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Epidemiology, clinical characteristics, and outcome of hospitalized COVID-19 patients in Kurdistan Province, Iran

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Original Article

Abstract

BACKGROUND: The present study aimed to evaluate the epidemiology, clinical characteristics, and outcome of confirmed and suspected hospitalized coronavirus disease 2019 (COVID-19) cases in Iran hospitals affiliated with the Kurdistan University of Medical Sciences, Sanandaj, Iran.

METHODS: This cross-sectional study was performed on all confirmed and suspected hospitalized COVID-19 cases in hospitals affiliated with the Kurdistan University of Medical Sciences between March and September 2020. Required data were obtained from the Hospital Intelligent Management System of hospitals. Independent t-test, chi-square test, Fisher's exact test, and one-way analysis of variance (ANOVA) were used for univariate analysis. Variables with P-value < 0.3 in univariate analysis were entered into the multivariate model, and the adjusted odds ratio (AOR) was calculated.

RESULTS: Out of 9176 cases, 3210 cases (35.03%) were confirmed with COVID-19. The mean and standard deviation (SD) of age of the cases was 56.5 ± 19.3 in the confirmed and 57.5 ± 20.6 in the suspected cases. The confirmed and suspected cases' mortality rate was 15.0% and 10.2%, respectively. In both groups, the most common symptoms of admission to the hospital were respiratory distress, coughing, fever, and muscular pain. The variables of older age, male gender, being transferred to hospitals by ambulance, intensive care unit (ICU) hospitalization, being intubated, blood oxygen saturation level less than 93, and having an underlying disease were statistically associated with an increased chance of death.

CONCLUSION: The mortality rate among both confirmed and suspected hospitalized COVID-19 cases was significant, and this rate was higher for the confirmed cases. Death-related risk factors should be considered in resource allocation, management, and patient prioritization to reduce the outcome of death.

KEYWORDS: COVID-19; SARS-CoV-2; Epidemiology; Risk Factors; Mortality; Iran

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Introduction

Severe acute respiratory infection (SARI) causes illness, death, and hospitalization of millions of people worldwide each year and imposes a heavy socio-economic burden on communities.[1,3] It is also one of the main reasons for the referral and hospitalization of the elderly and children.[4,5] In Iran, SARI is the cause of several outbreaks every year and a reason for many hospitalizations in the hospitals. According to a national study, in

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2015, the cases and deaths due to SARI were 41294 and 1510, respectively.[6]

After severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome coronavirus (MERS-CoV), severe acute respiratory syndrome coronavirus (SARS-CoV), the causative agent of coronavirus disease 2019 (COVID-19), is the third outbreak of the coronavirus family in the first two decades of the 21st century, causing a public health crisis worldwide.[7,8] The disease was first identified in Wuhan, China, in December 2019, and in March 2020, the World Health Organization (WHO) declared it a global pandemic.[9] The number of infected cases and the resulting deaths are increasing rapidly worldwide. As of January 21, 2021, the SARS-CoV virus has infected approximately 97.41 million people worldwide, resulting in more than 2.09 million deaths.[10] In Iran, up to now, about 1.35 million people have been infected with this disease ,and about 67.2 thousand people have lost their lives.[10] The actual number of COVID-19 cases is much higher due to lack of patient visits to the hospitals, lack of symptoms in many infected cases, the limited number of polymerase chain reaction (PCR) diagnostic test kits, and lack of staff in health centers.[11-13]

COVID-19 is an acute respiratory syndrome with common symptoms including fever, cough, dyspnea, muscle aches, fatigue, sore throat, headache, and loss of smell and taste. Although the disease is mild in most people and improves without special treatment, it can lead to severe illness and even death in some people.[14] Studies have shown that several risk factors can be associated with an increased risk of death and disease severity in COVID-19 cases that should be considered when controlling and managing a pandemic. Among these risk factors, pre-existing hypertension (HTN), diabetes, cancer, cardiovascular disease (CVD), chronic kidney disease, and chronic lung disease can be considered the most important risk factors for death in COVID-19 cases.[13,15,16]

A study by Suleyman et al. (2020) in the Michigan State of the United States (US) on 436 patients with COVID-19 found that 94% of patients had at least one underlying disease.[17] In another study in the US, 92% of COVID-19 cases had underlying diseases, and HTN (60%) and diabetes (37%) were the most common underlying diseases among this group.[18] In the study of Jalili Khoshnood et al. in Iran, the most common underlying diseases among patients with COVID-19 were CVD (30.5%), respiratory system diseases (15.9%), and endocrine system diseases (15.7%).[19] In another study in Iran, the most common underlying diseases among hospitalized COVID-19 cases were HTN (19.5%), diabetes (14.2%), CVDs (14.2%), and chronic obstructive pulmonary disease (COPD).[13]

The COVID-19 pandemic threatens global public health security, and although the number of COVID-19 cases is increasing worldwide,[20] very little information is available on their epidemiological and clinical features, particularly in Iran. Evaluating the epidemiological and clinical data of COVID-19 cases is critical for understanding and controlling the pandemic and can be a tool for prioritizing patients and thus saving more lives.[1,3] In line with this and considering the importance of evidence-based decision-making, this study was conducted to evaluate the epidemiology, clinical characteristics, and outcome of confirmed and suspected COVID-19 cases admitted to the hospitals in Kurdistan Province, in western Iran.

Methods

This cross-sectional study was performed on patients admitted to the hospitals affiliated with Kurdistan University of Medical Sciences, Sanandaj, Iran, due to SARI. Kurdistan Province is located in western Iran, neighboring Iraq, with 1.6 million population.

Study participants: The study population included 9161 patients admitted to the hospitals affiliated with the Kurdistan University of Medical Sciences with symptoms of SARI between the beginning of March and the end of September 2020. A PCR test was performed for these patients. Patients with a positive PCR test (3210 cases) were considered confirmed cases of COVID-19, and other patients with a negative PCR test were considered suspected cases. The Inclusion criteria for the study were hospitalization due to confirmed or suspected COVID-19 disease, and the exclusion criterion was incomplete data recording.

Data collection and variables: Patients' data included the following items that were obtained from the Hospital Information System (HIS) of hospitals affiliated with the Kurdistan University of Medical Sciences:

1- Demographic characteristics, including gender and age

2- Clinical characteristics of patients including fever, cough, muscle pain, respiratory distress, decreased level of consciousness, change in the sense of smell and taste, seizures, headache, dizziness, chest pain, stomachache, nausea, vomiting, diarrhea, and anorexia on arrival at the hospital, mode of access to the hospital, hospitalization ward, history of smoking, history of substance abuse, cancer, liver disease, diabetes, blood diseases, weakened immune system, CVD, kidney disease, asthma, lung diseases other than asthma, neurological disease, history of HTN, underlying diseases, intubation, oxygen saturation level, and computed tomography (CT)-scan results

3- Outcome of the disease, including being recovered and discharged or death of patients with SARI at the time of hospital discharge

The patient's chronic illness status was determined based on the patient's self-report and in response to "Do you currently have a specific illness? Yes/No". If yes, the patient's chronic disease was recorded. The clinical symptoms recorded in this study included patients' clinical symptoms on admission time.

Statistical analysis: Independent t-test, chi-square test, Fisher's exact test, and one-way analysis of variance (ANOVA) were used in univariate analysis. Variables with P-value < 0.3 in univariate analysis were entered into the multivariate model, and the adjusted odds ratio (AOR) was calculated for them. The multivariate test selected variables based on the Forward Likelihood Ratio (LR) model. Analyses were performed using SPSS software (version 16, SPSS Inc., Chicago, IL, USA).

The Ethics Committee of Kurdistan University of Medical Sciences (IR.MUK.REC.1399.075) approved this study.

Results

In this study, 9176 cases were admitted to hospitals in Kurdistan Province due to SARI during the study period, and the result of PCR test of 3210 cases (35.03%) was positive. The mean ± standard deviation (SD) and the median age of the participants were 56.5 ± 19.3 and 58.0 [interquartile range (IQR): 42-71] in the confirmed cases and 57.5 ± 20.6 and 61.0 (IQR: 43-73) in the suspected cases, respectively. The mean ± SD of age of the deceased in the confirmed and suspected cases was 68.4 ± 16.5 and 68.1 ± 17.0 years, respectively. Most of the confirmed (50.0%) and suspected cases (51.7%) were men.

The mean and median of hospitalization days were 5.1 ± 4.9 and 4.0 (IQR: 2-6) in the confirmed and 4.2 ± 4.8 and 3.0 (IQR: 1-5) in the suspected cases, respectively. The mortality rate in the confirmed and suspected cases was 15.0% and 10.2%, respectively. The highest mortality rate was seen in cases of over 70 years old (28.9% among confirmed and 21.1% among suspected cases). About 53% of all deaths among confirmed and suspected cases belonged to the over-70 age group.

The percentage of admitted cases to the

intensive care unit (ICU) and intubated cases was 10.3% and 6.5% in the confirmed and 12.2% and 6.8% in the suspected cases, respectively. The mortality rate for patients admitted to the ICU was 55.7% and 34.5% among confirmed and suspected cases, respectively. The most common symptoms for the confirmed cases at the time of admission to the hospital were respiratory distress (59.6%), cough (47.8%), fever (33.1%), and muscular pain (26.2%) and for suspected cases were respiratory distress (56.3%), cough (38.8%), fever (32.5%), and muscle pain (24.6%). 38.5% of confirmed and 39.5% of suspected cases had underlying diseases.

The most common underlying diseases among confirmed cases were HTN (16.2%), diabetes (12.0%), CVD (10.3%), and among suspected cases were HTN (16.0%), CVD (11.7%), and diabetes (9.6%). The mortality rate for patients with underlying diseases among confirmed and suspected cases was 22.6% and 15.4%, respectively.

The highest mortality rate in confirmed cases was seen among those suffering from liver disease (44.0%), weakened immune system (42.9%), and kidney disease (30.8%). Moreover, the highest mortality rate for suspected cases belonged to those suffering from liver disease (22.2%), CVD (18.7%), and lung diseases other than asthma (18.4%). Table 1 shows the general information of all hospitalized cases by demographic variables, confirmed and suspected cases, and outcomes of death or discharge.

Based on the results of the univariate test for confirmed COVID-19 cases, there was a statistically significant relationship ($P < 0.05$) between the outcome of death with variables of gender, age group, mode of access to the hospital, type of hospitalization ward, fever, muscle pain, respiratory distress, decreased level of consciousness, headache, being intubated, blood oxygen saturation level less than 93, chronic diseases comorbidity including cancer, liver disease, diabetes, heart disease, kidney disease, lung disease, HTN, other chronic diseases, symptomatic lung CT scan, mean age, and mean length of hospital stay (Table 1).

In addition, among suspected cases, there was a statistically significant relationship ($P < 0.05$) between the outcome of death with variables of gender, age group, mode of access to the hospital, hospitalization ward, fever, muscle pain, respiratory distress, decreased level of consciousness, headache, dizziness, abdominal pain, nausea, vomiting, being intubated, blood oxygen saturation level less than 93, comorbidity of chronic diseases including cancer, diabetes, heart disease, kidney disease, lung diseases other than asthma, other chronic diseases, HTN, underlying diseases, symptomatic lung CT-scan, mean age, and mean days of hospitalization (Table 1).

In this study, all variables with P-value < 0.3 obtained in univariate analysis (Table 1) were included in the Forward LR model in the logistic regression test.

Variables included in the model of the confirmed cases were gender, mean age, fever, cough, muscle pain, respiratory distress, reduced level of consciousness, change in the sense of smell, headache, anorexia, mode of access to the hospital, hospitalization ward, history of smoking, having underlying diseases, being intubated, blood oxygen saturation level, and CT-scan results. Moreover, variables included in the model of the suspected cases were gender, mean age, fever, cough, muscle pain, respiratory distress, reduced level of consciousness, change in the sense of smell, headache, dizziness, chest pain, abdominal pain, nausea, vomiting, anorexia, mode of access to the hospital, hospitalization ward, history of substance abuse, having underlying diseases, being intubated, blood oxygen saturation level, and CT-scan results. The "death outcome" variable was considered a dependent variable (Table 2).

Table 1. Relationship between demographic and clinical variables with death and discharge outcome in confirmed and suspected coronavirus disease 2019 (COVID-19) cases in Kurdistan Province, Iran, based on univariate test

Variables	Clinical outcome during hospitalization among confirmed cases			Clinical outcome during hospitalization among suspected cases		
	Discharge	Death	P	Discharge	Death	P
Gender						
Men	1367 (83.5)	271 (16.5)	0.011	2727 (88.6)	352 (11.4)	0.002
Women	1362 (86.6)	210 (13.4)		2615 (91.1)	257 (8.9)	
Age group (year)						
0-4	29 (87.9)	4 (12.1)	< 0.001	92 (93.9)	6 (6.1)	< 0.001
5-18	39 (90.7)	4 (9.3)		120 (96.0)	5 (4.0)	
19-29	186 (97.4)	5 (2.6)		345 (98.0)	7 (2.0)	
30-49	837 (95.4)	40 (4.6)		1360 (95.5)	64 (4.5)	
50-69	1009 (85.4)	172 (14.6)		1878 (90.3)	201 (9.7)	
+70	629 (71.1)	256 (28.9)		1547 (82.6)	326 (17.4)	
Mode of access to hospital						
Self-presentation	2527 (86.8)	384 (13.2)	< 0.001	4677 (91.4)	439 (8.6)	< 0.001
By ambulance	2020 (67.6)	97 (32.4)		665 (79.6)	170 (20.4)	
Hospitalization ward						
ICU	147 (44.3)	185 (55.7)	< 0.001	475 (65.5)	250 (34.5)	< 0.001
Others	2582 (89.7)	296 (10.3)		4867 (93.1)	359 (6.9)	
Fever						
Yes	923 (87.0)	138 (13.1)	0.027	1796 (92.8)	140 (7.2)	< 0.001
Cough						
Yes	1320 (86.1)	213 (13.9)	0.098	2097 (20.9)	215 (9.3)	0.058
Muscle pain						
Yes	732 (87.1)	108 (12.9)	0.044	1353 (92.3)	113 (7.7)	< 0.001
Respiratory distress						
Yes	1559 (81.3)	359 (18.7)	< 0.001	2921 (87.1)	431 (12.9)	< 0.001
Reduced consciousness level						
Yes	41 (36.6)	71 (63.4)	< 0.001	191 (56.0)	150 (44.0)	< 0.001
Changes in sense of smell						
Yes	50 (92.6)	4 (7.4)	0.116	54 (94.7)	3 (5.3)	0.213
Changes in sense of taste						
Yes	22 (88.0)	3 (12.0)	0.470*	50 (92.6)	4 (7.4)	0.489
Seizure						
Yes	11 (84.6)	2 (15.4)	0.603*	19 (86.4)	3 (13.6)	0.396*
Headache						
Yes	159 (90.9)	16 (9.1)	0.009	216 (94.3)	13 (5.7)	0.013
Dizziness						
Yes	33 (86.8)	5 (13.2)	0.616	82 (96.5)	3 (3.5)	0.032
Chest pain						
Yes	38 (82.6)	8 (17.4)	0.814	145 (86.8)	22 (13.2)	0.279
Stomachache						
Yes	64 (85.3)	11 (14.7)	0.767	215 (93.5)	15 (6.5)	0.041
Nausea						
Yes	72 (84.7)	13 (15.3)	0.877	219 (94.4)	13 (5.6)	0.012
Vomiting						
Yes	69 (85.2)	12 (14.8)	0.787	221 (95.7)	10 (4.3)	0.002
Diarrhea						
Yes	45 (88.2)	6 (11.8)	0.415	109 (91.6)	10 (8.4)	0.437
Anorexia						
Yes	167 (87.0)	25 (13.0)	0.259	307 (91.1)	30 (8.9)	0.304
History of smoking						
Yes	33 (91.7)	3 (8.3)	0.261	113 (91.9)	10 (8.1)	0.437

Table 1. Relationship between demographic and clinical variables with death and discharge outcome in confirmed and suspected coronavirus disease 2019 (COVID-19) cases in Kurdistan Province, Iran, based on univariate test (continue)

Variables	Clinical outcome during hospitalization among confirmed cases			Clinical outcome during hospitalization among suspected cases		
	Discharge	Death	P	Discharge	Death	P
History of substance abuse						
Yes	11 (84.6)	2 (15.4)	0.602*	35 (83.3)	7 (16.7)	0.132*
Intubation						
Yes	64 (30.8)	144 (69.2)	< 0.001	192 (47.3)	214 (52.7)	< 0.001
Blood oxygen saturation level (%)						
< 93	1636 (80.2)	405 (19.8)	< 0.001	3057 (85.4)	524 (14.6)	< 0.001
> 93	1093 (93.5)	76 (6.5)		2285 (96.4)	85 (3.6)	
Having cancer						
Yes	36 (73.5)	13 (26.5)	0.022	79 (76.0)	25 (24.0)	< 0.001
Liver disease						
Yes	5 (55.6)	4 (44.4)	0.034*	14 (77.8)	4 (22.2)	0.105*
Diabetes						
Yes	306 (79.7)	78 (20.3)	0.002	479 (86.2)	77 (13.8)	0.003
Anemia						
Yes	15 (83.3)	3 (16.7)	0.520*	28 (84.8)	5 (15.2)	0.245*
Weakened immune system						
Yes	4 (57.1)	3 (42.9)	0.073*	11 (91.7)	1 (8.3)	0.648*
CVD						
Yes	240 (72.5)	91 (27.5)	< 0.001	564 (81.3)	130 (18.7)	< 0.001
Kidney disease						
Yes	36 (69.2)	16 (30.8)	0.001	136 (83.4)	27 (16.6)	0.007
Having asthma						
Yes	81 (79.4)	21 (20.6)	0.107	175 (87.5)	25 (12.5)	0.282
Pulmonary diseases other than asthma						
Yes	45 (70.3)	19 (29.7)	0.001	146 (81.6)	33 (18.4)	< 0.001
Neurological disease						
Yes	14 (77.8)	4 (22.2)	0.279*	51 (83.6)	10 (16.4)	0.111
History of HTN						
Yes	397 (76.3)	123 (23.7)	< 0.001	798 (83.6)	157 (16.4)	< 0.001
Underlying diseases						
No underlying diseases	1772 (89.8)	201 (10.2)	< 0.001	3355 (93.1)	247 (6.9)	< 0.001
One underlying disease	631 (79.0)	168 (21.0)		1315 (86.2)	210 (13.8)	
More than one underlying disease	326 (74.4)	112 (25.6)		672 (81.6)	152 (18.4)	
CT-scan result						
With symptoms	1547 (83.0)	317 (17.0)	0.001	3562 (89.3)	426 (10.7)	0.049
No symptoms	61 (89.7)	7 (10.3)		147 (94.2)	9 (5.8)	
No CT-scan performed	1121 (87.7)	157 (12.3)	-	1633 (90.4)	174 (9.6)	
Pregnancy**						
Yes	12 (92.3)	1 (7.7)	< 0.001	25 (100)	0 (0)	0.095*
Age (year)	54.4 ± 18.9	68.4 ± 16.5	< 0.001#	56.3 ± 20.6	68.1 ± 17.0	< 0.001#
Duration of hospitalization (day)	5.0 ± 4.7	6.2 ± 6.0	< 0.001#	4.1 ± 4.2	5.0 ± 6.6	< 0.001##

Data are presented as mean ± standard deviation (SD) or number and percentage

*Chi-square test assumptions were not met and Fisher's exact test results were reported.

**Only for women

#P-value was the same for both independent t-test and non-parametric Mann-Whitney test

##P-value in Mann-Whitney non-parametric test was non-significant and equal to 0.40

ICU: Intensive care unit; CVD: Cardiovascular disease; HTN: Hypertension; CT: Computed tomography

Table 2. Relationship between demographic and clinical variables with death and discharge outcome in confirmed and suspected coronavirus disease 2019 (COVID-19) cases in Kurdistan Province, Iran, based on logistic regression multivariate test

Variables	Confirmed cases			Suspected cases		
	OR	95% CI	P	OR	95% CI	P
Age	1.04	1.03-1.04	< 0.001	1.03	1.02-1.03	< 0.001
Sex						
Women	1	-	0.008	1	-	0.006
Men	1.38	1.09-1.74		1.32	1.08-1.61	
Mode of access to hospital						
Self-presentation	1	-	0.002	1	-	< 0.001
By ambulance	1.75	1.24-2.46		1.79	1.40-2.30	
Hospitalization ward						
Others	1	-	< 0.001	1	-	< 0.001
ICU	6.02	4.49-8.08		3.81	3.05-4.76	
Respiratory distress						
No	1	-	< 0.001	1	-	< 0.001
Yes	1.62	1.25-2.10		1.66	1.34-2.07	
Intubation						
No	1	-	< 0.001	1	-	< 0.001
Yes	8.67	5.99-12.56		9.17	7.06-11.91	
Blood oxygen saturation level less than 93						
No	1	-	< 0.001	1	-	< 0.001
Yes	1.89	1.40-2.54		2.70	2.06-3.50	
Underlying diseases						
No underlying diseases	1	-	-	1	-	
One underlying disease	1.43	1.09-1.87	0.009	1.53	1.22-1.93	< 0.001
More than one underlying disease	1.77	1.30-2.41	< 0.001	1.80	1.38-2.33	< 0.001
Cough						
No	-	-	-	1	-	0.039
Yes	-	-	-	1.24	1.01-1.52	
Duration of hospitalization	-	-	-	1.02	1.01-1.04	0.011

Percentage of model accuracy in estimation: 88.2
The amount of Nagelkerke R: 0.402
Using the Forward LR model
OR: Odds ratio; CI: Confidence interval; ICU: Intensive care unit

Older age [AOR: 1.04, 95% confidence interval (CI): 1.03-1.04], male gender (AOR: 1.38, 95% CI: 1.09-1.74), going to the hospital by ambulance (AOR: 1.35, 95% CI: 1.02-1.77), ICU hospitalization (AOR: 1.75, 95% CI: 1.24-2.46), having respiratory distress (AOR: 1.62, 95% CI: 1.25-2.10), being intubated (AOR: 8.67, 95% CI: 5.99-12.56), blood oxygen saturation level less than 93 (AOR: 1.89, 95% CI: 1.40-2.54), and having one (AOR: 1.43, 95% CI: 1.09-1.87) or more than one underlying disease (AOR: 1.77, 95% CI: 1.30-2.41) increased the chance of death outcome in the confirmed COVID-19 cases.

Besides, older age (AOR: 1.03, 95% CI: 1.02-1.03), male gender (AOR: 1.32, 95% CI: 1.08-1.61), going to hospital by ambulance (AOR: 1.79, 95% CI: 1.40-2.30), ICU hospitalization (AOR: 3.81, 95% CI: 3.05-4.76), having respiratory distress (AOR: 1.66, 95% CI: 1.34-2.07), being intubated (AOR: 9.17, 95% CI: 7.06-11.91), blood oxygen saturation level less than 93 (AOR: 2.70, 95% CI: 2.06-3.50), having one (AOR: 1.53, 95% CI: 1.22-1.93) or more than one underlying disease (AOR: 1.80, 95% CI: 1.38-2.33), cough (AOR: 1.24, 95% CI: 1.01-1.52), and lengthened hospital stay (AOR: 1.02, 95% CI: 1.01-1.04) increased the chance of death outcome for suspected COVID-19 cases (Table 2).

Discussion

The present study provides comprehensive information on epidemiology, demographic and clinical features, and outcomes of confirmed and suspected hospitalized COVID-19 cases. According to studies, several risk factors can be associated with increased risk of death and disease severity in patients with COVID-19, which should be considered when controlling and managing this pandemic.[13,15,16,21]

Based on the findings of this study, the result of the PCR test was positive for about 35% of individuals hospitalized due to SARI in hospitals in Kurdistan Province. The mean and SD of age in the confirmed and suspected COVID-19 cases was 56.5 ± 19.3 and 57.5 ± 20.6 years, respectively. Most of the both confirmed and suspected cases were men. The mean and SD of age of the deceased in both confirmed and suspected cases was 68.4 ± 16.5 and 68.1 ± 17.0 years, respectively. In the study of Argenziano et al., which was performed on the first 1000 patients with positive PCR referred to a medical center in New York City, US, the mean age of the patients was 63 years, and most of the patients were men.[۱۸] In a study by Guan et al. in China, the mean age of the hospitalized COVID-19 cases was 47 years, and about 58% were men.[22] In the study of Zali et al. in Iran, performed on 8252 confirmed and 7783 suspected COVID-19 cases referred to the hospital, most of the cases in both groups were men. In addition, the mean and SD of age of the deceased and recovered cases was 67.5 ± 15.8 and 49.2 ± 17.4 years among confirmed and 66.7 ± 19.5 and 47.7 ± 19.0 years among suspected cases, respectively.[21] In another study in Tehran, Iran, which was performed on 1083 confirmed COVID-19 cases, the mean and SD of age of patients was 50.8 ± 19.3 years, and most of them (62%) were men.[19]

In our study, the mortality rate among the confirmed was higher than the suspected cases (15.0% and 10.2%, respectively) and the highest mortality rate (28.9% among confirmed and 21.1% among suspected cases) and more than half of all deaths in both confirmed and suspected patients occurred in cases over 70 years of age. Although people of all ages were susceptible to COVID-19, the death rate was higher among the elderly. In a study in New York City, the death rate was reported to be 21% (211 cases), and they concluded that patients admitted with COVID-19 had severe complications and high mortality.[18] According to a study conducted in China on 5139 COVID-19 cases, about 60% of all deaths were seen in people over 64 years of age.[23] In a study in Shiraz, Iran, performed on 113 confirmed hospitalized patients with COVID-19, the death rate was reported to be 8%. The highest death rate (14.3%) occurred in the age group of 75 years and above in the preceding study.[13] In another study in Tehran, which was performed on confirmed hospitalized COVID-19 cases, the overall mortality rate was 10.8%, and it was 24.8% in the over-60 age group. The highest proportion of occurrence was seen in the age group of 60 years (34.6%).[19] In the study of Zali et al. in Tehran, which was carried out on confirmed and suspected COVID-19 cases admitted to the hospital, the mortality rate among the confirmed was higher than the suspected cases (13.5% and 6.4%, respectively)[21]. This study showed the highest mortality rate in the elderly group (with 32.5% among the confirmed and 16.8% among suspected cases).

Based on the findings of our study, the mortality rate for the patients with underlying diseases was higher among the confirmed compared to suspected cases (22.6% and 15.4%, respectively), and the highest mortality rate among confirmed cases was for those with liver diseases, and weakened immune and renal system. Moreover, the highest mortality rate among suspected cases belonged to those with liver diseases, CVD, and pulmonary diseases other than asthma. In a study in

Tehran that was performed on confirmed and suspected COVID-19 cases referred to the hospital, the mortality rate among patients with underlying diseases was higher in the confirmed compared to the suspected cases (34.2% and 21.7%, respectively). In the preceding study, the highest mortality rate among confirmed cases belonged to patients with cancer (46.4%), neurological disease (42.9%), pulmonary disease (41.3%), HTN (34.7%), CVD (33.7%), and diabetes (25.5%). In addition, the highest mortality rate among suspected cases belonged to patients with diabetes and HTN simultaneously (26.8%), cancer (20.5%), CVD (14.7%), HTN (12.9%), and diabetes (11.1%).[21]

The percentage of patients admitted to ICU and intubated was 10.3% and 6.5% among the confirmed and 12.2% and 6.8% among the suspected cases, respectively. 62.7% of the confirmed and 56% of suspected cases admitted to ICU needed intubation. The study by Suleyman et al. in the US on 436 patients with COVID-19 from five hospitals found that 40% of hospitalized patients needed intensive care. In the preceding study, about 80% of patients admitted to ICU needed ventilation, and about 40% died. The researchers concluded that many people hospitalized for COVID-19 in Detroit, US, needed intensive care and ventilation services and experienced death.[17] In the study of Zali et al. in Tehran, the percentage of people admitted to ICU in the two groups of confirmed and suspected cases were 14.2% (1173 cases) and 14.9% (1162 cases), respectively.[21]

In both groups, respiratory distress, cough, fever, and muscle pain were the most common symptoms of admission to the hospital. In a study of 24000 patients who tested positive for COVID-19 from nine countries, the most common symptoms were fever (78%), cough (57%), fatigue (31%), loss of smell (25%), and dyspnea (23%).[14] In a study in the US, the most common symptoms were cough (73%), fever (73%), and dyspnea (63%).[18] In a study in China, the most common symptoms of patients with COVID-19 were fever (43.8%) and cough (67.8%).[۲۲] According to the results of a study on 1083 confirmed COVID-19 cases in Iran, the most common symptoms were fever (67.0%), dyspnea (56.0%), cough (54.3%), and muscle pain (33.1%).[19] Results of our study revealed the significant effect of older age, male gender, being transferred to hospital by ambulance, ICU hospitalization, having respiratory distress, intubation, blood oxygen saturation level less than 93, having underlying diseases, cough (only in suspected cases), and longer hospital stay (only in suspected cases) on the increased chance of death in both groups of patients. In a study in Tehran that was performed on 1083 confirmed hospitalized COVID-19 cases, the mortality rate was significantly higher in patients over 60 years of age (24.8%), cases with HTN (25.4%), cases without cough (17%), and cases with dyspnea (16.5%).[19] In a study in Tehran that was conducted on 8252 confirmed and 7783 suspected COVID-19 cases referred to the hospital, the results of multiple Cox proportional hazards regression analysis showed that being male [adjusted hazard ratio (HR): 1.19, 95% CI: 1.05-1.35], age over 65 years (adjusted HR: 2.18, 95% CI: 1.93-2.48), and ICU hospitalization (adjusted HR: 3.93, 95% CI: 3.46-4.57) were the most significant risk factors for death among confirmed hospitalized COVID-19 cases. In the preceding study, age over 65 years (adjusted HR: 2.38, 95% CI: 1.97-2.87) and ICU hospitalization (adjusted HR: 3.93, 95% CI: 3.46-4.57) were the most important risk factors associated with death among the suspected COVID-19 cases.[21] The results of a study in China showed that the male gender, older age, heart disease, and hyperglycemia had a significant negative effect on the survival of admitted patients with COVID-19.[24] According to a study in the US, male gender and age over 60 years were significantly associated with mortality in

admitted COVID-19 cases.[18] Results of a review study revealed that variables of male gender, age over 65, dyspnea, blood oxygen saturation less than 93, having kidney disease, diabetes, CVD, immunosuppression, pulmonary, liver, and neurological disease, and pregnancy were the most significant risk factors for disease severity in patients with COVID-19.[25]

This study is one of the preliminary studies on COVID-19 in Kurdistan Province with a sufficient number of patients, and this is one of the strengths of the study, and in addition to univariate analysis, multivariate analysis has also been performed. Limitations of the study include the use of available data and lack of follow-up of patients to investigate the consequences and complications of the disease and lack of study of the effect of different drug groups on the outcome of hospitalized patients.

Conclusion

The mortality rate among both confirmed and suspected hospitalized COVID-19 cases was significant, and this rate was higher among confirmed cases. Moreover, the mortality rate among patients admitted to the ICU was higher in the confirmed than the suspected cases. The most common symptoms of admission to the hospital in both groups were respiratory distress, cough, fever, and muscle pain. Variables of older age, male gender, being transferred to hospital by ambulance, ICU hospitalization, respiratory distress, intubation, blood oxygen saturation level less than 93, having underlying diseases, cough (only in suspected cases), and longer hospital stay (only in suspected cases) had a statistically significant relationship with an increased chance of death outcome.

Conflict of Interests

Authors have no conflict of interests.

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