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Original Article

Clinical and Paraclinical Characteristics of 57 Deceased COVID-19 Patients in Tehran, Iran: A Retrospective Observational Study

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ABSTRACT

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Keywords
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Background and Aims: In 2019, a novel coronavirus called SARS-COV-2 spread throughout the world, causing a pandemic a few months later. As the virus is not well-known and highly contagious, it is important to observe patients for all possible symptoms and comorbidities. This study aimed to demonstrate some demographic, clinical, and paraclinical features of the deceased patients with COVID-19 in Iran.

Materials and Methods: A retrospective observational study was designed to demonstrate the clinical and paraclinical features of deceased patients who had a positive real time-polymerase chain reaction test result for COVID-19. The study included all COVID-19 patients who visited Shariati Hospital, Tehran, Iran, from February 20th until May 20th, 2020. All data were analyzed using IBM SPSS version 21 (Mann-Whitney or Fisher's test).

Results: The patients had a mean age of 63.86 ± 16.428, and most were males (59.65%). Diabetes and hypertension were the most frequent comorbidities. The most common symptoms among the patients were dyspnea (64.91%), weakness (61.40%), fever (60.71%), and having ground-glass opacities in the CT scans (85.96%). There was also a rise in lactate dehydrogenase, serum ferritin, D-dimer, and procalcitonin.

Conclusions: Older COVID-19 patients are more likely to get more severe forms of the disease. Most of the deceased COVID-19 patients had ground-glass opacities in their CT scans. Dyspnea, fatigue, and fever were the most frequent symptoms. Hypertension and diabetes were the most important comorbidities. There was almost no significant difference between the two genders regarding clinical and paraclinical symptoms.

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Introduction

In the past two decades, coronaviruses have caused three novel respiratory diseases called Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS), and COVID-19. The latter was discovered in Wuhan, China, in December 2019, which gradually spread worldwide. In 2020, it was considered a pandemic by the World Health Organization (WHO) [1, 2]. The principal clinical symptoms of patients infected with COVID-19 are fever and cough [3]. Therefore, the WHO diagnostic criteria include having a fever above 38˚C, cough, and acute respiratory infection. The Centers for Disease Control and Prevention (CDC) also proposes a similar principle without emphasizing having a cough as a clinical symptom [4].

However, this disease is a challenge for healthcare professionals since not all patients follow the same pattern. There is a whole variety of clinical and paraclinical symptoms that are reported in COVID-19 patients. Myalgia, dyspnea, headache, gastrointestinal disturbances, such as diarrhea and sore throat, are reported clinical symptoms. The laboratory findings reported increased C-reactive protein (CRP) levels, D-dimer levels, lactate dehydrogenase, and procalcitonin [3, 5]. Similarly, the clinical outcome of COVID-19 patients also varies from an asymptomatic or mild fever to severe pneumonia, which could result in intensive care unit (ICU) admission and even death [6-8].

The case fatality rate (CFR) of COVID-19 is constantly changing according to reports and calculations, varying from 4 to 7% [9]. However, it should be mentioned that some scientists believe that the current calculations under-estimate the potential threat of COVID-19 in symptomatic patients [10], and even with these low numbers of CFR, COVID-19 has killed more people than SARS and MERS killed combined [11]. Another factor that we should consider is that the reproduction number of the SARS-COV-2 is higher than SARS. Therefore, even with low CFR numbers could be a major threat to human lives [12]. The CFR also varies between different countries. For instance, on March 12th, the highest CFR was recorded in Italy, China, Iran, and the United States of America. On March 23rd, this figure changed to Italy, Spain, France, Iran, and China [13]. Furthermore, as the pandemic has not finished, all these figures could change in the future. Therefore, each country needs to broaden its knowledge in various aspects regarding this disease.

This study aimed to demonstrate some demographic, clinical, and paraclinical features of the deceased patients with COVID-19 in Iran.

Materials and Methods

A retrospective observational study was conducted to observe and investigate clinical and paraclinical risk factors resulting in death in COVID-19 patients. All patients who died at Shariati Hospital for three months (from February 20th to May 20th, 2020) were evaluated. Those diagnosed with COVID-19 and who had a positive reverse transcriptase-

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polymerase chain reaction (RT-PCR) test result were included in the study. The patients' data were collected from their clinical record at the hospital, which consisted of demographic data (age, sex, etc.), clinical symptoms (fever, fatigue, dry cough, etc.), medical history (cardiovascular disease, cancer, etc.) history of medications (NSAIDs, corticosteroids, etc.), laboratory data (liver function test, complete blood count, etc.) and imaging. Each patient was identified by a number to keep the patients' identities confidential. The study was approved by the Tehran University of Medical Sciences' ethics committee to be implemented at Shariati Hospital, Tehran, Iran.

Statistical analysis

The data were then categorized and imported to IBM SPSS software version 21. All data were analyzed using either Mann-Whitney or Fisher's test to evaluate any differences between the two genders. The alpha level was set at 0.05.

Results

From February 20th to May 20th, 2020, 148 patients susceptible to COVID-19 died in Shariati Hospital. Fifty-seven of those patients had a positive RT-PCR test result for COVID-19. Therefore, they were included in our observation. Also, a total of 733 COVID-19 patients visited the hospital during that time, indicating that the CFR in this center was about 7.7%. The patients' demographic data and laboratory test results are demonstrated in Table 1.

The deceased patients had a mean age of 63.86±16.428, and most were males (59.65%). The patients' clinical symptoms, past medical history, and comorbidities are summarized in table 2. Except for experiencing nausea and vomiting, which was significantly higher in females with a prevalence of 34.78%, there was no statistically significant difference between males and females. The most common symptoms among the patients were dyspnea (64.91%), weakness (61.40%), fever (60.71%), and having ground-glass opacities in the CT scans (85.96%). Comorbidities of hypertension (47.37%) and diabetes (36.84%) were the most common ones. Almost all the patients needed ventilation (96.5%), so mechanical ventilation was employed for most of them (92.45%).

Discussion

According to the published data, patients with COVID-19 experiencing a more severe and progressive form of the disease are older than those who are more stable and have milder symptoms. For instance, the mean age of patients with progressive symptoms in a study in Wuhan, China, was 65, which is similar to the patients in the present study with the mean age of 63. The proportion of males with severe disease was similar to our results (56.9% vs. 59.65%), indicating that men are slightly more vulnerable to the COVID-19, even though the difference is not statistically significant [14]. The most common symptoms in the patients were dyspnea (64.91%), fatigue (61.40%), and

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fever (60.71%). Two of the most important comorbidities for COVID-19 are hypertension and diabetes [15]. The proportion of patients with hypertension or diabetes who experience severe symptoms is higher than patients with milder symptoms. Our study results showed that 47.37% of the deceased patients had hypertension, and 36.84% had diabetes. Similar results can be seen in the patients' non-surviving groups in a retrospective cohort study in Wuhan, China, with 48% for hypertension and 31% for diabetes [14].

As for the laboratory test results, the liver function test, including alanine amino-transferase and aspartate amino-transferase, shows a minor increase in patients with severe symptoms, consistent with our results. It should be mentioned that no significant change was observed in the total population of COVID-19 patients [5, 14, 16]. According to the literature, lactic acid dehydrogenase, serum ferritin, D-dimer, and procalcitonin are all associated with death, confirming our findings. The only considerable thing in our results is that patients had much higher Lactic acid dehydrogenase levels than what was reported before in other studies (1214.121 compared to 521 in non-surviving patients) [14].

Table1. Patients' demographic and laboratory data

	Female		Male		P-Value
	N	Mean ± SD	N	Mean ± SD	
Age (year)	23	61.522 ± 18.74	34	65.441 ± 14.747	0.6138
BMI (kg/m^2)	21	26.563 ± 3.988	30	25.331 ± 3.319	0.2592
Initial pulse rate (pulse/minute)	22	104.045 ± 19.007	34	99.588 ± 20.172	0.2268
Hospitalization time (day)	16	5.188 ± 5.115	25	7 ± 8.266	0.7657
Invasive ventilation (day)	20	3.55 ± 6.901	27	3.963 ± 6.892	0.4601
Non-invasive time to ventilation (day)	20	1.4 ± 4.147	27	1.148 ± 2.824	0.9464
Time to start ventilation (day)	23	3.478 ± 3.703	32	7.031 ± 9.282	0.2106
Time to dependent mv (day)	23	3.348 ± 6.485	33	5.061 ± 7.734	0.3567
Initial respiratory rate (breaths/min)	23	26.13 ± 17.932	32	22.438 ± 7.687	0.6594
Initial systolic Blood Pressure (mmHg)	23	122.304 ± 26.345	32	116.531 ± 15.56	0.2552
Initial diastolic Blood Pressure (mmHg)	23	68.348 ± 13.145	33	74.242 ± 11.667	0.1597
Initial temperature (˚C)	22	37.418 ± 0.972	33	37.761 ± 1.294	0.3935
WBC (per mm^3)	23	14650 ± 22320.85	32	7906.25 ± 5661.838	0.4183
Hb (g/dL)	22	10.791 ± 2.832	32	12.181 ± 3.388	0.0940
CRP (mg/L)	21	67.614 ± 34.484	30	70.023 ± 27.858	0.5918
AST (U/L)	21	74.857 ± 55.329	30	72.767 ± 68.37	0.9508
ALT (U/L)	21	46.714 ± 47.123	31	48.032 ± 41.667	0.5262
ALP (U/L)	22	351.909 ± 507.558	30	244.667 ± 183.591	0.4537
Bilirubin T (mg/dL)	17	1.382 ± 1.101	27	95.383 ± 272.923	0.0554
Bilirubin D (mg/dL)	17	0.713 ± 0.793	25	1.795 ± 4.423	0.5716
LDH (U/L)	12	1146 ± 632.781	21	1253.048 ± 930.555	0.9559
D-dimer (mcg/mL)	4	2.625 ± 2.213	10	2.792 ± 3.298	2.213
Ferritin (ng/mL)	6	2552 ± 4273.349	10	2170.2 ± 3054.047	0.7715
Procalcitonin (ng/mL)	9	1.668 ± 2.868	14	1.106 ± 1.19	0.8291

Hb= Hemoglobin; CRP= C-Reactive protein; ALT= Alanine aminotransferase; AST= Aspartate aminotransferase; ALP= Alkaline phosphatase; WBC= White blood cells; LDH= Lactic acid dehydrogenase

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Table2. Clinical symptoms and past medical history of the patients

Symptoms	Male, N=34 N (%)	Female, N=23 N (%)	P-Value
Fever	22 (64)	12 (52.17)	0.405
Fatigue	18 (52.94)	17 (73.91)	0.166
Dyspnea	23 (67.65)	14 (60.87)	0.778
Dry cough	13 (38.24)	8 (34.78)	1.000
Myalgia	10 (29.41)	6 (26.09)	1.000
Chest pain	4 (11.76)	0 (0)	0.140
Sore throat	1 (2.94)	0 (0)	1.000
Nausea vomiting	3 (8.82)	8 (34.78)	0.020
Diarrhea	0 (0)	2 (8.70)	0.159
Anorexia	3 (8.82)	3 (13.04)	0.677
Melena	1 (2.94)	2 (8.70)	0.559
LOC	2 (5.88)	3 (13.04)	0.384
Confusion	3 (8.82)	0 (0)	0.265
Oliguria	9 (26.47)	5 (21.74)	0.762
Lymphadenopathy	4 (11.76)	5 (21.74)	0.461
Crackles	10 (29.41)	7 (30.43)	1.000
Crazy paving	2 (5.88)	1 (4.35)	1.000
Past medical history			
Diabetes	15 (44.12)	6 (26.09)	0.263
CKD	4 (11.76)	2 (8.70)	1.000
Cardiac dysfunction	8 (23.53)	4 (17.39)	0.744
Pulmonary disease	4 (11.76)	2 (8.70)	1.000
Cancer	5 (14.71)	7 (30.43)	0.193
Transplantation	4 (11.76)	1 (4.35)	0.638
HIV	0 (0)	0 (0)	-
HTN	13 (38.24)	14 (60.87)	0.112
Arrythmia	2 (5.88)	3 (13.04)	0.384
Medications			
Prophylactic Hydroxychloroquine	1 (2.94)	1 (4.35)	1.000
Flu vaccine	0 (0)	0 (0)	-
Cytotoxic drugs	5 (14.71)	3 (13.04)	1.000
Chemotherapy	2 (5.88)	5 (21.74)	0.106
NSAID	2 (5.88)	0 (0)	0.510
Smoking	4 (11.76)	2 (8.70)	1.000
Oral corticosteroid	2 (5.88)	3 (13.04)	0.384
Inhaled corticosteroid	1 (2.94)	1 (4.35)	1.000
Kaletra®	27 (79.41)	16 (69.57)	0.532
Antibiotics	33 (97.06)	21 (91.30)	0.502
Hydroxychloroquine	28 (82.35)	22 (95.65)	0.223
Imagings			
Consolidation	16 (47.06)	10 (43.48)	1.000
Ground glass	27 (79.41)	22 (95.65)	0.125
Pleural effusion	10 (29.41)	6 (26.09)	1.000
Nodular lesions	3 (8.82)	3 (13.04)	0.677
Patient management			
Mechanical ventilation	30 (93.75)	19 (90.48)	1.000

CKD= Chronic kidney disease; HIV= Human immunodeficiency virus; HTN= Hypertension; NSAID= Non-Steroidal anti-inflammatory drug; LOC= Loss of consciousness

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The chief imaging features observed in the CT scans were the consolidations (45.61%) and the ground-glass opacities (85.96%), which is consistent with the previous reports [14].

There was no statistically significant difference between the two genders regarding any of the factors discussed in this article except for a higher incidence of nausea and vomiting in female patients. Almost all observations in this study were consistent with previous observations from other centers. One of the discrepancies of our results was that having a fever as a symptom of the disease was less frequent in the deceased patients in Iran (60.71%) than other studies that reported numbers as high as 90% [14, 17].

Conclusion

Most of the deceased COVID-19 patients had ground-glass opacities in their CT scans. Dyspnea, fatigue, and fever were the most frequent symptoms; however, it should be mentioned that "fever" had a lower frequency in our center compared to previous studies. Hypertension and diabetes were the most important comorbidities. There was almost no significant difference between the two genders regarding clinical and paraclinical symptoms. An important limitation of this study was the missing data from the clinical records, and therefore, a prospective cohort study may give us a more complete and detailed set of data about patients with COVID-19.

Conflicts of Interest

There is no conflict of interest to report.

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