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Evaluation of clinical features of COVID-19 and outcomes of patients admitted to 5 Azar and Shahid Sayad Shirazi hospitals in Gorgan from April to September 2020

Farideh Kouchak [1], Alireza Heidari [1]*, Fatemeh Paein Mahali [1], Zahra Khatirnamani [1]

1. Health Management and Social Development Research Center, Golestan University of Medical Sciences, Gorgan, Iran
Correspondence: Assistant Professor of Health Policy, Health Management and Social Development Research Center, Golestan University of Medical Sciences, Gorgan, Iran; Tel: +981732558400; Email: alirezaheidari7@gmail.com

Abstract

Background: Coronavirus disease (COVID-19) is a public health emergency of international concern. The aim of this study was to determine clinical features and outcomes of patients with COVID-19.
Methods: This study was a retrospective cohort that included all patients with COVID-19 who were hospitalized in the Shahid Sayad Shirazi and 5 Azar hospitals in Gorgan (northeastern Iran) from April to September 2020. Overall, information from 345 eligible patients was recorded. Data were described using descriptive statistics. Data analysis was carried out in SPSS software (version 24).
Results: The mean age of patients with COVID-19 was 55.94 years (standard deviation=17.28). The majority of patients were women (51.9%). Disease outcomes were reported as recovery, death, and unknown for 77.1%, 2.6%, and 20.3% of the patients, respectively. The most prevalent underlying conditions were hypertension (29.3%), type 2 diabetes (16.8%), and heart disease (8.4%). The most common symptoms were shortness of breath (55.4%), weakness and fatigue (44.3%), and cough (39.7%). Moreover, the most common computed tomography scan findings were ground glass opacities (32.75%), consolidation (26.67%), and thickening of the pulmonary interstitial structures (13.62%).
Conclusion: Studying the duration of hospitalization and its related factors can provide a better understanding of COVID-19's impact on medical interventions as well as hospital capacities to deal with the rising number of COVID-19 patients. Clinical features, laboratory findings, and their relationship with the outcome of patients with COVID-19 can be crucial for early diagnosis and management of the disease. In addition, due to the importance of optimal use of limited health facilities, optimizing patient classification and creating predictive tools for a better treatment outcome seem essential.

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Highlights:

What is current knowledge?
The COVID-19 pandemic poses many challenges, and it is important to gather more information about the disease. Clinical features, laboratory findings, and their relationship with the outcome of patients with COVID-19 can be critical for early diagnosis and management of the disease.

What is new here?
Determining clinical features in patients with COVID-19 and outcomes could be beneficial for researchers as well as health planners and policy makers.

Introduction

In late 2019, a novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was detected in China. On January 30, 2020, the World Health Organization declared the SARS-CoV-2 outbreak an international public health threat (1). The global mortality rate of coronavirus disease 2019 (COVID-19) has been estimated to be 3.4% (2). In Iran, the first confirmed cases of COVID-19 were found in the Qom Province. According to a report by the Ministry of Health of Iran, until August 20, 2021, a total of 4,677,114 people was infected with SARS-CoV-2 in Iran, of which, 102,038 people have died. The mortality rate of this disease in Iran is still increasing. Having 1% of the world's population, about 3% of all global COVID-19-related deaths have occurred in Iran (3,4).

Symptoms of infection with SARS-CoV-2 include cough, headache, muscle pain, and rarely digestive disorders; on the other hand, it can lead to serious lung damage and even death in the affected patients (5,6). The average incubation period of this virus was reported to be 5 days (range 4 to 7 days) (7). An epidemiologic study conducted by the Chinese Center for Disease Control and Prevention on 44,672 confirmed cases of COVID-19 showed that 86.6% of the patients were 30-79 years old, 80.9% had mild/common pneumonia, 13.8% were severe cases, and 4.7% were critically ill. The case fatality rate for critically ill patients was 49%. Patients with comorbidities such as cardiovascular diseases, diabetes, chronic respiratory disease, hypertension, and cancer had higher mortality rates (10.5%, 3.7%, 5.6%, 6%, and 5.6%, respectively) compared to patients without comorbidities (0.9%). The clinical features of severely- and critically-ill patients with COVID-19 are almost identical to those of SARS and the Middle East respiratory syndrome (MERS), including fever, dry cough, fatigue, shortness of breath, anorexia, acute respiratory distress syndrome, arrhythmia, acute kidney injury, various degrees of liver injury, and septic shock. Some patients also experience symptoms such as nasal congestion, runny nose, sore throat, myalgia, and diarrhea (7-9).

Based on the radiological findings in previous studies, most of the computed tomography (CT) scan findings include bilateral ground glass opacity of lung parenchyma, typically with a peripheral and subpleural distribution (10). According to laboratory data, a decrease in the absolute lymphocytes count can be observed in most patients with COVID-19 (11), indicating that the virus may act mainly on lymphocytes, especially T-cells. Damage to T lymphocytes can be a major factor for disease progression (12). In clinical practice, low absolute lymphocyte count can be considered as a reference index for the diagnosis of new cases of COVID-19.

With more than 20% critically ill patients and a mortality rate of about 3%, COVID-19 is a global health emergency (13). Therefore, timely diagnosis and proper treatment of critical cases are of fundamental importance (14). Critically ill patients who are over 60 years of age as well as those with underlying medical conditions such as hypertension, diabetes, cardiovascular disease, and chronic respiratory disease are at higher risk of death, and therefore, require more careful clinical management and special care (15). Although previous studies on patients with COVID-19 have focused on disease severity rather than morality rates, these studies have partially answered key questions about the progression and outcomes of COVID-19 as well as potential risk factors leading to hospitalization and intensive care unit admissions. Currently, there is not enough information about the epidemiology, clinical characteristics, and mortality rate of COVID-19 in the Middle East, especially in Iran, which is considered one of the most important focal points of this disease worldwide. Therefore, this study was conducted to determine the clinical features of confirmed patients with COVID-

19 admitted to the 5 Azar and Shahid Sayad Shirazi hospitals in Gorgan, northeastern Iran.

Methods

This was a retrospective cohort study that included all patients with COVID-19 who were hospitalized in the Shahid Sayad Shirazi and 5 Azar hospitals in Gorgan (northeastern Iran) from April to September 2020. Subjects were enrolled via total population sampling, and the information about 345 eligible patients was included in the study. Inclusion criteria were having a complete medical record and a positive polymerase chain reaction (PCR) test.

After obtaining permission from the ethics committee of Golestan University of Medical Sciences (ethics approval code: IR.GOUMS.REC.1400.032), the required medical records were retrieved. Data were collected in form of a Microsoft Excel from the hospital information system, patients' records, and the hospitals' Shafa system (in case of patients' CT scan findings). Data related to demographic characteristics of patients (age, sex, and ethnicity), CT scan findings, underlying disease, laboratory findings, symptoms (fever, cough, fatigue and weakness, diarrhea, vomiting, and dyspnea), and outcomes (recovery or death) were recorded. The collected data were analyzed with SPSS software (version 24). Descriptive statistics (tables, number, and frequency percentage) were used to describe qualitative data, and quantitative data were described using mean and standard deviation.

Results

Table 1 shows the distribution of quantitative demographic and clinical characteristics of the patients. The mean age of the patients was 55.94±17.28 years (range 7-89 years).

The distribution of qualitative demographic and clinical characteristics of the patients is presented in Table 2.

Regarding the disease outcome, nine patients (2.6%) died, 266 patients (77.1%) recovered, and 70 patients (20.3%) were unknown. Most patients were of Persian ethnicity (90.1%) and had a C-reactive protein value of greater than 10. The most common underlying diseases were hypertension (29.3%), type 2 diabetes (16.8%), and heart disease (8.4%). The most common symptoms were shortness of breath (55.4%), fatigue and weakness (44.3%), and cough (39.7%) Figure 1.

Table 1: Distribution of quantitative demographic and clinical characteristics of patients with COVID-19

Variables	Mean	Standard deviation	Minimum	Maximum
Age	55.94	17.28	7	89
White blood cells	7.28	3.64	0.20	22.20
Lymphocytes	21.95	9.51	5.00	53.00
Lactate dehydrogenase	619.29	264.26	150.00	2630.00
Hemoglobin	13.05	9.44	3.20	127.00
Platelet	197.45	84.63	7.00	657.00
Aspartate transaminase	52.77	36.15	10.00	341.00
Alanine transaminase	50.01	41.84	6.00	368.00
Erythrocyte sedimentation rate	56.63	28.53	2.00	156.00
Creatinine	1.26	1.02	0.40	12.30

Table 2: Distribution of qualitative demographic and clinical characteristics of patients with COVID-19

Variable	Subclass	Number	Percent
Disease outcome	Death	9	2.6
	Recovery	266	77.1
	Unknown	70	20.3
Gender	Men	166	48.1
	Women	179	51.9
Ethnicity	Persian	311	90.1
	Turkmen	34	9.9
Underlying disease	Hypertension	101	29.3
	Type 2 diabetes	58	16.8
	Type 1 diabetes	6	1.7
	Heart disease	29	8.4
	Lung disease	17	4.9
	Neurological disorder	16	4.6
	Hypothyroidism	6	1.7
	Cancer	7	2.0
	Anemia	4	1.2
	Kidney disease	18	5.2
	Rheumatic disease	4	1.2
	Hyperlipidemia	10	2.9
C-reactive protein	<10	103	29.9
	>10	242	70.1

As shown in Figure 2, the most common CT scan findings were ground glass opacities (32.75%), consolidation (26.67%), and thickening of the pulmonary interstitial structures (13.62%).

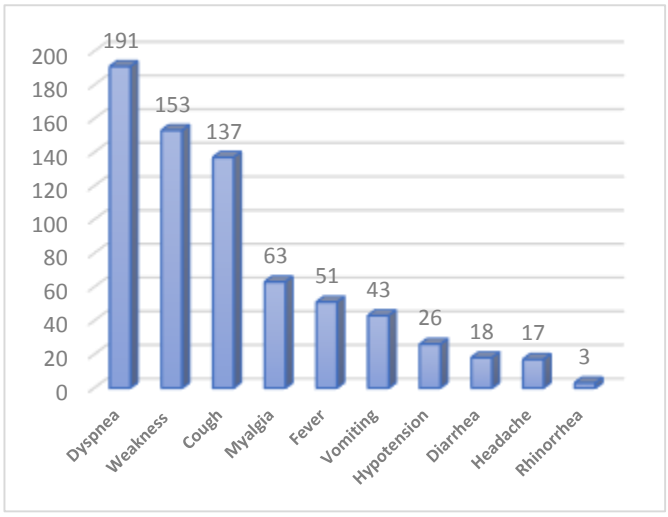

Figure 1: Distribution of patients with COVID-19 based on the clinical symptom

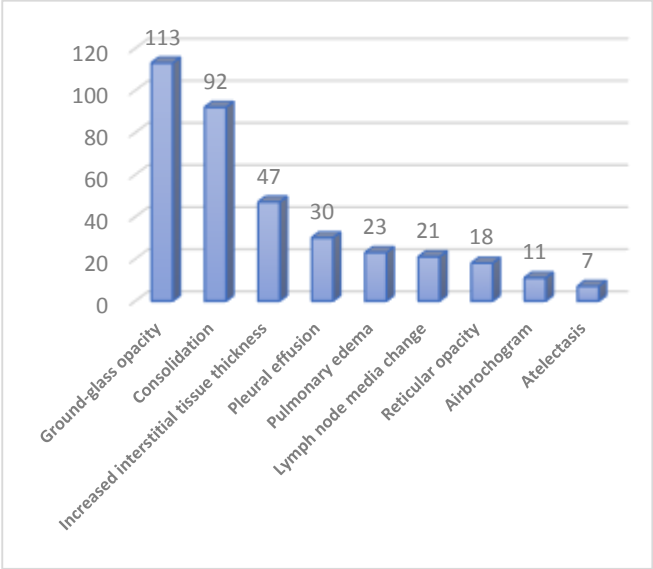

Figure 2: Distribution of CT scan findings of patients with COVID-19

Discussion

The present study was conducted to determine the clinical characteristics of patients with COVID-19 who were hospitalized in the 5 Azar and Shahid Sayad Shirazi hospitals in Gorgan (northeastern Iran) from April to September 2020. The mean age of the patients was 55.94±17.28 years. The frequency of women was slightly higher than that of men. The majority of patients were of Persian ethnicity, which was expected considering the higher frequency of this ethnicity in the study area. In a study by Papizadeh et al., the mean age of patients with COVID-19 was 47 years. However, inconsistent with our findings, the majority of patients in the mentioned study were men (16). In another study, the mean age of patients with COVID-19 was 53.75 years, which is similar to our findings. However, contrary to our findings, 62.8% of the patients in the mentioned study were men (17). Similarly, in a study in New York (USA), the majority of patients with COVID-19 (54%) were men (18). In line with our findings, a study in China reported that the majority of patients with COVID-19 were women, and the mean age of the patients was 55.5 years (19).

In our study, the most common underlying diseases were hypertension (29.3%) and type 2 diabetes (16.8%). In the study by Papizadeh et al., 44.62% of patients had comorbidities such as diabetes and hypertension, which is somewhat similar to our findings (16). In a study by Honarvar et al., cardiovascular disease (17.14%), diabetes (14.92%), chronic lung disease (6.24%), and hypertension (2.72%) were the most common comorbidities (20). A study in China also reported hypertension and diabetes as the most common comorbidities in patients with COVID-19 (19).

The most common clinical manifestations of patients with COVID-19 were respiratory symptoms (55.4%), fatigue and weakness (44.3%), and cough (39.7%). Fever was observed in 14.8% of patients. In our study, 2.6% of the patients died, but the majority of them (77.1%) recovered from the disease.

Consistent with our findings, Papizadeh et al. reported shortness of breath and myalgia as the most common clinical manifestations of COVID-19. They also reported morality rate of less than 20%, which is higher than the rate found in the present study (16). Shahriarirad et al. reported fatigue (66.4%), cough (64.6%), and fever (59.3%) as the most common symptoms at the disease onset (17). Honarvar et al. reported respiratory distress (63.32%), fever (56.47%), dry cough (56.26%), and sore throat (15.70%) as the most common symptoms of COVID-19 (20).

The results of Zachariah's study showed that most of the patients had fever (80%) or respiratory symptoms (64%). In Wu et al.'s study, the most common symptoms were cough, followed by fever, weakness, and fatigue (19). In a previous study, the rates of intensive care unit admission and mortality in patients with COVID-19 were reported to be 55.5% and 8%, respectively (20).

The mean WBC count and absolute lymphocyte count were 7.28±3 ×103/µl and 21.95±9.51×103/µl, respectively. In line with these findings, in a study by Alamdari et al. on 396 living and 63 deceased patients with COVID-19 in Shahid Modares Hospital in Tehran (Iran), the mean WBC and absolute lymphocyte counts were 7.21±2.22 and 1.02±0.13 ×103/µl, respectively (21). New evidence indicates that about 85% of people with COVID-19 have a low lymphocyte count; therefore, patients with diabetes and other conditions should be monitored continuously and more carefully for their lymphocyte count (22, 23).

In the present study, the most common CT scan findings were ground glass opacities (32.75%) and consolidation (26.67%), while lung atelectasis and air bronchogram were the least frequent CT scan findings. In this regard, a study in China reported ground glass opacity, MIC opacity (Minimum Inhibitory Concentration), and consolidation as the most prevalent findings in CT scan of patients with COVID-19 (24). In line with our findings, Shahriarirad et al. reported ground glass opacity (77.9%) and consolidation (58.5%) as the most common abnormalities in chest CT scans (17). In another study, patchy ground glass opacity, ground glass opacity nodules, vascular enlargement in ground glass opacity areas, air bronchogram, bronchioleectasis, interlobular septal thickening, and crazy-paving pattern were significantly more prevalent in COVID-19 patients than in those with influenza-related pneumonia (25).

Despite having clinical manifestations, many hospitalized patients in our study did not have a positive PCR test, which is a limitation of this study. Due to discharge with personal consent, PCR test was not performed on some patients, and they were excluded from the study.

Conclusion

Based on the results, the mortality rate of patients with COVID-19 was 2.6% in the study areas. Respiratory symptoms are the most common symptoms in hospitalized patients. The most frequent comorbidities in patients with COVID-19 are hypertension and type 2 diabetes. The most common CT scan findings are ground glass opacity and consolidation.

A study on the duration of hospitalization and its related factors among COVID-19 patients can provide a better understanding of the disease impact as well as hospital capacities to deal with rising number of COVID-19 patients. The COVID-19 pandemic poses many challenges, and it is necessary to collect more information about the disease. Clinical features, laboratory findings, and their relationship with the outcome of patients with COVID-19 can be crucial for early diagnosis and management of the disease. In addition, due to the importance of optimal use of limited health facilities, optimizing patient classification and creating predictive tools for a better treatment outcome seem essential.

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Ethical statement

The study has been approved by the Ethics Committee of Golestan University of Medical Sciences (Ethics approval code: IR.GOUMS.REC.1400.032).

Conflict of interest

The authors declare that there is no conflict of interest.

Author contributions

FK: Conceptualization, methodology, project administration, writing. AH: Conceptualization, methodology, investigation, writing, visualization. FPM: Investigation, software, writing. ZK: Software, validation, data collection, methodology, writing. All authors read and approved the final manuscript.

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