational retrospective study was conducted at King Saud Hospital Unaizah, Qassim, Saudi Arabia, and included 82 critically ill patients admitted to the ICU from April to October 2020 (first wave) who came to the emergency department with symptomatic pneumonia and confirmed presence of coronavirus by positive PCR.

Patients

King Saud Hospital is the leading secondary hospital in Unaizah, Qassim region, with a capacity of 295 beds and 16 ICU beds, which can be extended to 30 beds.

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Data collection and definitions

From April to October 2020, demographic data, comorbidities of hypertension, diabetes, smoking, malignancy, chronic renal disease, clinical presentation, laboratory (complete blood count (CBC), C-reactive protein (CRP), ferritin, erythrocyte sedimentation rate (ESR)) treatment, and outcomes were collected in an electronic form by trained data collectors and analyzed.

Labs data were recorded on the first day of admission, and treatment included the need for vasopressin, mechanical ventilation, use of hydroxychloroquine (HCQ), tocilizumab, use of antiviral medications (such as lopinavir), antibiotics, length of hospital stay, and outcome.

We included all the files that met our inclusion criteria: 18 years old or older, positive sample confirmed by PCR, admitted to the ICU with respiratory distress or present with shock or acidosis, and admitted to the ICU.

The data were collected in a Google Form and then recorded in an Excel sheet, and each patient was assigned a number (without using names or admission numbers).

Patient privacy was secured by replacing the identifying number for each patient in the study. No statistical sample size was calculated. Institutional review board approval was obtained from the King Saud Hospital, Qassim, Saudi Arabia (Approval No: 1442-1702040).

Statistical analysis

Frequent and frequency tables summarized descriptive statistics for the demographics and patient clinical and physical features. Continuous variables (age) were summarized using mean, minimum, standard deviation, and maximum values. A chi-square test was used to test the association between discharge and other categorical variables. On the other hand, a student t-test was used to test for the significant difference in the age between the discharged and those not discharged. All the analyses were performed in the Statistical Package for the Social Sciences (SPSS) version 23, and a p-value of 5% was considered significant.

RESULTS

The study included 82 COVID-19 patients. On average, the mean age of the patients was 58 years (range 18–91). On admission to the ICU, 63 had a heart rate above 100, and 19 were below 100. Seventy-seven had blood pressure above 90/60, and five had below 90/60. Thirty-eight patients had temperatures below 38°C, while 17 were above 38°C. Fifty-three patients had a respiratory rate below 20, while 29 were above 20. The patient's WBC was normal for 49, leukocytosis for 28, and leukopenia for five. Platelets were

normal for 73 patients, seven had thrombopenia, and two had thrombocytosis. Fifty-two patients had ferritin levels above 400, while 15 were normal, with no data for 15 patients. The patient's D-Dimer value was above 0.2 for 67; 14 had missing data, and one had a normal value. The lactate dehydrogenase (LDH) value was above 225 in 78 patients and normal in three; one patient had missing data.

The following treatments were given: mechanical ventilation (30 patients), oxygen without intubation (34 patients), antiviral medication (three patients), vasopressor (four patients) who received tocilizumab (six patients), and steroids (nine patients).

Forty-one patients were discharged, while the remaining 41 were not. Of 82 patients, 61 were male, and 21 were female. Among the historical medications, diseases were hypertension in 37 patients, 25 were disease-free, 15 were diabetic, three had ischemic heart disease, and one had hypothyroid and pulmonary TB. Among the symptoms were cough ($n = 68$), Fever ($n = 6$), dyspnea ($n = 5$), fatigue ($n = 2$), and nausea and vomiting ($n = 1$) [Figure 1 and Table 1].

We detected a significant difference in age between the discharge group ($P = 0.017$). The average age was higher in the not discharged group (63 years) than in the discharged group (53.95 years). Most from the discharged group had normal WBC values ($P = 0.012$). Further, most of the individuals with D-Dimer values above 0.2 ($n = 37$) were not discharged; however, a significantly high number of those at the same level was discharged ($n = 30$) ($P = 0.043$). Among those not discharged, 39 were treated with mechanical ventilation; on the other hand, among those discharged, 32 were treated with oxygen without intubation ($P = 0.00$). Further, as shown in Table 2, most ($n = 38$) had coughing as the symptom. Similarly, the most frequent symptom was coughing among those not discharged ($n = 30$) ($P = 0.063$).

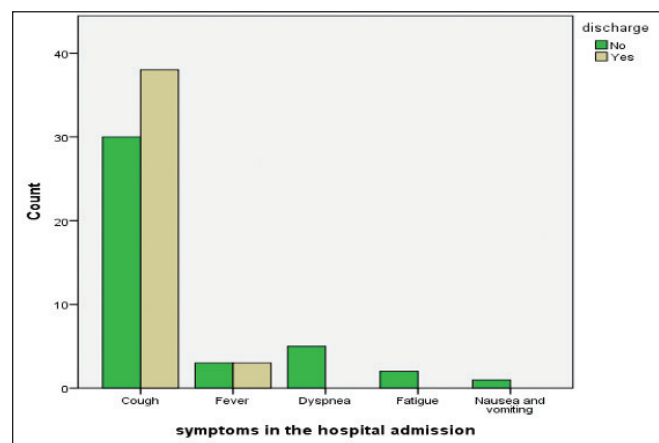


Figure 1: This distribution of the symptoms among the discharged and those not discharged.

Table 1: Demographic and clinical features of COVID-19 patients.

Characteristics	Count	Percentage
Vital signs at ICU Heart rate	82	100
Below 100	63	76.8
Above 100	19	23.2
Vital signs at ICU Blood pressure	82	100
Above 90/60	77	93.9
Below 90/60	5	6.1
Vital signs at ICU temperature	82	100
Below 38	65	79.3
Above 38	17	20.7
Vital signs at ICU respiratory rate	82	100
Above 20	53	64.6
Below 20	29	35.4
WBC (4.5–11 + 10⁹)	82	100
Normal	49	59.8
Leukocytosis	28	34.1
Leukopenia	5	6.1
Platelets	82	100
Normal	73	89
Thrombocytopenia	7	8.5
Thrombocytosis	2	2.4
Ferritin	82	100
Above 400	52	64.4
Normal	15	18.3
Missing values	15	18.3
D-Dimer	82	100
Above 0.2	67	81.7
Missing values	14	17.1
Normal	1	1.2
LDH	82	100
Above 225	78	95.1
Normal	3	3.7
Missing values	1	1.2
Treatment received	82	100
Mechanical ventilation	45	54.9
Oxygen without intubation	34	41.5
Antiviral medication	3	3.7
Discharge	82	100
No	41	50
Yes	41	50
Gender	82	100
Male	61	74.4
Female	21	25.6
History of medical diseases	82	100
Hypertension	37	45.1
Medical free	25	30.5
Diabetes	14	17.1
Ischemic heart disease	3	3.7
Chronic Kidney disease	1	1.2
Hypothyroidism	1	1.2
Pulmonary TB	1	1.2
Symptoms in the hospital admission	82	100
Cough	68	82.9
Fever	6	7.3
Dyspnea	5	6.1
Fatigue	2	2.4
Nausea and Vomiting	1	1.2

Table 2: Cross-tabulation of the patient features per the discharge groups.

Characteristics	Discharge	Not discharged	p-value
Age	<i>m</i> = 53.951 (SD = 18.18)	<i>m</i> = 63.00, SD = 15.36	0.017
Vital signs at ICU: Heart rate			0.191
Below 100	29 (35.4%)	34 (41.5%)	
Above 100	12 (14.6%)	7 (8.5%)	
Vital signs at ICU: Blood pressure			0.021
Above 90/60	41 (50.0%)	36 (43.9%)	
Below 90/60	0 (0%)	5 (6.1%)	
Vital signs at ICU: Temperature			0.785
Below 38	33 (40.2%)	32 (39%)	
Above 38	8 (9.8%)	9 (11.0%)	
Vital signs at ICU: respiratory rate			0.488
Above 20	28 (34.1%)	25 (30.5%)	
Below 20	29 (35.4%)	16 (19.5%)	
WBC (4.5–11 + 10⁹)			0.012
Normal	31 (37.8%)	18 (22.0%)	
leukocytosis	9 (11.0%)	19 (23.2%)	
Leucopenia	1 (1.2%)	4 (4.9%)	
Platelets			0.34
Normal	36 (43.9%)	37 (45.1%)	
Thrombocytopenia	3 (3.7%)	4 (4.9%)	
Thrombocytosis	2 (2.4%)	0 (0%)	
Ferritin			0.689
Above 400	27 (32.9%)	25 (30.5%)	
Normal	6 (7.3%)	9 (11%)	
Missing values	8 (9.8%)	7 (8.5%)	
D-Dimer			0.043
Above 0.2	30 (36.6%)	37 (45.1%)	
Missing values	11 (13.4%)	3 (3.7%)	
Normal	0 (0%)	1 (1.2%)	
LDH			0.5
Above 225	38 (46.3%)	40 (48.8%)	
Normal	2 (2.4%)	1 (1.2%)	
Missing values	1 (1.2%)	0 (0%)	
Treatment received			0
Mechanical ventilation	6 (7.6%)	39 (47.6%)	
Oxygen without intubation	32 (39%)	2 (2.4%)	
Antiviral medication	3 (3.7%)	0 (0%)	
Gender			0.448
Male	32 (39%)	29 (35.4%)	
Female	9 (11%)	12 (14.6%)	
History of medical diseases			0.092
Hypertension	15 (18.3%)	22 (26.8%)	
Medical free	15 (18.3%)	10 (12.2%)	
Diabetes	10 (12.2%)	4 (4.9%)	
Ischemic heart disease	0 (0%)	1 (1.2%)	
Chronic Kidney disease	0 (0%)	3 (3.7%)	
Hypothyroidism	1 (1.2%)	0 (0%)	
Pulmonary TB	0 (0%)	1 (1.2%)	

(Continued)

Table 2: (Continued)

Characteristics	Discharge	Not discharged	p-value
Symptoms in the hospital admission			0.063
Cough	38 (46.3%)	30 (36.6%)	
Fever	3 (3.7%)	3 (3.7%)	
Dyspnea	0 (0.0%)	5 (6.1%)	
Fatigue	0 (0.0%)	1 (1.2%)	
Nausea and Vomiting	0 (0.0%)	2 (2.4%)	

Among the 41 discharged patients, 32 were male, and nine were female; on the other hand, among the 41 who were not discharged, 29 were male, and 12 were female ($P = 0.448$).

DISCUSSION

We report the clinical characteristics and demographic data for patients who confirmed the diagnosis of COVID-19 and were admitted to the ICU of King Saud Hospital.

The patient's average age was 58, and 74% were males. Hypertension was comorbidity in 45% and diabetes in 17%, and cough was the most common symptom (82.9%)

Most (59.8%) presented with normal WBC upon admission to ICU, and 8.5% presented with thrombocytopenia. Ferritin was high at 64.4%, D-Dimer value at 81%, and LDH at 95%.

Initially, the treatment provided for respiratory failure related to COVID-19 pneumonia was early intubation: 54% were intubated, and 39% were on non-invasive oxygen therapy, which showed good outcomes, and the patients were discharged from the ICU.

We observed that the average age of patients who survived and were discharged from ICU was around 53 years, and a high D-Dimer value upon admission to ICU was associated with mortality.^[7]

In our study, most patients were male, and the average age was 58. A retrospective study in a Saudi hospital in 2020 reported a mean age of 36 years for COVID-19 patients, who were mostly male.^[1,5] In a study conducted at AlNoor Hospital in the western region, the median age for admitted COVID-19 patients was 46 years,^[5] which is similar to the finding of a study done in Kuwait (mean age 47 years old, primarily males).^[6]

In our study, the most prevalent symptoms of COVID-19 were respiratory symptoms such as cough and fever. Our study found that in most patients admitted to the ICU, the first presentation was cough and fever in 82.9% and 7.3%, respectively. Shortness of breath was reported for 6.1% of the patients, and fever and cough were very common symptoms.^[1,7,8]

Hypertension and diabetes are considered the most common pre-existing diseases in patients with critical COVID-19 pneumonia, mentioned in multiple studies in Saudi Arabia.^[2,6,8,9]

Also, we found that patients admitted to the ICU had a normal level of WBC initially; otherwise, the patients who died during the admission had leukocytosis. On the other hand, leukopenia was not significant in our patients.

Ferritin, D-Dimer, and LDH are considered acute phase inflammatory markers. We noticed that the level was high on admission to ICU, which correlates with an increased risk for mortality^[10] with a clinical difference. This is obvious in severe cases, as another study in the eastern region of Saudi Arabia found no difference as the sample was mild and asymptomatic.^[2] A study in Kuwait reported an association between a high level of D-Dimer and mortality.^[5,7]

One study reported that a high D-Dimer value in intubated patients is associated with an increased risk of pulmonary embolism.^[6,11]

Treatment strategies from the Ministry of Health in Saudi Arabia initially recommended hydroxychloroquine, which was stopped because there was no substantial evidence of its effectiveness. Tocilizumab was effective for our patients but should be used early.^[12] In our study, the patients experiencing a cytokine storm had high LDH, ferritin, and D-Dimer values, similar to a single-center study in the Philippines.^[12]

Most (54%) patients admitted with pneumonia related to COVID-19 with respiratory failure received endotracheal intubation among the first interventions. Recommendations were later changed to non-invasive intubation, which improved the outcome.^[3,13]

Mortality increased with a median age > 63 years and in men with pre-existing comorbidities, consistent with the literature.^[4,7]

Our study addresses an early period of the COVID-19 pandemic. We plan to study the same items among patients admitted later in the pandemic when additional strains were circulating and vaccinations were available.

Some patient history items, including the intubation period and lab values were missing. Some patients spent more than 2 weeks in the hospital, and another patient was transferred to another ICU.

CRP was unavailable for all patients, so we removed it from the data. The guidelines from the Ministry of Health were changed in April, so the group admitted early received a different treatment protocol than those admitted after the guideline update.

We lack knowledge regarding mild COVID-19 and the factors that increase the severity of diseases, especially in otherwise healthy patients.

LIMITATION

The symptoms vary, so in the future, the virus serotype will be included as the effect of the vaccine in reducing the severity of symptoms and complications.

CONCLUSION

In our study, hypertension and male gender were common factors for increasing the severity of the disease and respiratory symptoms; the labs and other investigations indicate which patients need ICU management, and non-invasive ventilation shows good clinical outcomes for patients included in the study.

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Ethical approval

The ethical approval was obtained from the institutional review board of King Saud Hospital, Saudi Arabia [Approval number: 1442-1702040].

Declaration of patients consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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