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The Relationship between Symptoms of COVID-19 Patients, Their Demographic Characteristics, Underlying Condition, and Comorbidities: A Case Study in Iran

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A B S T R A C T

Background: Since the emergence of COVID-19 disease and its spread, many people have been globally infected. Also, evidence has shown that some specific conditions and underlying diseases result in more severe symptoms in the patients. Therefore, this study aimed to investigate the relationship between demographic characteristics and underlying conditions with symptoms in patients with COVID-19 in one of Iran's major hospitals.

Methods: The present cross-sectional and descriptive-analytical study was conducted from February 20th, 2020 to August 20th, 2021. The sampling method was census. The data were collected from the statistics department, medical records, HIS, and they were analysed via SPSS software version 25 using descriptive statistics and statistical tests such as Spearman, Mann-Whitney, and Chi-square.

Results: Among the 7,236 patients with a definite diagnosis of COVID-19, most (53.2%) of the subjects were men and the total death rate was 8%. There was a positive correlation (p-value=0.000) between age and length of stay. About 69% of the patients had symptoms related to the disease in their CT scan and 39.5% had an oxygen level of less than 93%, which roughly 2.6% of them were intubated. There was a significant relationship between patients' age, sex, and length of stay with their discharge status, first symptoms of disease, and patient's underlying conditions. Also, there was a significant difference in patients' discharge status based on having some early symptoms, gastrointestinal symptoms, and underlying conditions.

Conclusion: The findings of this study emphasize the importance of early detection and management strategies, especially for individuals with specific risk factors. These insights are crucial in guiding healthcare practices and policies to effectively combat the ongoing pandemic. Also, the study outcomes provide valuable insights for healthcare professionals and policymakers, aiding in the development of targeted interventions and patient-centered care protocols.

Keywords: Demographic Characteristics, Underlying Conditions, COVID-19, Symptoms, Iran

Introduction

Control of infectious diseases is known as a public health achievement. Although due to the reduction of premature mortality in children, important advances in health, vaccination of children, and the discovery of antimicrobial drugs, the average life expectancy has increased significantly during the 20th century, many new pathogens with the potential to cause an epidemic have appeared or like previously unknown agents, have been discovered. After nearly 100 years from 1918, the time that influenza pandemic killed more than 50 million people worldwide, it seems that despite improvements in sanitation and communications, the rate of infectious disease outbreaks is increasing

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and in the last two decades it increased again (1).

In December 2019, an outbreak of a new virus appeared in the city of Wuhan, Hubei Province, China, which was later named SARS CoV-2. On March 11th, 2020, the World Health Organization declared that the virus has caused a worldwide pandemic (2–4). The symptoms of this disease were unknown and numerous at the beginning of the outbreak, but researchers have listed some symptoms for this disease. Fever and cough were two common symptoms among patients and the number of people with fever increases during hospitalization. They did not consider diarrhea as a symptom of the disease (5). Wong (6) conducted a research and concluded that the symptoms of this disease are dry cough, sore throat, low-grade fever, and in more severe cases, acute respiratory infection. Huang et al. (4) also reported that the early signs of the disease are fever, cough, shortness of breath, fatigue, headache, and finally, some patients suffer from acute respiratory distress syndrome, heart problems, acute kidney damage, and shock. Alsayed (7) also listed common symptoms of COVID-19 in children as cough, pharyngeal erythema, fever, tachypnea and diarrhea, rhinorrhoea, and nasal congestion, which can be various in different people.

The COVID-19 disease is associated with cardiovascular, pulmonary, neurological, digestive, and immune system complications, and thereby, underlying diseases can aggravate the condition of patients with pathological effects on different body systems. The mortality rate due to systemic injuries in people with underlying diseases has been much higher than in healthy people (8–11).

This disease has spread in many countries and Iran is one of them. The total number of infected people in the world has been more than 636 million and death toll was 6,599,291. In Iran, more than 7.5 million people have been infected by this disease and 144,580 people have died. In fact, the overall mortality rate of this disease in Iran is 1.93%, which is higher than the world average (1.04%). Considerably, the death rate in the first months of the outbreak of this disease both globally and in Iran was much higher (about 6 to 7 per cent) (12). Therefore, this study was conducted with the aim of studying the symptoms of COVID-19 disease and its correlation with demographic characteristics and underlying diseases in all patients referred to a large public hospital from the beginning of the outbreak to 18 months later.

Materials and Methods

Type and methods of study

The present cross-sectional and descriptive-analytical study was a quantitative retrospective research that was conducted from February 20th, 2020, and August 20th, 2021. The research environment was Shahid Sadoughi Hospital in Yazd, as the main referral and treatment centre for COVID-19 patients.

Sampling procedure

The study population included all patients hospitalized due to COVID-19 in Shahid Sadoughi Hospital in Yazd. For selecting the study participants, the census was used and the total number of 7236 patients with COVID-19 at the desired timeframe were included. The tool used in this research was a data collection form which included the intended variables of the study such as patients' demographic characteristics (age, sex), underlying diseases and comorbidities (history of hypertension, diabetes, heart disease, other chronic diseases, chronic blood disease, chronic kidney disease, asthma, other chronic lung diseases, cancer, pregnancy, history of smoking, and addiction), the COVID-19 symptoms in patients (fever, decreased level of consciousness, anosmia, loss of sense of taste, seizures, headache, dizziness, hemiparesis, organs' hemiplegia, chest pain, inflammation, abdominal pain, nausea, vomiting, diarrhea, anorexia, CT scan status, respiratory intubation, oxygen saturation), discharge status, final status of patients, etc.

Data collection method

The researchers first prepared a data collection form according to the variables affecting the infection rate and severity of the COVID-19 disease mentioned in the existing reports and

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studies, as well as the study hypotheses. Then, they collected the data from the hospital. The desired data were collected from the statistics department, medical records, and HIS of Shahid Sadoughi Hospital in Yazd, Iran.

Data analysis method

After data collection, they were analyzed via SPSS software version 25 using descriptive statistics to describe the collected data and different quantitative and qualitative statistical tests such as Spearman, Mann-Whitney, and Chi-square.

Ethics approval

This study was approved by Shahid Sadoughi University of Medical Sciences and the ethical code of the research project is IR.SSU.SPH.REC.1399.078.

Results

Among the 7,236 patients referred to Shahid Sadoughi Hospital in Yazd between February 20th, 2020 and August 20th, 2021, with a definite diagnosis of COVID-19, most (53.2%) of the subjects were men. The hospital discharge rate was 92% and the death rate due to the disease was 8%. The prevalence of each underlying disease is also shown in Table 1. Also, about 69% of the patients had symptoms related to the disease in their CT scan and 39.5% had an oxygen level of less than 93%, which roughly 2.6 percent of them were intubated (Table 1).

Table 1. Demographic characteristics, comorbidities, underlying conditions, first symptoms of disease, gastrointestinal symptoms, and other characteristics of the patients with COVID-19 in Shahid Sadoughi hospital; Yazd, Iran (from 2020/02/20 to 2021/08/21)

Variables		N	%	Variables		N	%
Sex	Male	3847	53.2	Decreased level of consciousness	Had	121	1.7
	Female	3389	46.8		Did not have	7115	98.3
Discharge status	discharge	6657	92	Anosmia	Had	65	0.9
	Death	579	8		Did not have	7171	99.1
History of hypertension	Had	475	6.6	Loss of sense of taste	Had	44	0.6
	Did not have	6761	93.4		Did not have	7191	99.4
Diabetes	Had	476	6.6	Seizures	Had	18	0.3
	Did not have	6760	93.4		Did not have	7217	99.7
Heart disease	Had	179	2.5	Headache	Had	561	8.1
	Did not have	7057	97.5		Did not have	6367	91.9
Other chronic diseases	Had	136	1.9	Dizziness	Had	183	2.6
	Did not have	7100	98.1		Did not have	6745	97.4
Chronic blood disease	Had	16	0.2	Hemiparesis	Had	31	0.4
	Did not have	7220	99.8		Did not have	6897	99.6
Chronic kidney disease	Had	48	0.7	Organs' hemiplegia	Had	20	0.3
	Did not have	7188	99.3		Did not have	6908	99.7
Asthma	Had	38	0.5	Chest pain	Had	170	2.5
	Did not have	7198	99.5		Did not have	6758	97.5
Other chronic lung diseases	Had	45	0.6	Inflammation (or skin lesion)	Had	7	0.1
	Did not have	7191	99.4		Not have	6921	99.9
Cancer	Have	51	0.7	Abdominal pain	Have	238	3.4
	Did not have	7185	99.3		Did not have	6766	96.6
Pregnancy	Had	43	0.6	Nausea	Had	410	5.9
	Did not have	7193	99.4		Did not have	6594	94.1
				Vomiting	Had	267	3.8

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Variables		N	%	Variables		N	%
History of smoking	Had	49	0.7	Diarrhea	Did not have	6737	96.2
	Did not have	7187	99.3		Had	221	3.2
Addict	Had	44	0.6	Anorexia	Did not have	6783	96.8
	Did not have	7192	99.4		Had	390	5.6
Fever	Had	3330	46		Did not have	6614	94.4
	Did not have	3906	54		Had symptoms	4439	68.9
Cough	Had	3965	54.8	CT scan	Did not have symptoms	189	2.9
	Did not have	3271	45.2		Was not conducted	1816	28.2
Muscular pain	Had	2083	28.8	Respiratory intubation	Was conducted	191	2.6
	Did not have	5153	71.2		Was not conducted	7045	97.4
Respiratory distress	Had	2704	37.4	Oxygen saturation (Po2)	>93%	4376	60.5
	Did not have	4532	62.6		<93%	2860	39.5

The mean age of patients hospitalized due to COVID-19 was 61.87 years (SD=121.275) and the average length of stay was 5.98 days (SD= 6.385). Also, the results showed that there was a positive correlation (p-value=0.000, r=0.07) between the age and the average length of stay.

The results of the present study demonstrated that there was a significant relationship between age and discharge status of the patients. The median of age of died patients was 70 years, while the median of age of discharged patients was 54 years. Furthermore, there was a significant difference in the age of patients who had early symptoms of fever, cough, respiratory distress, decreased level of consciousness, anosmia, seizures, headache, hemiparesis, nausea, and diarrhea compared to those who did not. In addition, age difference was statistically significant between patients who were intubated, their blood oxygen level was lower than 93%, those who were pregnant or had diabetes, heart disease, hypertension, other lung diseases except asthma and other chronic diseases, and other patients. So that patients who had fever, cough, anosmia, seizures, headache, nausea, diarrhea, and those who were pregnant, had an oxygen percentage above 93% or had other chronic diseases, compared to other patients. However, older patients had symptoms such as respiratory distress, decreased level of consciousness, hemiparesis, or diseases such as diabetes, heart disease, lung diseases other than asthma, and hypertension, or were intubated (Table 2).

Also, the findings of the study showed that there was a significant difference in the length of stay based on discharge status, having previous contact with an infected person, having early symptoms of fever, respiratory distress, chest pain, gastrointestinal symptoms such as nausea, and vomiting. There was also a significant relationship between having addiction, diabetes, chronic blood disease, blood pressure, and other chronic diseases, pregnancy, blood oxygen percentage, and respiratory intubation with the length of stay of patients in the hospital. In fact, male patients compared to women, those who were discharged compared to those who died, people with a history of addiction and those whose blood oxygen level was above 93%, had a shorter average length of stay. However, the average length of stay in the hospital was longer for the patients who had previous contact with an infected person and also had early symptoms such as fever, respiratory distress, chest pain, nausea, and vomiting, or had diseases like diabetes, chronic blood disease, hypertension, and other chronic diseases or were pregnant or had respiratory intubated (Table 3).

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Table 2. The relationship between age with discharge status, first symptoms of COVID-19 disease, and patient's underlying conditions and comorbidities (test used [according to non-normality of age variable]: Mann-Whitney)

Variables	Discharge status				First symptom/ fever				First symptom/ cough				First symptom/ respiratory distress			
	Discharge		Death		Had		Hadn't		Had		Hadn't		Had		Hadn't	
	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1
	54	67-39	70	80-60	54	67-39	57	69-42	54	67-40	57	70-41	57	69-42	54	68-39
	P-value=0.000				P-value= 0.000				P-value=0.000				P-value=0.000			
	First symptom/ decreased level of consciousness				First symptom/ anosmia				First symptom/ convulsion				First symptom/ headache			
	Had		Hadn't		Had		Did not have		Had		Did not have		Had		Did not have	
	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1
	73	83-57	55	68-40	48	60-38	56	68-40	7	40-2	55	68-40	51	63-37	56	68-40
	P-value=0.000				P-value=0.002				P-value=0.000				P-value=0.000			
	First symptom/ hemiparesis				Gastrointestinal symptoms/ nausea				Gastrointestinal symptoms/ diarrhea				Respiratory intubation			
	Had		Hadn't		Had		Did not have		Had		Did not have		Conducted		Wasn't conducted	
Age	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1
	67	76-55	55	68-40	52	66-39	55	68-40	50	64-35	56	68-40	63	77-43	55	68-40
	P-value=0.002				P-value=0.038				P-value=0.000				P-value=0.000			
	Oxygen saturation (PO2)				Diabetes				Pregnancy				Heart disease			
	>93%		<93%		Had		Did not have		Had		Did not have		Had		Did not have	
	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1
	51	64-37	62	73-48	64	72-54	55	68-39	32	34-27	56	68-40	66	78-57	55	68-40
	P-value=0.000				P-value=0.000				P-value= 0.000				P-value=0.000			
	Other chronic lung disease except asthma				Other chronic disease				History of hypertension							
	Had		Did not have		Had		Did not have		Had		Did not have					
	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1				
	63	79-45	55	68-40	41	60-27	56	68-40	67	76-58	54	67-39				
	P-value= 0.012				P-value=0.000				P-value=0.000							

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Table 3. The relationship between length of stay with sex, discharge status, prior contact with infected person, first signs of the COVID-19 disease, and patients' underlying conditions and comorbidities (test used [according to non-normality of length of stay variable]: Mann-Whitney)

Variables	Sex				Discharge status				Prior contact with infected person				First symptom/ fever			
	Male		Female		Discharge		Death		Had		Did not have		Had		Did not have	
Length of stay	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1
	4	7-3	5	7-3	4	7-3	8	14-4	5	7-3	4	7-3	5	7-3	4	7-3
	P-value= 0.009				P-value= 0.000				P-value= 0.000				P-value=0.049			
	First symptom/ respiratory distress				First symptom/ chest pain				Gastrointestinal symptoms/ nausea				Gastrointestinal symptoms/ vomiting			
	Had		Did not have		Had		Did not have		Had		Did not have		Had		Did not have	
	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1
	5	8-3	4	7-3	6	10-4	5	7-3	5	7-3	5	7-3	5	8-3	5	7-3
	P-value= 0.000				P-value= 0.000				P-value=0.019				P-value= 0.009			
	Addiction				Respiratory intubation				Oxygen saturation (PO2)				Diabetes			
	Had		Did not have		Conducted		Was not conducted		>93%		<93%		Had		Did not have	
	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1
	3	5-2	5	7-3	6	13-4	4	7-3	4	6-3	5	8-3	5	8-4	4	7-3
	P-value= 0.005				P-value= 0.000				P-value= 0.000				P-value= 0.000			
	Chronic blood disease				Pregnancy				Other chronic disease				History of hypertension			
	Had		Did not have		Had		Did not have		Had		Did not have		Had		Did not have	
	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1	Median	Q3-Q1
	10	14-5	5	7-3	9	14-4	5	7-3	6	10-3	5	7-3	5	8-4	5	7-3
	P-value= 0.001				P-value= 0.000				P-value= 0.000				P-value= 0.000			

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Table 6 shows that there was a significant relationship between gender of the patients and their discharge status, early symptoms of the disease including fever, muscular pain, inflammation or skin lesion, CT scan status, history of smoking, addiction, diabetes, blood pressure and other chronic diseases. The percentage of death in men (8.8) was higher than women (7.1). Men also had the early symptom of fever more than women, and the number of smokers or drug addicts in men was more than women. In contrast, women mainly had symptoms such as muscular pain, inflammation or skin lesion, and symptoms found in CT scans. Furthermore, a greater number of women had cancer, diabetes, hypertension, and other chronic diseases (Table 4).

Table 4. The relationship between sex with discharge status, first symptoms of disease, CT scan status, and underlying conditions and comorbidities of patients (test used: Chi-square)

		Sex				Total		P-value
		Male		Female				
		N	%	N	%	N	%	
Discharge status	Discharge	3509	91.2	3148	92.9	6657	92	0.009
	Death	338	8.8	241	7.1	579	8	
First symptom/ fever	Had	1837	47.8	1493	44.1	3330	46	0.002
	Did not have	2010	52.2	1896	55.9	3906	54	
First sign/ muscular pain	Had	1032	26.8	1051	31	2083	28.8	0.000
	Did not have	2815	73.2	2338	69	5153	71.2	
First symptom/ inflammation or skin lesion	Had	1	0	6	0.2	7	0.1	0.038
	Did not have	3699	100	3222	99.8	6921	99.9	
CT scan status	Had symptoms	2342	67.3	2097	70.7	4439	68.9	0.004
	Did not have symptoms	98	2.8	91	3.1	189	2.9	
	Was not conducted	1041	29.9	775	26.2	1816	28.2	
History of smoking	Had	46	1.2	3	0.1	49	0.7	0.000
	Did not have	3701	98.8	3386	99.9	7187	99.3	
History of addiction	Had	33	0.9	11	0.3	44	0.6	0.004
	Did not have	3814	99.1	3378	99.7	7192	99.4	
History of cancer	Had	19	0.5	32	0.9	51	0.7	0.022
	Did not have	3828	99.5	3357	99.1	7185	99.3	
History of diabetes	Had	216	5.6	260	7.7	476	6.6	0.000
	Did not have	3631	94.4	3129	92.3	6760	93.4	
History of other chronic diseases	Had	60	1.6	76	2.2	136	1.9	0.033
	Did not have	3787	98.4	3313	97.8	7100	98.1	
History of hypertension	Had	222	5.8	253	7.5	475	6.6	0.004
	Did not have	3625	94.2	3136	92.5	6761	93.4	

The results of the study also showed a significant difference between the patients who were discharged and those who died in terms of early symptoms of the disease, gastrointestinal symptoms, underlying conditions, and comorbidities. In other words, the percentage of fever, nausea, and diarrhea was more in patients who were discharged. However, respiratory distress and decreased level of consciousness were more common in those who died. Most of the patients who died had a blood oxygen level of less than 93% and were intubated. The results also demonstrated that the prevalence of diabetes, hypertension and chronic kidney disease was higher in patients who died than those who were discharged (Table 5).

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Table 5. The relationship between discharge status with first symptoms of disease, gastrointestinal symptoms, and patients' underlying conditions and comorbidities (test used: Chi-square)

		Discharge status				Total		P-value
		Discharge		Death				
		N	%	N	%	N	%	
First symptom / cough	Had	3674	55.2	291	50.3	3965	54.8	0.022
	Did not have	2983	44.8	288	49.7	3271	45.2	
First symptom / respiratory distress	Had symptoms	2374	35.7	330	57	2704	37.4	0.000
	Did not have symptoms	4283	64.3	249	43	4532	62.6	
First symptom / decreased level of consciousness	Had	83	1.2	38	6.6	121	1.7	0.000
	Did not have	6574	98.8	541	93.4	7115	98.3	
Gastrointestinal symptoms/ nausea	Had	390	6.1	20	3.5	410	5.9	0.010
	Did not have	6035	93.9	559	96.5	6594	94.1	
Gastrointestinal symptoms/ diarrhea	Had	212	3.3	9	1.6	221	3.2	0.021
	Did not have	6213	96.7	570	98.4	6783	96.8	
Respiratory intubation	Conducted	105	1.6	86	14.9	191	2.6	0.000
	Was not conducted	6552	98.4	493	85.1	7045	97.4	
Oxygen saturation (PO2)	>93%	4185	62.9	191	33	4376	60.5	0.000
	<93%	2472	37.1	388	67	2860	39.5	
History of diabetes	Had	420	6.3	56	9.7	476	6.6	0.002
	Did not have	6237	93.7	523	90.3	6760	93.4	
History of chronic kidney disease	Had	40	0.6	8	1.4	48	0.7	0.026
	Did not have	6617	99.4	571	98.6	7188	99.3	
History of hypertension	Had	419	6.3	56	9.7	475	6.6	0.002
	Did not have	6238	93.7	523	90.3	6761	93.4	

Discussion

The results of the present study demonstrated that the mortality rate of the COVID-19 patients who were hospitalised in the referred hospital during the first 18 months of the pandemic was 8%. The death rate at the beginning of the pandemic (August 20, 2020) was 3.6% in the world and 5.7% in Iran (12,13), and also in the middle of the pandemic (April 10, 2021), the death rate of patients in the world and Iran was 2.15 and 3.14, respectively (12,14). After about 28 months of the COVID-19 pandemic, the recent overall mortality rate in the world and Iran was 1.95 and 1.14, respectively (12). Nevertheless, in a review study conducted by Salunkhe et al. (15), based on the results of reviewing 14 studies in 5 months from December 2019 to May 2020, the hospital mortality rate among 11,938 patients was reported 15%.

Among the 7236 COVID-19 patients in the present study, most of them were men (3847 (53.2%)). Furthermore, mortality rate in men (8.8) was higher than women (7.1). In the study conducted by Nasrollahzadeh Sabet (16), most of the hospitalized patients with COVID-19 were men (64.8 percent). In the study of Salunkhe et al. (15), most of the patients were men (7637 (64%)) and the mortality rate was higher in men (15). Kordzadeh-Kermani (8) also stated that the risk of getting infected to a more severe type of COVID-19 disease is higher in men. Zarinfar (17) also studied various research studies related to factors affecting deaths caused by COVID-19 and found that majority of the deceased were male. In the review article of Alwani et al. (18), it was also found that although the rate of infection in men and women is not different, the rate of severe illness and hospitalization in the ICU, also the mortality rate due to the COVID-19 were higher in men. Pijls (19) also stated that men had a higher

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risk of being infected with COVID-19, being hospitalized, needing intensive care, and death than women.

The COVID-19 virus can affect all systems and organs in the body. The most common symptoms are fever, headache, cough, fatigue, shortness of breath, sore throat, muscular pain, change in sense of smell and taste, sputum, lymphopenia, pneumonia and hypoxemia (17,20). The most common early symptoms of COVID-19 among the patients in the present study were cough (54.8%), fever (46%), respiratory distress (37.4%), muscular pain (28.8%), and headache (8.1%). Additionally, 68.9% of the patients showed symptoms in their CT scan, 39.5% of them had a blood oxygen level of less than 93%, and 2.6% of them were intubated.

Kordzadeh-Kermani (8) also reported common clinical symptoms of COVID-19 infection including fever, dry cough, sore throat, headache, fatigue, muscular pain, and shortness of breath. Tandan (21) also stated that the most common symptoms among COVID-19 patients were fever, cough, fatigue/body pain, pneumonia, and sore throat. He et al. (22) in their systematic review also mentioned that symptoms were different in patients with severe or moderate type of COVID-19 including cough, fever, shortness of breath, diarrhea, fatigue, sputum, muscular pain, abdominal pain, and anorexia. Alwafi (23) reported that fever, cough, shortness of breath, fatigue, nausea/vomiting, muscular pain, sore throat, and anosmia and loss of taste were symptoms that were significantly different among patients with mild, moderate, and severe COVID-19 disease.

Underlying diseases and demographic factors are among the most important factors affecting the mortality due to COVID-19. Underlying diseases in adults through the pathological effects on different body organs can aggravate the condition of COVID-19 patients (17,20). According to the results of the current study, the prevalence of diabetes, hypertension, and chronic kidney disease was higher in patients who died compared to those who were discharged. According to the review study by Zarinfar et al. (17), the most important underlying diseases affecting the COVID-19 disease and mortality caused by it, are blood pressure, cardiovascular diseases, diabetes, and obesity. Underlying diseases by weakening the immune system, causing inflammation, metabolic disorders, coagulation disorders, mechanical and functional changes of the respiratory system, lead to the deterioration of the patients' status or their death due to the COVID-19.

Salunkhe et al. (15) also reported that blood pressure, diabetes, and heart diseases were the most common underlying diseases among those who died due to the COVID-19 in the hospital (15). Lin and Lippi have also mentioned blood pressure as one of the risk factors that increases the death risk due to the COVID-19 (24,25). In the review study of Kordzadeh-Kermani (2020) and the cross-sectional study of Alwafi (2021), it is also stated that underlying diseases such as hypertension, diabetes, cardiovascular diseases, chronic kidney disease, chronic lung disease, and cancer are correlated to the increase in the risk of getting infected by more severe COVID-19 disease (8,23). Wang (26) has also mentioned that diabetes in people with Covid-19 can accelerate the development of acute respiratory distress syndrome and lead to septic shock and organs' failure. Matsushita (27) also considered diabetes and blood pressure to be among the factors that increase the possibility of being subject to the severe type of COVID-19. Arab (28) has also concluded that the risk of death in COVID-19 patients with kidney disease showed a significant increase in comparison with the general population. Immunodeficiency, as well as having underlying diseases such as blood pressure and heart diseases, make the patients more prone to contracting COVID-19, causing severe disease and ultimately increasing the death rate. The results of the study of Nasrollahzadeh Sabet (16) also showed that the severity of the disease, clinical manifestations, and the mortality rate of patients with COVID-19 in the subgroups of cardiovascular, diabetes, and high blood pressure

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compared to other people infected with COVID-19 had significant differences.

There was a significant correlation between age and discharge status in this study. In other words, the death rate was higher in older patients. Salunkhe et al. (15) also concluded in their review article that the highest mortality rate (82%) was in people over 60 years. In the study of Jin et al. (29) , it is also stated that the mortality rate was higher in the elderly people. Matsushita (27) reviewed 16 studies and stated that older age was correlated with the risk of contracting severe types of COVID-19. Also, in the review study by Zarinfar et al. (17), age, race, occupation, and gender were factors that can directly and indirectly affect the sickness period, the severity and the death rate due to the COVID-19 disease. These factors through creating physiological differences, the amount of contact, and the amount of protection against the COVID-19 virus can lead to changes in severity and mortality resulting from viral infection. The results of many studies have shown that a high percentage of deaths caused by COVID-19 in all countries was in the elderly people, and in all studies reviewed in the study of Zarinfar (2021), the mean age of the infected people was above 61 years.

The findings of the present study indicate that there was a correlation between being female, having underlying diseases such as diabetes, blood pressure, chronic blood disease, and other chronic diseases in patients, as well as performing respiratory intubation for them, with their longer stay in the hospital due to the COVID-19. The study of Jang et al. (30) has also confirmed the correlation between being female, having underlying diseases such as hypertension, diabetes, heart disease, and mechanical ventilation with a longer length of stay in COVID-19 patients. Chiam (31) also mentioned that length of stay of patients who had underlying diseases such as blood pressure, diabetes, and electrolyte disorders was significantly longer than those who did not have these diseases. Also, patients with these underlying diseases had a longer length of stay. In fact, by adding any underlying disease in the statistical model, the length of stay increased by 2%. The findings have shown that male patients had a longer hospital stay than females. The findings of Shryane (32) also confirmed the longer length of stay of COVID-19 patients who had underlying diseases.

According to the findings of the present study, people who died had a longer length of stay than those who were discharged alive. This contradicts the finding of a systematic review by Rees et al. (33) indicating that patients who died had a shorter length of stay than those who were discharged alive. In the study by Chiam (31), there was also a significant difference between the lengths of stay in patients based on their discharge status. Patients who were transferred to a hospice had the longest length of stay with a median of 12 days, followed by patients who were transferred to a nursing or psychiatric centres with a median of 10.7 days, and patients who were discharged and went home had a median of 5.9 days.

The findings of this study showed that there was a significant correlation between having symptoms like fever, muscular pain, respiratory distress, etc. in patients with COVID-19 and their hospitalization ward. Furthermore, it was found that many patients who were hospitalized in the infectious diseases ward or ICU had underlying diseases such as diabetes, hypertension, heart disease, and chronic kidney disease. The findings of the study by Bellos et al. (34) indicated that most of the patients who were admitted to the ICU had shortness of breath, while diarrhea was more common in the patients who were not admitted to the ICU. Additionally, the results indicate that patients who were admitted to the ICU had more pulmonary embolism and pulmonary fibrosis and also showed higher severity of the disease. Bintoro (35) also stated that majority of people who died had underlying diseases such as diabetes, coronary heart disease, and chronic kidney disease. The findings of Wendel (36) also showed that, compared to those who were recovered, many patients who were admitted to the ICU and died,

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had ischemic or other cardiac and autoimmune diseases.

Conclusion

This study sheds light on the critical relationship between demographic characteristics, underlying conditions, and the severity of COVID-19 symptoms in patients. The findings emphasize the importance of early detection and management strategies, especially for individuals with specific risk factors. These insights are crucial in guiding healthcare practices and policies to effectively combat the ongoing pandemic. The study outcomes also provide valuable insights for healthcare professionals and policymakers, aiding in the development of targeted interventions and patient-centered care protocols.

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Conflict of interests

The authors declared no conflict of interests.

Authors' contributions

Shafaghat T and Rahimi MK designed research; all the authors conducted research, analyzed data, and wrote the paper. Rahimi MK had primary responsibility for final content. All authors read and approved the final manuscript.

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