Epidemiologic and clinical characteristics of 186 hospitalized patients with Covid-19 in Tehran, Iran: A retrospective, single-center case series

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Abstract

Background: The information on the difference in clinical characteristics between severe and non-severe cases is limited in some countries including Iran. The objective of this case series is to compare the clinical characteristics, radiologic features, and laboratory findings between COVID-19 severe cases who received the intensive care unit (ICU) care with non-severe cases who did not receive ICU care.

Methods: In this retrospective cohort study, 186 laboratory-confirmed patients with COVID-19 diagnosed from 1 March 2020 to 30 March 2020 were investigated.

Results: This study population included 186 hospitalized patients with confirmed COVID-19. The median age was 47 years, and 88 (47.31%) were female. Of these patients, 48 were admitted and transferred to ICU. Of 186 patients, 44.62% had medical comorbidities including hypertension and diabetes. The most common clinical manifestation were shortness of breath 86.56%, myalgia 74.19%, and headache. Higher neutrophil counts, CRP, and LDH as well as the lower levels of lymphocytes were the most important laboratory finding among COVID-19 patients. As of April 15, 2020, 33 were still hospitalized. A total of 116 patients (62.70 %) had been discharged, and 36 patients (19.94 %) had died. Of the 48 patients admitted to the ICU, 33.33% have died.

Conclusion: In the present study, shortness of breath was the most common clinical symptom, and the mortality rate in patients admitted to the ICU was about 33%, indicating that about one-third of patients with severe illness who admitted to the ICU section died.

Keywords: COVID-19; SARS-CoV-2, coronavirus; severe acute respiratory syndrome coronavirus

Introduction

In December 2019, the new COVID-19 coronavirus was recognized as a cause of respiratory illness. The first reports of pneumonia were from people who worked or lived in the Huanan seafood wholesale market in Wuhan, China raising concerns about a zoonotic viral infection[1, 2]. Phylogenetic analysis showed that the COVID-19 belongs to the beta-coronavirus[3]. Epidemiological studies have shown that the virus is spread relatively easily and can be transmitted by aerosol, droplets, and infected surfaces [4, 5]. The virus's high transmission ability caused the

virus to become pandemic in about four months. Between December 2019 and June 11, 2020, more than 7 million people were infected with COVID-19, and about 413,000 died from the disease.

The first studies by Huang on 41 patients and Chen on 99 patients showed Close contact and history of travel to endemic areas of the disease were observed in patients[6, 7]. The two studies reported that clinical symptoms in these patients included the following: fever, cough, and shortness of breath, fatigue, and radiologic evidence of pneumonia [8-10]. Organ dysfunction such as acute respiratory distress syndrome (ARDS) has been observed in dead patients[7, 11]. Studies have shown that in most people, the disease is asymptomatic or associated with mild symptoms, while in older cases, those with underlying disease, and the people with defective immune systems, the symptoms are more severe and are more likely to result in die[4, 10, 12]. However, the information on difference in clinical characteristics between severe and non-severe cases is limited in some countries including Iran. The objective of this case series is to describe the clinical characteristics with confirmed COVID-19 infection admitted to major hospitals in Tehran capital of Iran. Moreover clinical characteristics of severe cases who received the intensive care unit (ICU) care with non-severe cases who did not receive ICU care were also compared.

Method

Study design and participants

We performed a retrospective, multicenter study on the epidemiological history, clinical records, laboratory results, chest radiological features, and outcome of 186 laboratory-confirmed patients with COVID-19 that were diagnosed from 1 March 2020 to 30 March 2020. All the patients were hospitalized and were diagnosed with COVID-19 infection. The clinical manifestation, radiographic presentations, and disease outcomes were monitored up to April 15th, 2020, the final date of follow-up.

Data collection

The researchers analyzed the clinical data on epidemiology (history of travel or close contact with confirmed Covid-19 patients), signs and symptoms (fever and cough), underlying disease (hypertension and diabetes), laboratory finding, the radiological manifestation, and outcomes (discharged, death or in hospital). Data were retrospectively obtained from electronic medical

records. The real-time reverse transcriptase polymerase-chain-reaction (RT-PCR) test was performed using nasal and pharyngeal swab specimens. The immunological responses and organ function were evaluated by measuring white blood cells (WBC, Albumin, platelet, hemoglobin, C-reactive protein (CRP), alanine aminotransferase (ALT), Aspartate aminotransferase (AST), and lactate dehydrogenase (LDH). Additionally, computed tomography (CT) was used to diagnose lung involvement.

Statistical analysis

Demographic and clinical characteristics as categorical variables were presented as numbers and percentages, while continuous variables were presented as medians and interquartile ranges (IQR). Inter-group differences in the characteristics were tested by using Pearson's $\chi 2$ test or Fisher's exact test for categorical variables, and by using Ranksum test for continuous variables with non-parametric distribution. All analyses were conducted using Stata version 13.1.

Results

Demographic features

This study population included 186 hospitalized patients with confirmed covid-19. The median age was 47 years (range, 33-62), [88(47.31%)] and [98(52.63%)] of all patients were female and male respectively. Of these patients, [48(25.8%)] were admitted and transferred to ICU. Of these 186 patients, [40(21.51%)] was healthcare worker and [130(69.89%)] have travel history or contact with covid-19 patients. Of 186 patient's, [83(44.62%)] had one or more medial comorbidities including hypertension [54(29.03%)], respiratory disease [43(23.12%)], diabetes [34(18.28%)], malignancy [13(6.99%)], chronic liver disease [10(5.38%)], chronic kidney disease [2(1.08%)], and current smoker [9(4.84%)]. Hypertension, respiratory disease and diabetes were the most common coexisting comorbidities. The most common clinical manifestation were shortness of breath [161(86.56%)], myalgia [138(74.19%)], headache [73(39.25%)], cough [123(66.13%)], fatigue [116(62.37%)], chest pain [111(59.68%)], fever [95(51.08%)], bone pain [66 (35.48%)], nose capping [63(33.87%)], chill [61(32.8%)], runny nose [61(32.8%)], and the less common symptoms were confused [44(23.66%)], nausea and vomiting [35(18.82%)], sputum production [25(13.44%)], and diarrhea [17(9.14%)].

Compared with patients who required ICU care (n=48), patients who did not receive ICU care (n=138) were significantly older ((median age, 62.5 years [IQR44-75]) vs (median age, 42 years [IQR 30-52]); P<0.0001) and were more likely to have underlying comorbidities, including hypertension (24 [50%] vs 30 [21.74%]), respiratory disease (22 [45.83%] vs 21 [15.22%]), and diabetes (8 [16.67%] vs 26 [18.84%]).

Laboratory finding

Among 186 covid-19 patients, there were numerous differences in laboratory findings between patients admitted to the ICU and non-ICU patients (table 2) including higher neutrophil counts, increased other laboratory biomarkers like LDH, ALT, AST and CRP as well as lower level of lymphocytes.

Chest X ray

Also, From 186 enrolled patients, 180 (96.77%) showed chest abnormality, 170 (91.40%) had lung bilateral abnormality, 68 (36.56%) presented consolidation, 123 (66.13%) with ground-glass opacity and 10 (5.37%) showed lung unilateral abnormality of chest scans (table 3).

Outcome

As of April 15, 2020, 33 (17.84%) were still hospitalized. A total of 116 patients (62.70 %) had been discharged, and 36 patients (19.94 %) had died. Of the 48 patients admitted to the ICU, 6 (12.50%) were still in the ICU, 26 (54.17%) had been discharged, and 16 (33.33%) had died.

Discussion

As far as we know, this is the first case series study from Iran that compares clinical signs, laboratory findings, radiological results and outcome of disease between hospitalized patients in ICU and non-ICU sections. As of April 15, 2020, 186 patients have entered the study, of whom 48 have been admitted to the ICU. 116 people were discharged, 36 died and 33 were hospitalized. The median age of people admitted to the ICU was 62.5 years, and the median age of people admitted to the public section was 42 years. The average age of the deceased was 59 years, indicating that the disease was more dangerous in adults and was associated with higher mortality.

The most common clinical symptoms found in these patients were shortness of breath, myalgia, headache, cough, fatigue, chest pain, fever, bone pain, nose capping, chill, and runny nose

respectively. The less common symptoms were confused, nausea and vomiting, sputum production, and diarrhea respectively. Unlike chen studies in which the most common clinical signs were fever and cough, in our study, respiratory distress and myalgia were the most common clinical signs in patients[7]. In Dawei Wang and Chaolin Huang studies, fever was observed in 98% of patients, while in this study it was observed in 51%. Also, ARDS was 17% in chen study, which was 23.12% in our study [6, 7, 12].

Among the patients who required ICU care, those patients who did not receive ICU care were significantly older (median age, 62.5 years) than the non-ICU receiving patients. Also, the hypertension, ARDS and respiratory disease were higher among ICU admitted patients in comparison to non-ICU receiving patients.

Also, in terms of fever and shortness of breath, there was no significant difference between hospitalized patients in the general ward and hospitalized patients in the ICU section (P-value > 0.05). Cough, myalgia, and runny nose were higher among non-ICU patients in comparison to ICU admitted patients. While, fatigue, loss of sense of smell, and confused were higher among ICU admitted patients in comparison to non-ICU patients. As well as, mortality rate among ICU patients were higher in comparison to non-ICU patients.

Among laboratory finding, LDH, ALT, and AST and neutrophil count were higher among ICU admitted patients in comparison to non-ICU patients, while Lymphocyte count, albumin and platelets were higher among non-ICU patients compared to ICU admitted patients.

Consolidation was higher in patients admitted to the ICU than in patients admitted to the general ward. However, there was no significant difference between the two groups in terms of other radiological findings.

Symptoms such as diarrhea and runny nose were also much less common in these patients. In terms of clinical symptoms, especially shortness of breath, cough, fatigue, the results of this study were similar to previous studies[13]. While, fever in this study are less common than previous studies. In the Chen study, fever were seen in 81% of patients[7], while in the present study, about 51% of patients have fever symptom. The most important complications in hospitalized patients were hypertension and ARDS. In previous studies, Shock and ARDS had been reported as two common complications[12]. ARDS was observed in 45.83% of patients admitted to the ICU and in 100% of patients who died. Indicating that in addition to age, ARDS also contributed to the death[14,

15]. Also, increasing CRP, and decreasing lymphocytes were the most important laboratory findings. Unlike other viral infections, these patients show a decrease in lymphocytes. SARS and MERS also have shown a decrease in lymphocytes[4, 16]. Radiological findings also showed that about 96.77% of patients showed pulmonary involvement, which was bilateral involvement, and GGO was more common than unilateral involvement and consolidation. In Chaolin Huang study[6], lung involvement was 98%, and in the present study, 96.77% of patients showed pulmonary involvement in the CT scans. The study also found that about 69.89% of patients had a history of travel to endemic area or contact with an infected person. Indicating contact with infected people has been shown to play a vital role in the spread of infection[17].

In this study, the RT-PCR test was performed only on the swap throat samples and did not have access to the Broncho alveolar lavage (BAL) sample. In addition, a number of patients are still hospitalized, and the outcome of their illness could affect the outcome of the study, which are the major limitations of this study.

In the present study, shortness of breath was the most common clinical symptom, and the mortality rate in patients admitted to the ICU was about 33%, indicating that about one-third of patients with severe illness were admitted to the ICU section were died.

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Abbreviations:

Intensive care unit (ICU)

Acute respiratory distress syndrome (ARDS)

Real-time reverse transcriptase polymerase-chain-reaction (RT-PCR)

White blood cells (WBC)

C-reactive protein (CRP)

Alanine aminotransferase (ALT)

Aspartate aminotransferase (AST)

Lactate dehydrogenase (LDH)

Computed tomography (CT)

Interquartile ranges (IQR)

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Table 1: Demographics, Baseline Characteristics, Comorbid Conditions, and Clinical Outcomes of Patients with Confirmed COVID-19.

	Total (186)	ICU (48)	Non ICU (138)	p-value
Age, median (IQR)	47(33-62)	62.5(44-75)	42(30-52)	<0.0001
sex				
male	98 (52.63)	34 (70.8)	64 (46.38)	0.001
female	88 (47.31)	14 (29.17)	74 (53.62)	
Contact history				
Travel history/contact with patients	130 (69.89)	33 (68.75)	97 (70.29)	0.84
Healthcare worker	40 (21.51)	7 (14.58)	33 (23.91)	0.175
comorbidities				
hypertension	54 (29.03)	24 (50)	30 (21.74)	<0.0001
diabetes	34 (18.28)	8 (16.67)	26 (18.84)	0.737
malignancy	13 (6.99)	2 (4.17)	11 (7.97)	0.520
Respiratory disease	43 (23.12)	22 (45.83)	21 (15.22)	<0.001
Chronic kidney disease	2 (1.08)	2 (4.17)	0 (0)	0.066
Chronic liver disease	10 (5.38)	2 (4.17)	8 (5.80)	0.666
Current smoker	9 (4.84)	4 (8.33)	5 (3.62)	0.240
ARDS	43 (23.12)	22 (45.83)	21 (15.22)	<0.001
Sign and symptom				
Shortness of breath	161 (86.56)	40 (83.33)	121 (12.32)	0.447
fever	95 (51.08)	27 (56.25)	68 (19.28)	0.405
cough	123 (66.13)	25 (52.08)	98 (71.01)	0.017
fatigue	116 (62.37)	36 (75)	80 (57.97)	0.036
Chest pain	111 (59.68)	32 (66.67)	79 (57.25)	0.252
Bone pain	66 (35.48)	22 (45.83)	44 (31.88)	0.082
chill	61 (32.80)	13 (27.08)	48 (34.78)	0.328
Nose capping	63 (33.87)	11 (22.92)	52 (37.68)	0.063
Loss of sense of smell	44 (23.66)	23 (47.92)	21 (15.22)	<0.0001
myalgia	138 (74.19)	30 (62.5)	108 (78.26)	0.032
sputum production	25 (13.44)	7 (14.58)	18 (13.04)	0.80
diarrhea	17 (9.14)	7 (14.58)	10 (7.25)	0.149
Confused	44 (23.66)	18 (37.50)	26 (18.84)	0.009
Nausea and vomiting	35 (18.82)	10 (20.83)	25 (18.12)	0.678
headache	73 (39.25)	23 (47.92)	50 (36.23)	0.153
runny nose	61 (32.80)	10 (20.83)	51 (36.96)	0.040
outcome				
hospitalized	33 (17.84)	6 (12.50)	27 (19.71)	0.017
discharged	116 (62.70)	26 (54.17)	90 (56.69)	
death	36 (19.94)	16 (33.33)	20 (14.60)	

Intensive care unit (ICU), interquartile range (IQR),

Table 2: Laboratory finding of patients infected with Sars-Cov-2

	Normal range	Median IQR			p-value
		Total (186)	ICU (48)	Non ICU (138)	
White blood cell count × 10^9 L	3.5-9.5	8.7 (5.8-11.8)	9.55 (4.7-13.6)	8.7 (5.8-10.6)	0.216
Neutrophil count × 10^9 L	1.8-6.3	6.3 (4.2-9)	8.45 (5.01-12.1)	5.7 (4.2-7.56)	0.002
Neutrophil increased (n)		94	32	62	
Lymphocyte count × 10^9 L	1.1-3.2	1.49 (0.8-2.2)	0.95 (0.32-1.49)	1.7 (1-2.4)	0.0001
Lymphocyte decreased (n)		61	25	36	
Platelet × 10^9 L	125-350	189 (142-241)	152.5 (105-188)	196 (153- 248)	0.0001
LDH	125-243	323.5 (216-640)	688 (328.5-917)	256 (198-420)	<0.0001
CRP, mg/L	0-5	30 (22-64)	42 (33.5-64)	28 (17-39)	<0.0001
Hemoglobin g/dl	13.5-17.5	12.2 (10.7-13.3)	11.7 (10.5-12.8)	12.4 (10.8-13.8)	0.026
Albumin g/L	3.5-5	3.7 (3.5-3.9)	3.5 (3.1-3.9)	3.7 (3.5-3.9)	0.055
ALT	<40 U/L	25 (17-41)	37.5 (22.5-46)	23 (16-35)	0.0001
AST	<40 U/L	24 (17-31)	29 (23.5-48)	22 (15-30)	<0.0001

Lactate dehydrogenase (LDH), C-reactive protein (CRP), Alanine transaminase (ALT), Aspartate transaminase (AST)

Table 3: Chest X-ray and CT scan Findings in Patients with Confirmed COVID-19.

	Total (n=186)	ICU (n=48)	Non ICU (n=138)	p-value
Chest abnormality	180 (96.77)	47 (97.92)	133 (96.37)	0.057
Bilateral abnormality	170 (91.40)	47 (97.92)	123 (89.13)	0.075
Consolidation	68 (36.56)	25 (52.08)	43 (31.16)	0.010
Ground-glass opacity (GGO)	123 (66.13)	27 (56.25)	96 (69.57)	0.093
Unilateral abnormality	10 (5.37)	0 (0)	10 (7.97)	0.072

Computerized tomography scan (CT scan), Ground-glass opacity (GGO)