




## Epidemiological characteristics of patients with COVID-19 in Southwest of Iran from February 19 to June 20, 2020

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### Abstract

**Background:** COVID-19 spread rapidly throughout the world and affected many people. The purpose of this study was to investigate the epidemiological characteristics of patients with COVID-19 in southwest of Iran from February 19 to June 20, 2020.

**Methods:** In this retrospective study, the epidemiological characteristics of 7313 patients with COVID-19 in southwest of Iran were analyzed and reported from February 19, 2020, to the end of Jun ,2020. Data were extracted from electronic records in hospitals. Sex ratio and mortality rate of the disease were calculated. A multiple logistic regression analysis was used to evaluate the factors affecting mortality.

**Results:** From all patients studied, 3920 (53.5%) were men and 2066 (28.24%) were in the age 30 to 40 years age group. The case fatality rate of the disease based on the total number of patients (hospitalized and nonhospitalized) was 4.84%. The highest mortality rate was seen in patients with various cancers and in those aged over 80 years. The most common symptoms in patients were fever and cough, diabetes, hypertension, and cardiovascular diseases. Logistic regression results also showed that the chances of death in the 70-60 and 80-70 years age group were 5.94 (OR, 5.94; 95% CI, 2.14-16.43) and 8.63 (OR, 8.63, 95% CI, 3.09-24.14) compared to 10-20 years age group.

**Conclusion:** These results indicate the need to increase primary care, provide the necessary equipment to treat patients, and more importantly, early identification of patients and treatment for them.

**Keywords:** COVID-19, Coronavirus, Eepidemiology, Iran

**Conflicts of Interest:** None declared

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### Introduction

In December 2019, a number of cases of pneumonia of unknown cause appeared in Wuhan and Hubei, China. Clinical evidence showed that these cases are very similar to viral pneumonia (1-4). Most patients worked or lived in the Huanan Seafood Wholesale Market. In the early stages of pneumonia, severe acute symptoms of respirato-

ry infection occurred, with some patients rapidly developing acute respiratory distress syndrome, acute respiratory failure, and other serious complications. By a complete and more accurate analysis of lower respiratory tract specimen, on January 7, a new coronavirus was detected by the China Centers for Disease Control and Prevention,

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#### ↑What is “already known” in this topic:

Due to the increase in morbidity and mortality in Iran, especially in Khuzestan province in southwestern Iran, this study aimed to investigate the epidemiology of COVID-19.

#### →What this article adds:

These results indicate the need to increase primary care, provide the necessary equipment to treat patients, and more importantly, early identification of patients and treatment for them.

which was subsequently named the New Coronavirus 2019 (nCoV-2019) by the world health organization (WHO) (5-8). The disease is highly contagious, and each infected person can infect an average of 3 people (9). The most common symptoms are fever, cough, and shortness of breath (10). COVID-19 spread rapidly around the world until the WHO declared it a global emergency (11, 12).

The disease was first identified in Iran on February 19 (10). As of March 21, 2021, a total of 1,793,805 patients with COVID-19 have been identified in Iran, of whom 61,724 have died from the disease. (13) According to the latest statistics, Iran ranks 15th in the world in terms of the number of patients and 9th in terms of the number of deaths due to COVID-19 (14). Identifying the epidemiological features of the disease can help make the right decisions and then control the epidemic. Due to the increase in morbidity and mortality in Iran, especially in Khuzestan province in southwestern Iran with hot and dry climate, this study aimed to investigate the epidemiology of COVID-19 in southwestern Khuzestan province, which includes Abadan, Khorramshahr, and Shadegan. Therefore, the purpose of this study was to investigate the epidemiological characteristics of patients with COVID-19 in southwest of Iran from February 19 to June 20, 2020.

## Methods

### Study Design and Data Collection

This was a retrospective observational study, an epidemiological study conducted in hospitals under the auspices of Abadan University of Medical Sciences in southwest of Khuzestan province. The total population of this region, using the databases of health centers and national census data, was 627,970. COVID-19 patients who have been admitted from the beginning of February 19, 2020, to the end of Jun 20, 2020. Patients with COVID-19 disease were identified by reverse transcription polymerase chain reaction using nasal and throat swab samples or by computed tomography scan. All admitted patients have a

unique national code, so there were no duplicates. All clinical and demographic information of patients, results of daily follow-up, and the final outcome of each patient were recorded by health experts. In the study area, there were only 2 hospitals that like other medical centers in the country, performed all stages of testing and hospitalization of patients according to the protocols and national guidelines of COVID-19 management.

The variables used in this study were as follows: age; sex; final outcome (including mortality and survival); diabetes; hypertension; heart disease; cancer; and chronic kidney disease.

### Statistical Analysis

Frequency and percentage were used for descriptive analyses. Then, the mortality rate of the disease and the sex ratio (male to female) cases of mortality and morbidity were calculated. Graphs have also been used to show the age and sex distribution of morbidity and mortality as well as underlying diseases in patients. A multiple logistic regression model was used to investigate the effect of age, sex, and underlying diseases on attenuation. The adjusted odds ratio (OR) was calculated with a 95% CI.

P values < 0.05 were considered as statistically significant. Data analysis was performed using SPSS software Version 19 and Excel spreadsheet 2007.

## Results

From February 19, 2020, to the end of June 20, 2020, a total of 7317 COVID-19 patients have been referred to Abadan hospitals. The mean age of infection and death in men was  $41.48 \pm 16.35$  and  $60.16 \pm 19.52$ , respectively, and in women it was  $41.44 \pm 17.30$  and  $64.46 \pm 17.04$ , respectively. The mean age of infection and death in both sexes was  $41.46 \pm 16.80$  and  $62.12 \pm 18.54$ , respectively. Most of them were in the age category of 30-40 years (Fig. 1). Also, according to Table 1, most patients were men (53.5%). The sex ratio of male to female was 1.15: 1. A

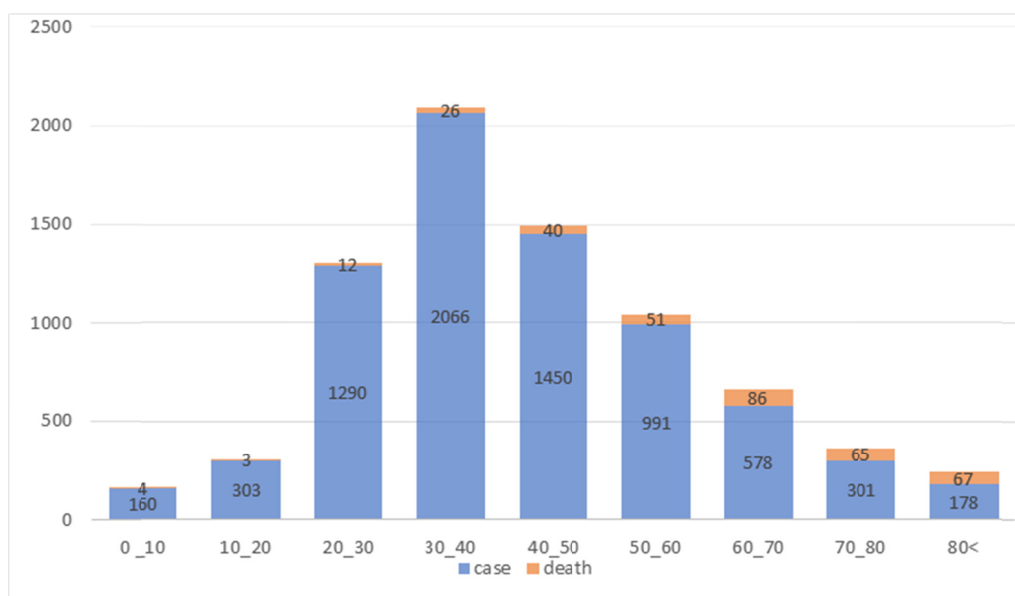


Fig. 1. The distribution of all cases and deaths in each age group (n = 7317)

**Table 1.** Demographics and characteristics of patients infected with COVID-19

Variable	All Cases N (%)	Deaths (n)	Case Fatality Rate (%)
Age (year)			
0-10	160 (2.19)	4	2.50
10-20	303 (4.14)	3	0.99
20-30	1290 (17.36)	12	0.93
30-40	2066 (28.24)	26	1.26
40-50	1450 (19.82)	40	2.76
50-60	991 (13.54)	51	5.15
60-70	578 (7.90)	86	14.88
70-80	301 (4.11)	65	21.59
>80	178 (2.43)	67	37.64
Gender			
Male	3920 (53.57)	193	4.92
Female	3397 (46.43)	161	4.74
Symptom of the disease			
Weakness	96 (1.31)	1	1.04
Chest discomfort	86 (1.18)	2	2.33
Anorexia	58 (0.79)	1	1.72
Lethargy	47 (0.64)	4	8.51
Dizzying	82 (1.12)	2	2.44
Contusion	387 (5.29)	12	3.10
Odor disorder	192 (2.62)	1	0.52
Headache	188 (2.57)	2	1.06
Sore throat	391 (5.34)	20	5.12
Diarrhea	95 (1.30)	0	0.00
Runny nose	36 (0.49)	0	0.00
Shortness of breath, cough, fever patient	5659 (77.34)	309	5.46
Recovery	6295 (86.03)	-	-
Hospitalized	708 (9.68)	-	-
Death	314 (4.29)	-	-
Comorbidity disease			
NO	5325 (72.78)	90	1.69
Hypertension	403 (5.51)	65	16.13
Diabetes	615 (8.41)	85	13.82
Respiratory disease	206 (2.82)	27	13.11
Cardiovascular	368 (5.03)	74	20.11
Chronic kidney disease	138 (1.89)	20	14.49
Cancer	26 (0.36)	12	46.15
Other disease*	236 (3.23)	36	15.25

\*Brain-neurological problems, seizures, obesity, hyperlipidemia, liver problems.

**Table 2.** The effective epidemiological factors on mortality of Covid-19 patients

Variable	Odds Ratio	P Value	95% CI
Age group, y			
10-20	-	-	-
60-70	5.941	0.001	2.147-16.438
70-80	8.638	0.001	3.091-24.140
Diabetes			
No	-	-	-
Yes	3.140	<0.001	2.406-4.099
Cardiovascular			
No	-	-	-
Yes	4.566	<0.001	3.436-6.069

total of 354 deaths occurred, with a total mortality rate of 4.84%. The mortality rates in men and women were 4.92% and 4.74%, respectively. Also, with increasing

the age of patients, the mortality rate increases, so that the highest mortality rate was in the age category over 80 years. The mortality rate was also calculated based on the symptoms of the disease, with the highest mortality rate occurring in patients who reported lethargy (8.51%). The highest mortality rate was based on the history of underlying disease in patients who reported a history of various cancers (46.15%). In patients with a history of diabetes, hypertension, and cardiovascular disease, the mortality rate was obtained to be 13.82%, 16.12%, and 20.10%,

respectively. The case fatality rate in patients with no comorbidity disease was 1.69%.

Also, diabetes, hypertension, and cardiovascular diseases were the most common comorbidity diseases in patients with 8.41%, 5.51%, and 5.03%, respectively. Also, according to **Table 2**, logistic regression results also showed that the chances of death in the age group of 60-70 years and 70-80 years were 5.94 (OR, 5.94; 95% CI, 2.14-16.43) and 8.63 (OR, 8.63, 95% CI, 3.09-24.14) is compare to age group 10-20, respectively. Also, the chance of death in patients with a history of diabetes was 3.49 (OR, 3.49; 95% CI, 2.60-4.68) compared to patients without a history of diabetes. The chance of death in patients with a

history of cardiovascular disease was 3.49 (OR, 4.56; 95% CI, 3.43-6.06) compared to patients who do not have a history of the disease.

### Discussion

The present study was performed on 7317 patients with COVID-19 in southwestern Khuzestan province in Iran with the purpose of reviewing the epidemiological status of COVID-19 patients. The mean age of patients who got the disease in both men and women was 41 years. While the mean age at death was slightly higher in women than men (64 years vs 60 years), the other 2 studies estimated the mean age at onset at 46 years (3) and 40 years (15), which had conformity with the results of our study. Other studies have shown that the mean age of infection is between 34 and 54 years (16-18). Also, the mean age of patients has been reported differently in other studies. The mean age was reported to be 47.5 years in Beijing (19), 63.2 years in Spain (20), 50 years in China (21), 48.1 years in southern Iran (22), and 63.2 years in a study of 1420 patients in Europe (23). The reason for these differences can be due to differences in the number of patients under study, evaluation of patients with different disease intensities, and the age composition of communities. The most common symptoms in our patients were fever (83%), cough (82%), and then shortness of breath (31%), which had conformity with the results of many other studies (1, 15, 16, 24). Also, in another study done in the south of Iran, the most common symptoms were dizziness, cough, and fever (18). The most common symptoms were reported to be fever, shortness of breath, and dry cough in Nigeria (25), fever, cough, and fatigue in Beijing (19), and headache and decreased sense of smell and cough in Europe (23). Coughing and shortness of breath are expected to be common symptoms, as most of the target cells are located in the respiratory system. Also, the reason for the common symptom of fever can be due to the fact that this symptom has been screened more than other symptoms.

Based on the results of our study, the mortality rate in people with COVID-19 was equal to 4.84%. Other studies done in Iran estimated the mortality rate at 1.8% (9), 2.9% (22), 10.8% (26), and 8% (18). This rate was reported at 2.6% in a study in Nigeria (25). Other studies in different parts of the world also reported a mortality rate of 2.5% to 15% (1, 5, 25, 27, 28). This difference in the mortality rate may be due to the fact that different studies have calculated mortality rates for different people, including hospitalized people, people with severe forms of the disease, as well as those non-hospitalized. Another reason for this difference can be the differences in access to medical equipment and facilities in different countries. We must keep in mind that the combination of age and the prevalence of underlying diseases in different communities are among the factors affecting mortality rate.

The results of the study showed that mortality rate is higher in people over 80 years. Also, the results of logistic regression showed that people aged 60 to 70 years were almost 6 times and people aged 70 to 80 years were 8.6 times more likely to die from COVID-19 than people aged 0 to 10 years. Also, in another study in Iran, the results

showed that with each year of age, mortality increases 1.05 times (9). Another study showed that with each year of age, the chance of mortality increases 1.8 times (29), and in the study conducted in Tehran, it was found that people over 60 years had a higher chance of mortality (26). All of these results indicate an increase in the fatality of the disease with increasing age. This can also be due to the fact that older people have more underlying diseases than other people and have a weaker immune system. All of these factors provide the basis for infection and attenuation for these people.

Based on our results, the sex ratio of infection (male to female) was 1.9. These results had conformity with other studies (15, 18, 24). In a study in Libya on 3695 patients, the sex ratio was estimated at 2.1 (30). High infection and mortality in men can be due to various reasons, including genetic and hormonal differences. Also, the reason for the low infection of women can be due to the role of the X chromosome. Sexual hormones play an important role in creating acquired immunity in women (18). We must also keep in mind that men leave home to work more than women. They have more contact with other people. Therefore, they are more exposed to the virus and get the disease.

The most common underlying diseases in patients in our study were diabetes, hypertension, and cardiovascular disease, respectively. People with diabetes and cardiovascular disease were 3.4 times more likely to die from COVID-19 than others. Other studies reported diabetes, high blood pressure, and cardiovascular disease as common underlying diseases in people with COVID-19 (29). Diabetes, hypertension, chronic respiratory disease, and cardiovascular disease were the most common comorbidities in another study in Iran, which increased the chance of mortality by 7 times (31). Diabetes, hypertension, and cardiovascular diseases were the most common comorbidities in Shiraz and increased the chances of mortality by 11.6 times (22). It should be noted that these people have weaker immune systems and are more susceptible to disease.

### Conclusion

The results of our study showed that older age, male gender, and underlying diseases all increase the infection and mortality. These results indicate the need to increase primary care, provide the necessary equipment to treat patients, and more importantly, early identification of patients and treatment for them. Strategies are also needed to take protective and preventive actions for vulnerable groups and work environments that may increase the risk of transmission. Our study was done on a large number of people, which is the most important advantage of this study.

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IR.ABADANUMS.REC.1399.051).

### Conflict of Interests

The authors declare that they have no competing interests.

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