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Research Article

Epidemiological Study of Patients with COVID-19 in Iran (Markazi Province)

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ABSTRACT

Background: The increasing prevalence of SARS-COV-2 infection necessitates further epidemiological studies in the field of this epidemic.
Methods: during 66 days (20/02/2020 to 01/06/2020) all patients diagnosed with SARS-COV-2 infection referred to Valiasr Hospital in Arak were monitored. Thus, based on the pre-prepared questionnaire, the information of the mentioned patients was extracted from the Hospital Information System (HIS) by the required formats and after eliminating the incomplete cases, it was aggregated based on coding (to preserve the patients' information). The results were evaluated using spss. v25 software.
Results: Out of 535 patients with SARS-COV-2 included in the study, 295 (55%) were male and 240 (45%) were female. Women with a mean age of 61.03 years were significantly ($p = 0.009$) at a higher age than men with a mean age of 56.59 years. Nearly 60% (304 patients) of patients had a history of underlying disease. Gender comparison of patients with a history of underlying disease infected with SARS-COV-2 infection did not show any significant difference between male and female patients. Comparison of the mean age of the improved and dead patients shows that the mean age of the dead patients with a significant difference ($P <0.001$) was higher than the improved subjects. This result is also true for people with a history of underlying disease ($p<0.0001$). The number of patients with arterial oxygen saturation <93% was significantly higher in the group of patients with a history of at least one chronic underlying disease than who did not have any chronic disease ($P <0.0001$). The mortality rate in ICU patients was significantly higher than those admitted to the normal ward ($p < 0.0001$).
Conclusion: Aging, gender, underlying diseases and arterial oxygen saturation (<93%) at the time of admission have important role in the hospitalization rate, severity of the disease and mortality in patients with COVID-19.

It has been almost a year (since December 31, 2019) since the first case of coronavirus was observed in Wuhan, China [1]. The infection, which initially appeared in patients with symptoms such as dry cough, respiratory distress, and fever, soon spread worldwide and now affects more than 28 million people worldwide [2-4]. Acute respiratory syndrome following coronavirus (SARS-COV2) is caused by the infectious function of an

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RNA-base virus that is produced by binding to the ACE2 surface receptors in epithelial cells via spike proteins [5-6]. The nationwide spread of this type of receptor in organs such as the lungs, gastrointestinal tract, urinary system, brain, heart, and arteries causes different manifestations in different patients [5,7-9]. Nearly a year after the outbreak of this infection worldwide, symptoms such as olfactory and taste disorders, gastrointestinal problems, vascular damage, headache, and also stroke have been added to the initial clinical manifestations of this disease [9-10].

The rapid spread of the infection and the lack of access to definitive and specific treatments led the situation in favor of epidemiological and ethological studies to identify and combat the infection. Such studies can help to adopt preferred methods of counteracting the spread of the new coronavirus by creating an information platform. According to what has been reported in various studies, factors such as the age of patients, history of underlying diseases, obesity, and inherited and acquired immunological disorders put people at greater risk of developing the new coronavirus [11-15]. However, racial, cultural (lifestyle) differences, and many other factors can also interfere with the prevalence and severity of the disease. Thus, the implementation of epidemiological studies in such diseases, while creating a kind of information base that can be cited for health policymakers in the study area, also provides the conditions for targeted treatment. Accordingly, the present study emphasizes the epidemiological parameters of patients with SARS-COV-2 and evaluates the prevalence of this disease in the central regions of Iran.

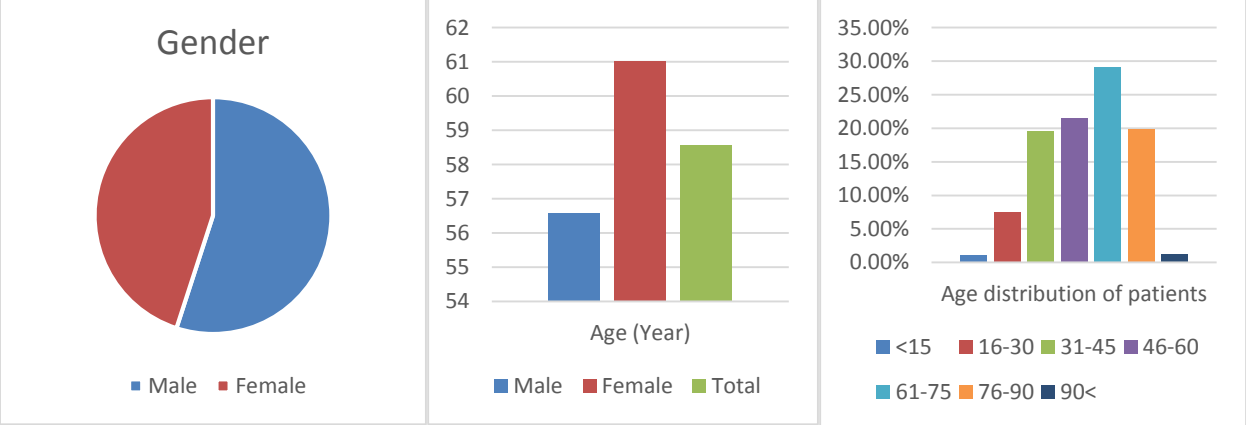
Methods

In this study, during 66 days (20/02/2020 to 01/06/2020) all patients diagnosed with SARS-COV-2 infection referred to Valiasr Hospital in Arak were monitored. Thus, based on the pre-prepared questionnaire, the information of the mentioned patients was extracted from the Hospital Information System (HIS) by the required formats and after eliminating the incomplete cases, it was aggregated based on coding (to preserve the patients' information). The results were evaluated using spss. v25 software by producing tables, the chi-square test was performed for qualitative data and the possibility of type 1 error was calculated. Also, the T-student test was calculated and analyzed to compare the mean age of patients. This research was approved by the Ethics Committee in Biomedical Research of Arak University of Medical Sciences (by code: IR.ARAKMU.REC.1399.174) before implementation.

Results

According to the results in (Figure 1), out of 535 patients with SARS-COV-2 included in the study, 295 (55%) were male and 240 (45%) were female. The mean age of participants was 58.58 years (the youngest patient was 6 years old and the oldest was 98 years old). However, women with a mean age of 61.03 years were significantly (p = 0.009) at a higher age than men with a mean age of 56.59 years.

Figure 1- Demographic information of patients



The study of the history of underlying disease showed 304 (56.82%) with a history of at least one disease were included in the study which of these, 31 died. Diabetes mellitus, Ischemic Heart disease and high blood pressure were more common than other diseases in people with the new coronavirus infection (Table 1).

Examination of arterial oxygen saturation at the admission time showed that out of 304 patients with a history of at least one chronic underlying disease, 123 (53.24%) had a saturation of less than 93%, while this amount for patients without a history of chronic disease was 115 (37.82%) and this difference is significant (p <0.0001). On the other hand, out of 49 patients who died

in this study, 28 (57.14%) are patients who have a history of at least one underlying disease with a decrease in arterial oxygen saturation to below 93%.

Gender comparison of patients with a history of underlying disease infected with SARS-COV-2 infection did not show any significant difference between male and female patients (Table 2).

Table 1- Prevalence of underlying diseases in people with COVID-19.

History of diseases		N (%)	Total	saturation of oxygen <93	ICU Admission	Death
	Diabetes	74 (13.8)				
	Ischemic Heart disease	60 (11.2)				
YES	Kidney disease	21 (3.92)	304	123 (53.24)	27 (8.88)	31 (10.19)
	Asthma	24 (4.5)				
	Blood pressure	53 (9.9)				
	Other	72 (13.5)				
NO		231 (43.1)	231	115 (37.82)	18 (7.79)	18 (7.79)
Total		-	535	238 (44.5)	48 (8.4)	49 (9.15)

Table 2- Gender comparison of patients with a history of underlying disease infected with SARS-COV-2 infection.

Diseases	Gender	N (%) *	P value
Diabetes	Male	39 (13.2)	0.650
	Female	35 (14.6)	
Ischemic Heart disease	Male	35(11.9)	0.598
	Female	25(10.4)	
Asthma	Male	9(3.1)	0.075
	Female	15 (6.3)	

*The percentages given are specific to each gender

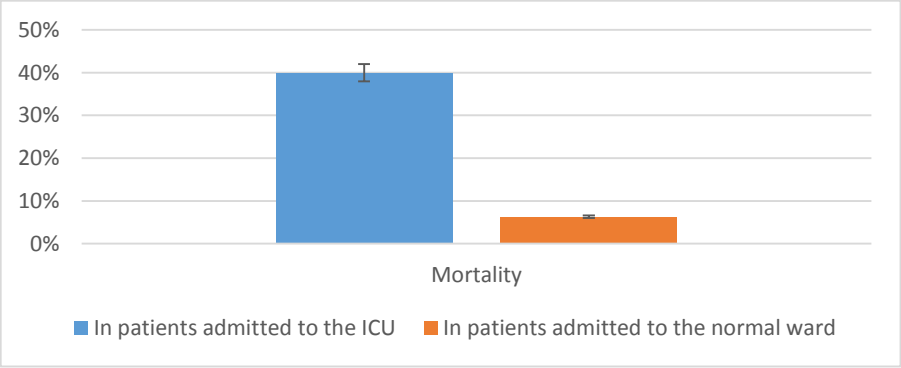
Comparison of the mean age of the improved and dead patients in (Table 3) shows that the mean age of the dead patients with a significant difference (P<0.001) was higher than the improved subjects. This result is also true for people with a history of underlying disease, as this group of patients are significantly older than their counterparts (without a history of underlying disease).

Table 3- Evaluation of age status in some indicators studied by patients

	Death	Recovery	With a history of disease	No history of disease
Age (M ± SD)	75.04±9.68	56.92±19.60	65.09±14.60	54.31±21.30
P value	<0.0001		<0.0001	

According to Figure 2, 18 (40.0%) deaths were reported in the ICU and 31 (6.3%) of deaths in the normal ward were reported, which is a significant difference (p = 0.0001).

Figure 2- Comparison of mortality rates of patients with COVID-19 in patients admitted to ICU and patients admitted to normal ward.



Discussion

Coronaviruses are a large family of viruses and a subset of coronaviruses that range from the common cold virus to the cause of more severe diseases such as SARS, Mers, and Covid-19 [16]. So far, seven human-borne coronaviruses have been identified, the latest of which, Acute Respiratory Syndrome (SARS-CoV-2), broke out in December 2019 in Wuhan, China [17].

According to previous reports [18-20], elderly patients are more likely to develop severe COVID-19. However, according to the clinical classification, the severity of the disease is higher in men than women [21]. The results of this study also showed that men infected with SARS-C0V2 were approximately 10% more likely than women to be referred to. Many different factors such as differences in the structure of the male immune system compared to women, behavioral and health patterns, and more underlying diseases such as diabetes, blood pressure in men can be considered as factors that justify these results [22]. These results are while the mean age of people infected with the virus in the group of men is 56.59 years versus 61.03 years in the group of women, which also has a significant difference (P= 0.009). This shows that men, in addition to being more infected than women, are also exposed to infection at a younger age. A study of 425 patients with COVID-19 showed that 56% were male [23]. Another study of 140 patients showed that 50.7% were male [24]. Thus, gender is a risk factor for higher severity and mortality in patients with COVID-19, regardless of age and sensitivity. This gender factor, as well as the higher incidence of men in most diseases, can be related to the general demographic fact of life expectancy in men compared to women in China and the world in general.

High protein expression of ACE2 receptor in specific organs is associated with specific organ failure, which is indicated by relevant clinical parameters in SARS patients [25-26]. Circulating ACE2 levels are higher in men than in women and patients with diabetes or cardiovascular disease [27]. High protein expression of ACE2 receptor in specific organs is associated with specific organ failure, which is indicated by relevant clinical parameters in SARS patients [25-26]. Circulating ACE2 levels are higher in men than in women and patients with diabetes or cardiovascular disease [27].

COVID-19 is believed to have an increasing progression in people with the underlying disease, often leading to death [27-30]. According to what is currently known, patients with COVID-19 who have co-morbid conditions such as high blood pressure or diabetes mellitus are more likely to have a more severe course and progression of the disease [31-35]. These factors increase ICU admissions and COVID-19 mortality. The results of the present study also showed that 39.62% of all patients studied had at least one underlying disease. Among them, diabetes with 13.8%, Ischemic heart diseases with 11.2%, and blood pressure with 9.9% had the highest prevalence in these patients. Twenty-seven of these patients were admitted to the intensive care unit, accounting for a total of 12.7%. Of the 323 patients without underlying disease, 18 went to the ICU, which was 5.57%. Therefore, it can be inferred that a significant number of patients with a history of underlying disease experience worsening clinical conditions. In a study of 7,336 patients with COVID-19 without type 2 diabetes, it was shown that those with type 2 diabetes needed more intervention [36]. As a result, in those with poorer glycemic control, the overall mortality rate increased than in those with better glucose control [37]. Patients with acute respiratory distress syndrome and coronavirus-associated respiratory failure may be associated with prothrombotic coagulation [38]. A retrospective meta-analysis of 1,558 COVID-19 patients as of March 1, 2020, was performed on individuals with comorbidities and risk of COVID-19 [39]. Common diseases such as hypertension, COPD, diabetes, and cardiovascular disease are the most important risk factors in individuals compared to other underlying diseases [40].

One of our important finding was the increased death rate in patients who were suffering from at least one underlying disease while their arterial oxygen saturation was less than 93% at the arrival time to the hospital. Indeed out of 49 patients who died in this study, 28 (57.14%) were in the mentioned situation. Some previous studies have confirmed the effect of low percentage of arterial oxygen saturation on the mortality rate of patients with the new coronavirus [41-43].

Conclusion

According to the results of the present study, men are far more at risk for COVID-19 disease and its related mortality. However, the severity of the disease also is more in the older patients. Based on the results, it can be said that the presence of the underlying disease can increase the risk and severity of the disease specially in company with low oxygen saturation at the time of admission.

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