Original Article

Characteristics of Hospitalized COVID-19 Patients in a Major Referral Center in Shiraz, Iran

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Abstract

Background: Several countries, including Iran, have been affected by the novel Coronavirus Disease 2019 (COVID-19) pandemic since December 2019. The aim of this study was to provide a comprehensive report on COVID-19 patients in Shiraz, Southern Iran.

Materials and Methods: This study was performed on 311 hospitalized patients with COVID-19. The data on demographic, clinical, and paraclinical features were analyzed.

Results: The median age of the patients was 58 years, with 42.1% of the patients being above 60 years of age. Upon admission, fever was detected in 28.2% of critically ill patients. At least one underlying disease or risk factor was also present in 75.6% of the patients. Shortness of breath was the most common clinical symptom (66.2%), dry cough (53.7%), and muscle pain (40.5%) was the second and third. Sneezing (0.3%), rhinorrhea (0.7%), and sore throat (3.09%) were observed only in non-critically ill patients. In addition, 26.9% of all patients had lymphocytopenia, 25.8% had raised C-reactive protein, and 79.9% had abnormal creatinine levels. Finally, death occurred in 39 patients (12.5%).

Conclusions: Noncritically ill patients were younger than critically ill patients. The most common risk factors for getting critically ill were surgery, hypertension, diabetes mellitus, chronic heart disease, asthma, and chronic renal disease.

Keywords: Clinical characteristics, coronavirus, COVID-19, Iran, SARS-CoV-2

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Introduction

The COVID-19 pandemic has influenced more than 87 million people, causing 1.9 million deaths worldwide. On February 19, 2020, two deaths were reported in Qom, and Iranian officials announced that COVID-19 is spreading in the country. The virus was rapidly spread in Iran, and all 31 provinces were infected by March 5, 2020. A total of 1.26 million cases were confirmed by January 7, with 55,830 deaths and 1.04 million recoveries. Since the beginning of the COVID-19 pandemic, three peaks were experienced. The third peak was the most pronounced and more than 14,000 new cases were detected per day on November 27, 2020.[1-4]

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Multiple reports have described the symptoms and outcomes of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) patients, providing an overview of the experiences of Chinese city or regional hospitals,[1–3] Singapore,[3] New York City,[4,5] Italy,[6] Spain,[7] Germany,[8] the United kingdom,[9] and the United States.[10] The initial data from China showed that 80% of patients had moderate symptoms. Additionally, approximately 20% of patients were admitted to hospitals, 25% of those required to be treated in intensive care units (ICUs).[11–13] Overall, SARS-CoV-2 infection exerted variable impacts on different patient populations. Furthermore, even within the same country, COVID-19 hospitalizations

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and deaths varied across areas, which were attributed to the differences in population characteristics and access to healthcare system resources.[14,15]

This study was conducted to provide a comprehensive view of the patients' condition in terms of laboratory data and clinical characteristics.The purpose of this study was to state the baseline features and outcomes of an unselected, unbiased, and a large cohort of hospitalized COVID-19 patients who had completed their hospital stays in Ali-e-Asghar Hospital, as the main healthcare center for COVID-19 cases in Shiraz, Iran.

Materials and Methods

This observational study was conducted on the medical records of the patients with a confirmed SARS-CoV-2 infection admitted to Ali-e-Asghar Hospital affiliated to Shiraz University of Medical Sciences between March 27 and July 14, 2020. SARS-CoV-2 was confirmed using real time-polymerase chain reaction (RT-PCR) of nasopharyngeal specimens. This study was approved by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1399.2).

Statistical analysis

In the case of continuous variables, the mean + SD or median with interquartile range (IQR) was reported, while in the case of categorical variables, the absolute number and percentage were presented. Mann–Whitney test and Welch's *t*-test were used to analyze nonparametric and parametric variables, respectively. All analyses were done using the SPSS 20 software (SPSS incorporate, Chicago).

Results

The final cohort included 311 hospitalized patients [Table 1], in whom SARS-CoV-2 was detected by RT-PCR on nasopharyngeal swabs from March 27 until July 14, 2020. The median hospitalization time was 7 days (IQR: 6.00–9.00) for noncritically ill patients and 12.5 days (IQR: 10.00–19.5) for critically ill patients. Patients who were admitted to ICU were considered as critically ill. In addition, 12.5% of the patients died in the hospital, whose characteristics are shown in Tables 2 and 3.

The patients' characteristics, categorized by the illness situation, have been presented in Table 1. Briefly, males comprised 53.05% of the participants. Besides, the median age of the patients was 58 (37–67) years and 42.1% were above 60 years old [Figure 1]. The age distribution of critically ill and noncritically ill patients has been illustrated in Figure 1. Accordingly, patients with critical illnesses were older than those without critical illnesses (68 (IQR: 57–73) vs. 58 (IQR: 37–67), $P = 0.002$).

At least one underlying disease or risk factor was present in 75.6% of the patients. The presence of comorbidity was upper in critically ill patients, but the difference was not a

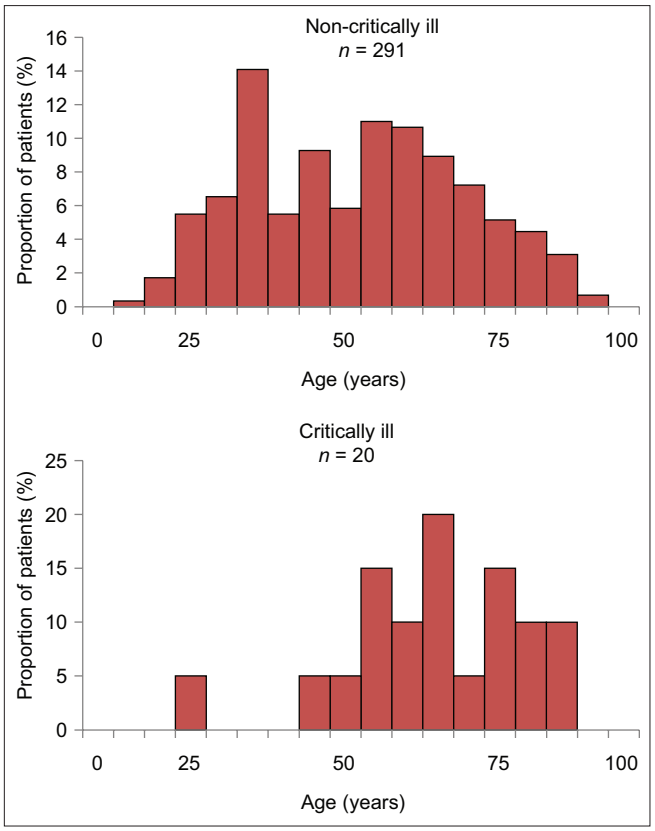

Figure 1: The age distribution of the patients with respect to critically ill and noncritically ill conditions

statistically significant result. The most common risk factors were surgery (31.5%), arterial hypertension (28.9%), diabetes mellitus (24.1%), chronic heart disease (19.3%), asthma (5.5%), and chronic renal disease (5.1%). Allergy was more frequent in critically ill patients (20%) than in the noncritically ill group (1.4%, $P = 0.001$). Only 2.2% of the patients had cancer who were critically ill and none was affected by HIV [Table 1]. In 28.6% of the critically ill patients, fever exceeded 37.8°C, which was significant compared to the noncritically ill group ($p = 0.013$). The most typical clinical symptom to be reported was breathlessness (66.2%), dry cough (53.7%), muscle pain (40.5%), chills (29.9%), lethargy (25.4%), headache (18.7%), and anorexia (13.2%) [Table 1]. Additionally, vomiting was evident in 10% of the patients who were not critically ill compared to 0% for not critically ill patients ($p = 0.004$). Furthermore, sneezing (0.3%), rhinorrhea (0.7%), and sore throat (3.09%) were observed only in noncritically ill patients.

A laboratory test conducted at the time of admission revealed the following: 26.9% of the patients had lymphocytopenia and 25.8% had elevated C-reactive protein. Moreover, the level of alkaline phosphatase was lower in the noncritically ill group in comparison with the critically ill patients ($p = 0.021$). The results also revealed a significant difference between the critically ill and noncritically ill patients regarding the median levels of white blood cells (WBCs) and platelets ($p = 0.002$

Table 1: Comparing hospitalized patients' demographics and paraclinical results between those who are seriously ill and those who are not

Variable	All patients	Noncritically ill	Critically ill	*P*
Number of patients	311	291	20	
Demographic information				
Sex (%)				
Male	165 (53.05)	154 (52.92)	11 (55)	0.999
Female	146 (46.94)	137 (47.08)	9 (45)	
Age, years				
Median (IQR)	58 (37-67)	58 (37-67)	68 (57-73)	
Distribution >60 *n* (%)	131 (42.1)	117 (40.2)	14 (70)	0.357
Duration of hospitalization				
Median (IQR)	7.0 (6.0-10.0)	7.0 (6.0-9.0)	12.5 (10.0-19.5)	0.001
PMH				
Flu vaccine	0	0	0	
Pulmonary disease	0	0	0	
History of drug use and smoking	14 (4.50)	12 (4.12)	2 (10.00)	0.225
Comorbidity *n* (%)				
At least on underlying disease	235	218 (74.91)	17 (85.00)	0.424
Surgery	98	88 (30.24)	10 (50.00)	0.082
Arterial hypertension	90	88 (30.24)	2 (10.00)	0.072
Diabetes	75	73 (25.08)	2 (10.00)	0.177
Cardiovascular disease	60	56 (19.24)	4 (20.00)	0.999
Chronic renal disease	16	15 (5.15)	1 (5.00)	0.999
Asthma	17	16 (5.50)	1 (5.00)	0.999
Chronic renal disease	16	15 (5.15)	1 (5.00)	0.999
Hypothyroidism	12	10 (3.44)	2 (10.00)	0.176
COPD	10	9 (3.09)	1 (5.00)	0.999
Allergy	8	4 (1.37)	4 (20.00)	0.001
Cancer	7	6 (2.06)	1 (5.00)	0.375
Medical allergy	6	6 (2.06)	0	0.999
Hyperthyroidism	4	4 (1.37)	0	0.999
Seasonal allergy	3	3 (1.03)	0	0.999
Chemotherapy	3	2 (0.69)	1 (5.00)	0.181
Pregnancy	2	1	1 (0.34)	0.999
Stroke	1	1 (0.34)	0	0.999
Organ transplantation	1	1 (0.34)	0	0.999
Immunosuppressive drugs	1	1 (0.34)	0	0.999
Tuberculosis	0	0	0	0.999
HIV	0	0	0	0.999
Immunodeficiency	0	0	0	0.999
Obesity	0	0	0	0.999
Clinical symptoms				
Fever no. total *n* (%)	7/253 (2.77)	5/246 (2.03)	2/7 (28.57)	0.013
Shortness of breath	206	193 (66.32)	13 (65.00)	0.999
Dry cough	167	154 (52.92)	13 (65.00)	0.358
Muscle pain	126	122 (41.92)	4 (20.00)	0.061
Chills	93	90 (30.93)	3 (15.00)	0.205
Lethargy	79	71 (24.40)	8 (40.00)	0.180
Headache	58	54 (18.56)	4 (20.00)	0.999
Anorexia	41	39 (13.40)	2 (10.00)	0.755
Nausea	34	30 (10.31)	4 (20.00)	0.253
Dizziness	24	23 (7.90)	1 (5.00)	0.723
Diarrhea	21	21 (7.22)	0	0.379
Wet cough	17	15 (5.15)	2 (10.00)	0.613
Loss of smell	14	13 (4.47)	1 (5.00)	0.999

Contd...

Table 1: Contd...

Variable	All patients	Noncritically ill	Critically ill	*P*
Decrease level of consciousness (%)	10	8 (2.94)	2 (16.67)	0.061
Sore throat	9	9 (3.09)	0	0.653
Loss of taste	6	5 (1.72)	1 (5.00)	0.331
Vomiting	2	0	2 (10.00)	0.004
Rhinorrhea	2	2 (0.69)	0	0.999
Sneezing	1	1 (0.34)	0	0.999
Laboratory findings				
WBC count				
Median (IQR)	5.90 (4.50-8.40)	5.70 (4.40-8.10)	8.1 (6.50-10.10)	0.002
Distribution no./total no. (%)				
<4 (%)	47/301 (15.61)	47/284 (16.55)	0/17 (0)	
4-10 (%)	211/301 (70.10)	198/284 (69.72)	13/17 (76.47)	
>10 (%)	43/301 (14.29)	39/284 (13.73)	4/17 (23.53)	
Lymphocyte				
Median (IQR)	22.0 (14.7-30.8)	22.2 (15.3-30.8)	18.9 (10.2-34.0)	0.483
Distribution no./total *n* (%)				
<15 (%)	75/278 (26.98)	68/261 (26.05)	7/17 (41.18)	0.148
Platelet				
Median (IQR)	197.0 (150.0-242.0)	194.0 (150.0-236.5)	237.0 (189.0-318.0)	0.019
Distribution no./total no. (%)				
<150 (%)	72/301 (23.92)	70/284 (24.65)	2/17 (11.76)	0.148
RBC				
Median (IQR)	4.83 (4.43-5.40)	4.86 (4.43-5.39)	4.74 (4.42-5.82)	0.684
Hemoglobin				
Median (IQR)	13.7 (12.2-14.9)	13.7 (12.2-15.0)	13.55 (12.7-14.4)	0.839
Neutrophil				
Median (IQR)	68.4 (59.4-77.0)	68.3 (59.6-76.8)	71.5 (50.0-80.0)	0.895
Distribution no./total no. (%)				
<18 (%)	1/291 (0.34)	1/274 (0.37)	0/17 (0)	
18-78 (%)	222/291 (76.29)	210/274 (76.64)	12/17 (70.59)	
>78 (%)	68/291 (23.37)	63/274 (22.99)	5/17 (29.41)	
C-reactive protein				
Median (IQR)	9.0 (5.0-14.0)	9.0 (6.0-14.0)	6.0 (2.5-34.5)	0.189
>6 mg/liter (%)	63/244 (25.82)	57/231 (24.67)	6/13 (46.15)	0.104
Alkaline phosphatase				
Median (IQR)	197.0 (160.0-245.0)	193.0 (157.0-243.5)	233.5 (191.5-311.5)	0.021
>140 U/liter (%)	38/267 (14.23)	38/253 (15.02)	0/14 (0)	0.231
Alanine transaminase				
Median (IQR)	23.0 (16.0-34.0)	24.0 (16.0-34.0)	17.5 (2.2-30.5)	0.107
>40 U/liter (%)	211/271 (77.86)	199/256 (77.73)	12/15 (80.00)	0.999
Aspartate transaminase				
Median (IQR)	24.0 (16.0-38.0)	24.0 (16.0-38.0)	17.0 (10.0-35.0)	0.082
>40 U/liter (%)	212/271 (78.23)	199/256 (77.73)	13/15 (86.67)	0.505
LDH				
Median (IQR)	474.5 (373.0-617.0)	469.5 (376.7-615.2)	545.0 (364.7-723.5)	0.553
>480 (%)	113/214 (52.8)	110/206 (53.4)	3/8 (37.5)	0.480
Prothrombin time				
Median (IQR)	15.0 (14.0-17.0)	15.0 (14.0-17.0)	16.0 (14.0-18.0)	0.118
>13 seconds (%)	7/276 (2.54)	7/262 (2.67)	0/14 (0)	0.999
Partial thromboplastin time				
Median (IQR)	36.0 (32.0-42.0)	36.0 (32.0-42.0)	35.0 (29.0-63.7)	0.773
>39 seconds (%)	170/276 (61.59)	161/262 (61.45)	9/14 (64.28)	0.999
Blood urea nitrogen				
Median (IQR)	14.0 (11.0-19.0)	14.0 (11.0-19.00)	14.0 (10.0-18.0)	0.55

Contd...

Table 1: Contd...

Variable	All patients	Noncritically ill	Critically ill	*P*
Creatinine				
Median (IQR)	1.10 (0.90-1.30)	1.10 (0.90-1.30)	1.10 (0.90-1.40)	0.968
>1.33 (%)	235/294 (79.93)	223/277 (80.50)	12/17 (70.59)	0.349
Total bilirubin				
Median (IQR)	0.66 (0.46-0.94)	0.66 (0.46-0.94)	0.62 (0.47-1.19)	0.789
Ca				
Median (IQR)	8.50 (8.10-8.90)	8.50 (8.10-8.80)	8.65 (8.22-9.35)	0.164
Mg				
Median (IQR)	2.10 (1.90-2.30)	2.10 (1.90-2.30)	2.15 (2.10-2.50)	0.083
Na				
Median (IQR)	140.0 (138.0-143.0)	140.0 (138.0-143.0)	141.0 (139.5-143.0)	0.244
K				
Median (IQR)	4.00 (3.80-4.42)	4.00 (3.80-4.40)	4.15 (3.92-4.57)	0.254
Outcome				
Death	39 (12.54)	34 (11.68)	5 (25.00)	0.276

Table 2: Characterization of blood parameters of dead patients

Blood parameters	Death
WBC	8.14±4.21
RBC	4.85±1.01
Hemoglobin	13.62±2.79
Neutrophil	75.57±15.07
Lymphocyte	17.47±13.01
Platelet	162.77±70.94
PT	16.02±2.15
PTT	40.22±12.86
BUN	27.21±18.05
Creatinine	1.66±1.23
Na	139.00±10.35
K	4.28±0.55
LDH	719.25±268.94
CRP	13.89±11.81
ALT	37.27±20.33
AST	35.85±23.94
ALP	207.08±109.15
Total bill	0.97±0.69
CA	8.20±0.65
Mg	2.15±0.35

and $P < 0.019$, respectively). Furthermore, abnormal creatinine levels were observed in 79.9% of the patients.

Discussion

This observational study was carried out on 311 COVID-19 patients, involved 272 survivors and 39 dead cases. In line with other studies,[16,17] the findings of the current research showed that increasing age was highly linked to severe conditions in patients with COVID-19. Similarly, Zhou *et al*.[18] disclosed that older age could negatively affect the prognosis (odds ratio = 1.10) in patients diagnosed with COVID-19. Older age was also found to be a significant, independent mortality indicator in Middle East respiratory syndrome (MERS) and SARS.[19,20] It has been suggested that age-dependent B-cell and T-cell deficiencies, additionally to the overproduction of type 2 cytokines, might be associated with deficiencies in viral replication control and sustained inflammatory reactions, resulting in poor outcomes.[21]

Generally, females are less vulnerable to viral diseases because of their innate immune responses, steroid hormones, and sex chromosomes. Despite the fact that one of the X chromosomes is not active, females are less susceptible to viral disease.[22] Previous studies[23,24] revealed a threefold higher mortality rate among males compared to females. In the present study, however, no significant differences were observed between the males and females in terms of the critical condition, which is in concordance to some studies[25] but in contrast to most.[26,27]

There was no association between current smoking status and adverse prognosis in COVID-19 patients included in a meta-analysis of 1,399 Chinese patients.[28] Consistently, smoking habits had no effects on the patients' illness conditions in the present study.

The current study findings indicated an increase in the levels of WBCs, neutrophils, and platelets as well as a decrease in the level of lymphocytes in critically ill patients. These findings were previously reported as a significant prognostic predictor of COVID-19. Elevated platelet count, as an inflammation indicator, might highlight the inflammatory processes in critically ill patients. Nevertheless, differences in neutrophils count might show sepsis or secondary infections in this population. COVID-19 patients with decreased lymphocyte levels have also shown to have a poor prognosis, according to other studies.[2,18]

In the present study, 12.5% of the patients died, which was higher compared to some reports (1, 2).[29,30] One of the most effective and durable healthcare systems in the Eastern Mediterranean region is found in Iran's health sector, which

Table 3: Characterization of dead patients

Variable	All patients
Number of death	39
Sex (%)	
Male	26 (66.7)
Female	13 (33.3)
Height	
Mean (SD)	171 (8.29)
Median (IQR)	170 (160-175)
Weight	
Mean (SD)	74.70 (8.97)
Median (IQR)	70 (65-80)
BMI	
Mean (SD)	25.46 (1.82)
Median (IQR)	25.71 (24.23-26.75)
Age, years	
Mean (SD)	66.20 (12.37)
Median (IQR)	62 (62-72)
PMH (%)	
Flu vaccine	0
Pulmonary disease	0
Drug, smoke, hist	4 (10.3)
Risk factors (*n*)	
Blood pressure	22
Diabetes	15
Cardiovascular disease	14
Fatty liver	0
Stroke	0
Chronic renal disease	6
Pregnancy	0
COPD	1
Tuberculosis	0
Hypothyroidism	2
Hyperthyroidism	2
Asthma	4
Allergy	0
Medical allergy	1
Seasonal allergy	0
Cancer	2
Chemotherapy	1
Chemo.last	0
HIV	0
Surgery	10
Immunodeficiency	0
Organ transplantation	0
Obesity	0
Immunosuppressive drugs	1
Clinical symptoms	
Nausea	5
Diarrhea	1
Vomiting	3
Lethargy	15
Shortness of breath	34
Headache	8
Dizziness	9
Muscle pain	19
Dry cough	22
Wet cough	1
Sneezing	1
Rhinorrhea	0
Sore throat	1
Anorexia	7
Lack of taste	0
Lack of smell	1
Chills	12

has been faced with many obstacles,[31,32] as a result of the COVID-19 pandemic coincide with the highest unilateral sanctions imposed by the United States against Iran.[33] Consequently, the epidemic burden as well as the number of deaths has increased.

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Conflicts of interest

There are no conflicts of interest.

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