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Evaluation of demographic status and related factors in mortality of patients suspected of COVID-19 admitted to Razi Hospital in Rasht

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Abstract

Introduction: SARS-CoV2 is the third strain from Corona family with zoonotic roots which has spread among humans from the beginning of this century. We conducted this study to examine mortality and its related factors among all patients admitted to Razi Hospital with suspicion of COVID-19 between February and April 2020.

Materials and Methods: In this analytical cross-sectional study,after obtaining permission from the ethics committee under the university's research deputy, the required information such as demographic data, clinical symptoms and imaging study results was collected by reviewing records of all patients with COVID-19 suspicion.

Results: From 1792 cases, 1045 patients were male and 747 patients were female. Mortality was 27% in all patients and 30% and 22% in men and women. The highest hospitalization rate was in the age group of 51-60 years and the highest mortality rate was in the age group of 81-90 years. 1472 patients lived in urban areas and 316 patients in rural areas. 997 patients had 93% O2 Saturation and less, of which 36% died. PCR test was performed for 505 patients, of which 69% were positive. Chest CT scan was performed in 96% of patients and chest X-ray was performed in 66% of patients with COVID-19.The most common symptoms were shortness of breath, cough, fever, chills, weakness, nausea and headache, respectively. The highest mortality was in patients with impaired consciousness at the beginning of hospitalization.

Conclusion: The results of the present study showed that male gender, older age, history of underlying disease, Chest x-ray involvement, drug use, shortness of breath and lesser O2 Saturation are associated with adverse outcomes, constitutional and gastrointestinal symptoms are associated with better outcomes in patients with COVID-19.

Keywords: Coronavirus, Acute respiratory syndrome, SARS-CoV-2, COVID-19, Mortality

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Introduction

Coronaviruses are a type of Coronaviridae. Coronaviridae is a family of enveloped, sensitive, positive, single-stranded RNA viruses that has the largest viral genome (26-33 kb) among RNA-infected viruses. The family Coronaviridae consists of two subfamilies called "Coronavirinae" (Coronavirus) and "Torovirinae" (Torovirus). Coronavirus can be divided into four groups based on phylogenetic classification: "Alpha, Beta, Gamma and Delta" (1). Few studies are showing that bats can host many types of coronaviruses, which varies depending on the habitat and the type of bat (2).

In general, coronaviruses cause a mild respiratory illness in humans with cold-like symptoms; But the ability to cause severe and even fatal respiratory diseases has been proven (3). A type of coronavirus called "Coronavirus 2019" was identified on December 31, 2019, in Wuhan, China, also known as "COVID-19". According to the analyzes, the amino acid positions of 501, 723 and 1010 have changed with the SARS virus, a stable mutation in non-structural protein 2 (nsp2) has resulted in COVID-19 being more contagious than in SARS. Also, the nsp3 destabilizing mutation caused an acceptable difference between SARS and COVID-19 (4). In a 2020 study by Huang C et al. to evaluate clinical findings in patients with coronary artery disease, laboratory features included leukopenia (25%), lymphopenia (25%), and increased aspartate aminotransferase (Seven of the 28 patients are non-ICU(37%)). In ICU patients, prothrombin and D-dimer levels were increased in admission compared to non-ICU patients. Elevated troponin (troponin-sensitive I (HS-cTnI)) was detected in five patients, possibly indicating virus-associated myocardial damage. Abnormalities in computed tomography (CT) of the chest were observed in all patients. Ninety-eight percent had a two-way conflict, and grand glass turbidity was generally seen. Complications included acute respiratory syndrome (29%) and secondary infection (10%) (5). In a 2020 study, Salehi et al. performed imaging findings in patients with coronary artery disease. One of the known features of COVID-19 in primary CT is multilobar ground-glass (GGO) opacity with peripheral or posterior distribution, mainly in the lower lobes and less in the right middle lobe. Abnormal early imaging findings of GGO opacities may be seen in a smaller number of cases, mainly in the elderly. Septal thickening, bronchiectasis, pleural thickening, and subpleural involvement are some of the less common findings, which are mainly seen in later stages of the disease. Pleural effusions, pericardial effusions, lymphadenopathy, cavitation, halo symptoms, and pneumothorax are very rare but may be seen as the disease progresses (6). Follow-up of CT in the next stage of the disease, with an increase in the number and size of GGOs and gradual conversion of GGO to multifocal turbidity, thickening of the septum and the formation of a paving pattern, is seen most strongly in CT findings on day 10 after the onset of symptoms. The acute respiratory syndrome is the most common symptom for the transfer of patients with COVID-19 to the ICU and the leading cause of death in this patient population. Imaging patterns of clinical improvement usually occur after 2 weeks of illness and include the gradual removal of opacities and a reduction in the number of lesions and lobes involved (6). Since various factors from age, gender and place of residence, to underlying diseases and special medical conditions from common cases such as diabetes to special cases such as cancer treatment or organ transplantation, along with the patient's symptoms are known to be effective in disease severity and outcome. In this study, the mortality rate of patients suspected of having COVID-19 was admitted in February and April 2020 and their relationship was examined based on statistical analysis.

Materials and Methods

Study population

In this cross-sectional-analytical study, after obtaining permission from the Ethics Committee in University Research at Guilan University of Medical Sciences (IR.GUMS.REC.1399.245), the data of all hospitalized patients suspected of having COVID-19 based on positive signs in favor of Corona, CT scan report and simple chest X-ray report in Razi Hospital in Rasht during February and April 2020 were reviewed.

Statistical analyses

After collecting the data, the data were entered into SPSS software version 22 and to describe them, relevant and appropriate statistical tables and graphs

were extracted. Chi-square and Fisher tests were used to investigate the possible relationship between the variables and the outcome of patients' deaths.

Results

In order to conduct the study, 1796 files were studied and 4 files were excluded due to lack of information. According to Table 1, out of 1792 patients, 484 (27%) died and 1308 (72.9%) recovered. There were 1045 male and 747 female patients, which accounted for 58.3% and 41.6% of the population of COVID-19 patients admitted during February and April 2020, respectively. 315 patients (30.1%) died among men and 169 patients (22.6%) among women. This rate is 17.5% for dead men compared to the total number of patients studied and for women 9.4%. There was a statistically significant relationship between being a man and mortality rate (P <0.001); Male patients were more likely to die than female patients.

Table 1. Frequency distribution of gender of patients in terms of outcome.

Gender		Consequences		Total	P-value
		Recovery	Death		
Male	Number	730	315	1045	<0.001
	Percent	69.8 %	30.1%	100.0 %	
	Percent of total	40.7 %	17.5%	58.3%	
Female	Number	578	169	747	
	Percent	77.3 %	22.6%	100.0 %	
	Percent of total	32.2 %	9.4%	41.6%	
Total	Number	1308	484	1792	
	Percent	72.9 %	27.0%	100.0 %	

82.3% (1472 people) of patients admitted to the city and 17.7% (316 people) lived in the village. The mortality of patients living in urban areas was 25.5% (375 cases) and 33.5% (106 cases) among villagers. Rural residents were higher than urban residents (33.5% vs. 25.5%).

The age of the patients in the study was between 16 and 100 years with a mean of 58.8 ± 15.7. The mortality rate of patients over 58.5 years was 37.8% and in the group less than 58.5 years was 15.5%. There was a statistically significant relationship between age over 58.5 years and death rate (P <0.001); This means that patients aged 59 years and older died more than those aged 59 years (37.8% vs. 15.5%).

8 patients (0.4%) in the age group of 16-20 years (100% recovery), 61 patients (3%) in the age group of 21-30 years (90% recovery, 9% death), 183 People (10%) in the age group of 31-40 years (90% recovery, 9% death), 308 people (17%) in the age group 41-50 years (82% recovery, 7% death), 396 people (22%) In the age group 51-60 years (78% recovery, 21% death), 385 people (21%) in the age group 61-70 years (67% recovery, 32% death), 273 people (15%) in the age group -71 80 years (59% recovery, 40% death), 158 people (8%) in the age group 81-90 years (53% recovery, 46% death), 20 people (1%) in the age group 91-100 years (55% recovery) , 45% feet). The highest hospitalization rates for both men and women were in the age group of 51 to 60 years with 12% and 9%, respectively. The highest mortality rate of men, as well as all patients regardless of gender, was in the age group of 81 to 90 years (46%) and for women in the age group of 91 to 100 years (55%).

The mean length of hospital stay of the studied patients was 5.4 days with a standard deviation of 4.7 days. Considering the cut-off of 5.5 days; 1147 patients have been hospitalized less than this period, with a death rate of 28.7% (329 cases) (68.8% of all deaths) in this group and 23.4% (149 cases) (31.2% of total deaths) among patients who have been hospitalized for more than this period. Deaths). There was a statistically significant relationship between the length of hospital stay and death rate (P = 0.016) so that in patients with a length of hospital stay of 5 days and less than patients admitted more than 5 days more death rate occurred (28.7% vs. 23.4 %).

Based on the information in Figure 1; 9.1% of patients were smokers, 3.9% were opium users, and 0.9% of patients admitted reported smoking and opium at the same time. In these three groups, the mortality rate was 25.5%, 45.6% and 46.7%, respectively. The mortality of people who had no history of smoking or opium (1484 people) was 25.9%. There was a statistically significant relationship between opium use (with or without smoking) and mortality (P = 0.002); Patients with a history of opium addiction (with or without

smoking) had a higher mortality rate than those without a history of addiction.

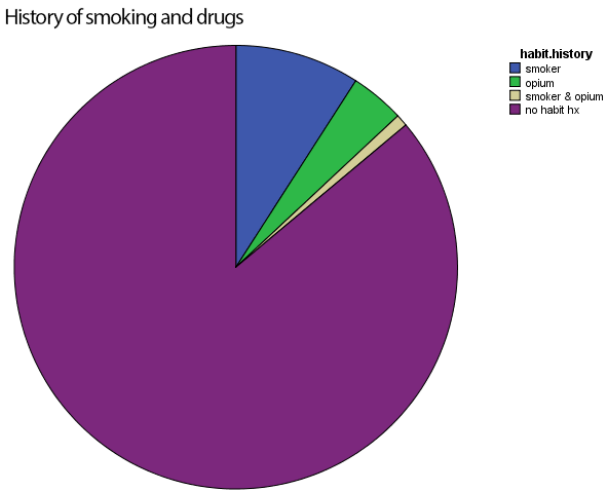

Figure 1. Frequency of patients by the history of smoking and opium.

Based on the information; 64.6% of hospitalized patients reported a positive history of underlying diseases. The mortality rate in this group was 32.7%, while among patients with no history of the underlying disease (35.4% of patients), 16.5% died and 83% recovered and were discharged. The number of people who had no underlying disease or previous medical history and died made up 5.9% of the total study population and the remaining 21.1% of the population who died had a history of the underlying disease. There was a statistically significant relationship between having a history of one of the underlying diseases and mortality (P <0.001); So that in any of the underlying diseases, the mortality rate was higher than people without a history of any disease.

Of all the cases, 151 were hospitalized in the intensive care unit, of which 131 (86%) died and 20 recovered. Of these, 115 (76.2%) had a history of the underlying disease. 93 people (61%) were men. There was a statistically significant relationship (P <0.001) between hospitalization in the intensive care unit and death outcome. There was also a statistically significant relationship (P <0.001) between male gender and history of the underlying disease with hospitalization in intensive care unit; So that male patients either with a history of underlying disease were admitted to the intensive care unit more than female patients or without a history of the underlying disease, and also among patients admitted to the intensive care unit more death rate than Occurred patients admitted to the emergency department.

According to Table 2 and Figure 2; Mortality in patients with hypertension was 33.8%. It is noteworthy that 38.3% of all deaths were due to this disease and 73% of recovered people had no history of this disease. Also, the death rate among people who did not have a history of hypertension was 23.9%. Diabetes improved by 68%, compared with 75% among people without a history of diabetes (excluding other diseases). 23.4% of patients with hyperlipidemia died.

The mortality rate among hospitalized cardiovascular patients was 36.5% and 7% of the total population died with a history of this disease. A history of stroke has been associated with 40% of deaths. Also, the mortality rate in respiratory diseases was 34.3% and 12.2% of the total death population were involved in respiratory diseases.

In conditions of suppression or immune system disorders such as cancer, chemotherapy and radiotherapy, as well as the use of immunosuppressive drugs and a history of transplant mortality was higher than the total average. The highest mortality rate was among people with a history of radiotherapy (66.7%).

There was a statistically significant relationship (P <0.001) between the history of hypertension, cardiovascular disease, history of cancer and mortality. Also between diabetes (P = 0.003), liver disease (P = 0.004), history of radiotherapy (P = 0.005), history of respiratory disease (P = 0.024), neurological disease (P = 0.010) and use of suppressive drugs Immune system (P = 0.046) was also observed to have a statistically significant relationship with mortality. So that the death rate in patients with any of the above diseases was higher than patients with a negative history of that disease.

There was no statistically significant relationship between hyperlipidemia, CVA, kidney and thyroid disease and history of organ transplantation and mortality.

Table 2. Frequency of each case of underlying disease and death rate.

Disease	Positive history	Death rates	P value	Disease	Positive history	Death rates	P value
Blood pressure	30.4%	33.8 %	<0.001	**Radiotherapy**	0.7%	66.7%	0.005
Diabetes	28.8%	32%	0.003	**Chemotherapy**	1.7%	43.3%	0.059
Hyperlipidemia	11%	23.4%	0.235	**Taking immunosuppressive drugs**	1.1%	57.9%	0.004
Cardiovascular disease	19.1%	36.5%	<0.001	**Liver disease**	7.4%	31.8%	0.221
Respiratory problems	9.6%	34.3%	0.024	**Kidney disease**	3.3%	31.7%	0.459
Stroke	2.2%	40%	0.128	**Thyroid problem**	2.5%	44.4%	0.010
Cancer	3.2%	56.1%	<0.001	**Neurology and psychiatry**	4.7%	36.5%	0.046
Organ transplantation	2.1%	35.1%	0.264				

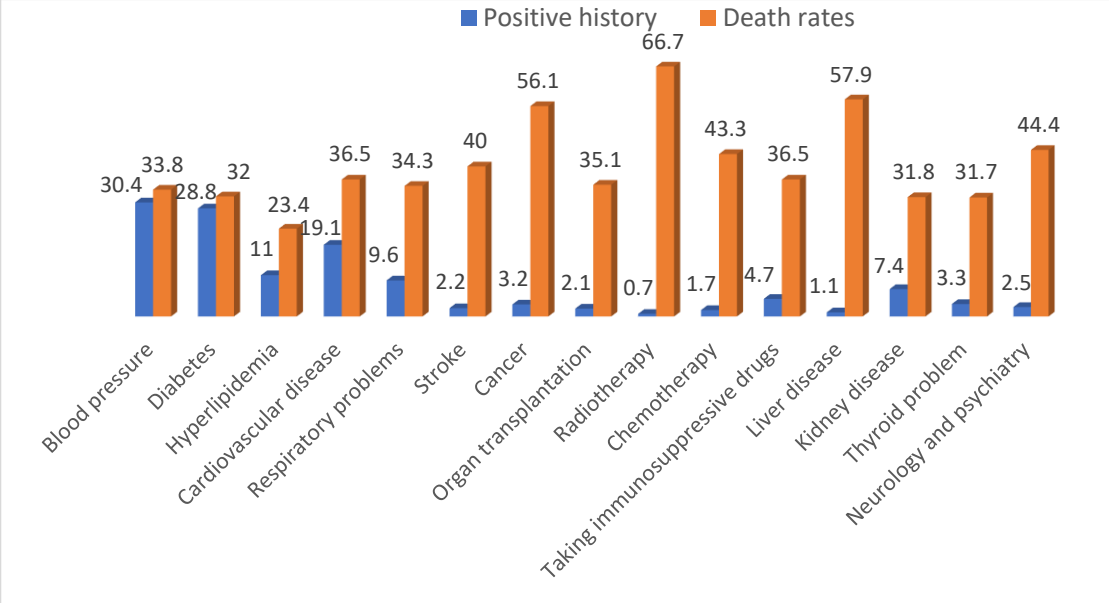

Figure 2. Prevalence of each underlying disease and death rate.

According to Table 3 and Figure 3; 1137 patients (64.6%) had fever and 623 patients (35.4%) did not have fever. 274 patients (24.1%) died in fever group and 193 (31.0%) deaths in non-fever group. There was a statistically significant relationship between the absence of fever and the rate of death (P = 0.002) so that in patients without fever the rate of death was higher than patients with fever (31.0% vs. 35.4%)

657 patients (37.4%) had chills and 1101 patients (62.6%) did not have chills. 139 patients (21.2%) with chills symptoms and 328 patients (29.8%) in patients without chills died. There was a statistically significant relationship between the absence of shivering and the rate of death (P <0.001) so that in patients without shivering the rate of death was higher than those with shivering (29.8% vs. 37.4%)

1239 patients (70.4%) had a cough and 520 patients (29.6%) had no cough. The death rate was 314 (25.3%) in people with cough and 153 (29.4%) in the group without cough. There was no statistically significant relationship between cough and death rate (P = 0.086).

1401 patients (79.6%) had shortness of breath and 358 patients (20.4%) had no shortness of breath. 424 patients (30.3%) died in patients with shortness of breath and 43 patients (12%) died in the group without shortness of breath. There was a statistically significant relationship between the symptoms of shortness of breath and the rate of death (P <0.001) so that the rate of death in patients with shortness of breath was higher than patients without shortness of breath (30.3% vs. 12%).

10.8% of the patients had a headache, 5.9% had diarrhea and 27.5% had myalgia. Mortality in each was 25.8%, 19.4% and 24.2%, respectively. There was no statistically significant relationship between headache, diarrhea and myalgia symptoms with death rate.

104 patients (5.9%) had decreased level of consciousness, of which 73 (70.2%) died. There was a statistically significant relationship (P <0.001) between decreased level of consciousness and mortality; The death rate was higher among patients with decreased level of consciousness than those without this symptom (70.2% vs. 23.8%).

The frequency of patients with nausea was 12.2%, vomiting 8%, weakness and lethargy 17.8%, sore throat 3.4% and neurological symptoms 0.9%. The mortality rates in each were 15.3%, 13.6%, 16.9%, 13.6%, and 17%, respectively. There was a statistically significant relationship between the absence of the above symptoms and mortality (P <0.05); So that the rate of recovery in people with these symptoms was higher than people without them.

Table 3. Frequency distribution of clinical symptoms in the studied patients according to the outcome.

Clinical symptoms			Consequences		Total	P value
			Recovery	Death		
Fever	Yes	Number	863	274	1137	0.002
		Percent	75.9%	24.1%	64.6%	
	No	Number	430	193	623	
		Percent	69.0%	31.0%	35.4%	
Chills	Yes	Number	518	139	657	<0.001
		Percent	78.8%	21.2%	37.4%	
	No	Number	773	328	1101	
		Percent	70.2%	29.8%	62.6%	
Cough	Yes	Number	925	314	1239	0.086
		Percent	74.7%	25.3%	70.4%	
	No	Number	367	153	520	
		Percent	70.6%	29.4%	29.6%	
Shortness of breath	Yes	Number	977	424	1401	<0.001
		Percent	69.7%	30.3%	79.6%	
	No	Number	315	43	358	
		Percent	88.0%	12.0%	20.4%	
Headache	Yes	Number	141	49	190	
		Percent	74.2%	25.8%	10.8%	0.862
	No	Number	1151	418	1569	
		Percent	73.4%	26.6%	89.2%	
Diarrhea	Yes	Number	83	20	103	0.107
		Percent	80.6%	19.4%	5.9%	
	No	Number	1209	447	1656	
		Percent	73.0%	27.0%	94.1%	
Myalgia	Yes	Number	367	117	484	0.183
		Percent	75.8%	24.2%	27.5%	
	No	Number	926	350	1276	

		Percent	72.6%	27.4%	72.5%	
Loss of consciousness	Yes	Number	31	73	104	<0.001
		Percent	29.8%	70.2%	5.9%	
	No	Number	1261	394	1655	
		Percent	76.2%	23.8%	94.1%	
Nausea	Yes	Number	182	33	215	<0.001
		Percent	84.7%	15.3%	12.2%	
	No	Number	1110	434	1544	
		Percent	71.9%	28.1%	87.8%	
Nausea	Yes	Number	121	19	140	<0.001
		Percent	86.4%	13.6%	8.0%	
	No	Number	1171	448	1619	
		Percent	72.3%	27.7%	92.0%	
Weakness and lethargy	Yes	Number	260	53	313	<0.001
		Percent	83.1%	16.9%	17.8%	
	No	Number	1033	414	1447	
		Percent	71.4%	28.6%	82.2%	
Sore throat	Yes	Number	51	8	59	0.024
		Percent	86.4%	13.6%	3.4%	
	No	Number	1241	459	1700	
		Percent	73.0%	27.0%	96.6%	
Neurological symptoms	Yes	Number	14	3	17	<0.001
		Percent	82.0%	17.0%	0.9%	
	No	Number	1278	462	1740	
		Percent	73.0%	26.0%	99.0%	

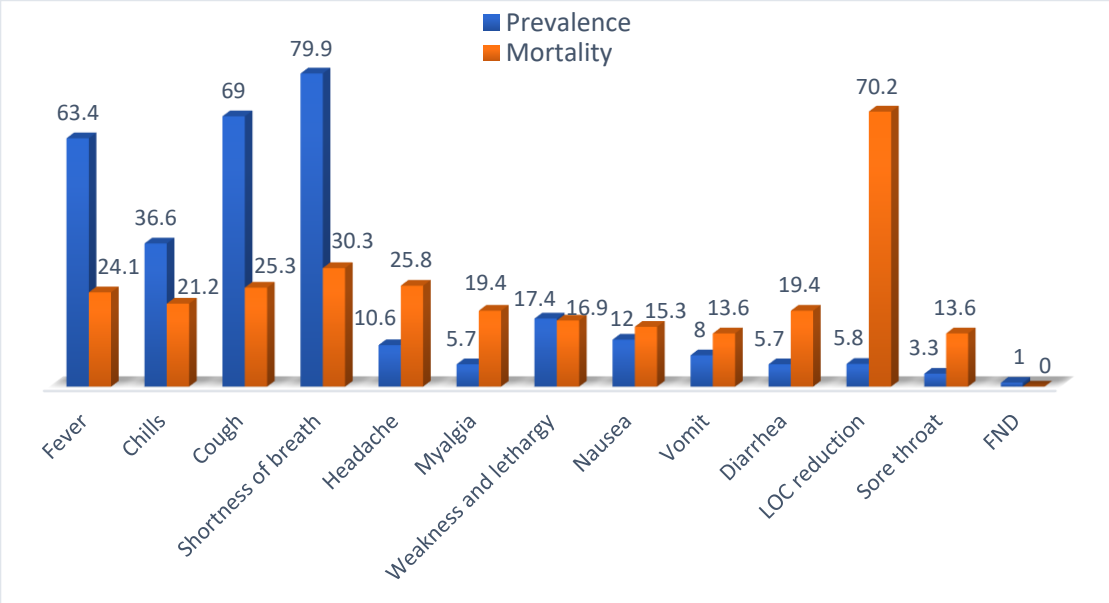

Figure 3. Prevalence of symptoms in patients and mortality.

O2 saturation of hospitalized patients was in the range of 40 to 100% and the maximum recorded number (mode) was 97%. Considering the cut-off of 93% in this variable; The mortality rate among patients with an oxygen saturation capacity of less than 93% at the time of admission was 36.5% and the mortality rate of patients admitted with O2 saturation above 93% was 12.9%. There was a statistically significant relationship between these two variables (P <0.001). Therefore, less than 93% O2 Saturation is associated with higher mortality.

According to Table 4 and considering the cut-off of 3 days for hospitalization, among the total deaths of 160 patients out of 3 patients who were hospitalized for more than 3 days, 160 patients (73.7%) had O2Saturation less than 93% 204 patients (82.9%) had 3 days of hospitalization, less than 93% had O2 saturation. As a result, hospitalization for less than 3 days and O2 saturation less than 93% have a statistically significant relationship with mortality outcome. On the other hand, among the total patients who were hospitalized for less than 3 days, 52.4% had less than 93% O2 Saturation and among the total patients who were hospitalized for more than 3 days, 59.4% had less than 93% O2 Saturation. Therefore, hospitalization for more than 3 days has a statistically significant relationship with O2 Saturation and worse (Figure 4).

Table 4. Frequency of patients by day of hospitalization and blood oxygen level at referral in terms of outcome

Consequences	Duration of hospitalization (days)		O2 saturation		Total	P-value
			≤93%	>93%		
Recovery	≤3	Number	183	309	492	<0.001
		Percent	37.1%	62.8%	27.8%	
	>3	Number	450	359	809	
		Percent	55.6%	44.3%	45.8%	
Death	≤3	Number	204	42	246	0.017
		Percent	82.9%	17.0%	13.9%	
	>3	Number	160	57	217	
		Percent	73.7%	26.2%	12.3%	
Total	≤3	Number	387	351	738	0.004
		Percent	52.4%	47.5%	41.8%	
	>3	Number	610	416	1026	
		Percent	59.4%	40.5%	58.1%	

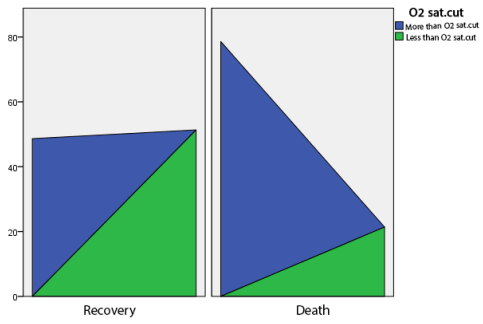

Figure 4. Comparison of different outcomes based on 93% cutoff for O2saturation.

According to Table 5; 750 patients underwent CT scan of the lungs, of which 96.5% (724 cases) had respiratory tract lesions according to COVID-19. This number is equivalent to 40.3% of the total number of cases under study. The mortality of these cases was 16.2%. CT scan of 26 cases (the remaining 3.5% of this group) did not show any positive results in favor of COVID-19 pulmonary involvement, but 15.4% of these cases died. There was no statistically significant relationship between positive findings in this imaging and mortality.

For 375 patients, a plain chest X-ray was performed. 248 cases (66.1%) had positive results in favor of COVID-19. The mortality rate in this group was 21.4% and among those whose chest X-ray findings were not consistent with COVID-19, it was 4.7%. . There was a statistically significant relationship between positive findings in plain chest radiography and mortality (P <0.001); Patients with lung involvement in plain chest X-ray had a higher mortality rate than patients without this involvement (21.4% vs. 4.7%).

PCR was performed for 505 patients, which was positive in 350 cases (69.3%) and negative in 155 cases (30.7%). Of those whose PCR was positive, 75.1% died. This ratio was 71.6% among those whose PCR test was negative and there was no statistically significant relationship between the positive result of this test and death outcome (Figure 5).

Table 5. Frequency distribution of diagnostic modalities in terms of outcome.

Diagnostic modality			Consequences		Total	P-value
			Recovery	Death		
Lung CT scan involvement in favor of COVID-19	Yes	Number	607	117	724	1.000
		Group percentage	83.8%	16.2%	100.0%	
		Total percentage	80.9%	15.6%	96.5%	
	No	Number	22	4	26	
		Group percentage	84.6%	15.4%	100.0%	
		Total percentage	2.9%	0.5%	3.5%	
Total		Number	629	121	750	
		Percent	83.9%	16.1%	100.0%	
Chest involvement in favor of COVID -19	Yes	Number	195	53	248	<0.001
		Group percentage	78.6%	21.4%	100.0%	
		Total percentage	52.0%	14.1%	66.1%	
	No	Number	121	6	127	
		Group percentage	95.3%	4.7%	100.0%	
		Total percentage	32.3%	1.6%	33.9%	
Total		Number	316	59	375	
		Percent	84.3%	15.7%	100.0%	
PCR	Yes	Number	87	263	350	0.441
		Group percentage	24.9%	75.1%	100.0%	
		Total percentage	17.2%	52.1%	69.3%	
	No	Number	44	111	155	
		Group percentage	28.4%	71.6%	100.0%	
		Total percentage	8.7%	22.0%	30.7%	
Total		Number	131	374	505	
		Percent	25.9%	74.1%	100.0%	

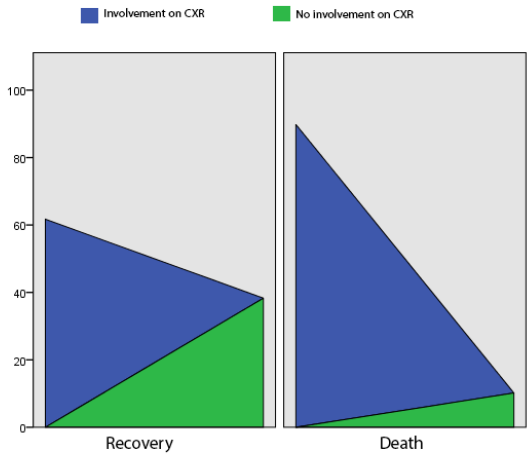

Figure 5. Comparison of different implications in chest radiography.

According to the information recorded in medical records and according to Table 6; Only 19 patients underwent all three methods of PCR, CXR and CT Scan Chest. In 6 patients (31%), the findings of all three methods were positive for COVID-19, of which 1 (16%) died and 5 (83%) recovered. In 7 patients (36%) PCR and CT scan findings were positive and CXR findings were negative, of which 1 patient (14%) died and 6 patients (85%) recovered. In total, in 1 patient (5%) only CT scan was positive and was associated with improved outcome. Also, the number of patients who had only positive PCR was 1 (5%) who had recovery. 4 patients (23%) had positive CXR and CT scan findings and negative PCR and all 4 patients had recovery. No significant relationship was found between the mentioned statistical information.

Table 6. Outcome assessment among diagnostic methods performed.

Group		Consequences		Total
		Death	Recovery	
Involvement of CXR and chest CT with positive PCR	Number	1	5	6
	Group percentage	16%	83%	100%
	Percentage in outcome	50%	29%	31%
No CXR involvement with chest CT and PCR positive involvement	Number	1	6	7
	Group percentage	14%	85%	100%
	Percentage in outcome	50%	35%	36%
No CXR involvement with chest CT and negative PCR involvement	Number	0	1	1
	Group percentage	0%	100%	100%
	Percentage in outcome	0%	5%	5%
No involvement of CXR and chest CT with positive PCR	Number	0	1	1
	Group percentage	0	%100	100%
	Percentage in outcome	0%	5%	5%
CXR and chest CT involvement with negative PCR	Number	0	4	4
	Group percentage	0%	100%	100%
	Percentage in outcome	0%	23%	21.1%
Total	Number	2	17	19%
	Group percentage	10%	89%	100%
	Percentage in outcome	100%	100%	100%

Discussion

In a cross-sectional analytical study, after obtaining permission from the ethics committee in the research department of Guilan University of Medical Sciences, a list of all cases admitted to Corona with suspicion during February and April 2020 in Razi Educational and Medical Center in Rasht was prepared. The list included 1,796 patients. The outcome of 4 patients in the files was not known and 1792 cases entered the statistical analysis process. The mortality rate was 484, representing 27% of the study population. In a study by Tehrani S et al. In Karolinska, Sweden, on 255 patients, 27% died. Most deaths occurred during hospitalization and within the first 30 days. The reason for the high mortality rate of this study was the lack of use of corticosteroids or other specific treatments that were later proven to be effective. In this study conducted in Karolinska, 90% of deaths were observed among patients 65 years and older (44% mortality rate) (7). In a British study of 20133 hospitalized patients with COVIDium 19, this rate was 26% (8).

The overall mortality rate based on inpatients and outpatients in the study of Nikpouraghdam et al., Was estimated to be 1.85%. This rate was 8.06% in hospitalized patients (9). In a study by Zhonghua et al., The mortality rate of critically ill patients hospitalized in China was reported to be over 49% (10). In a study of 22,512 patients in Italy, the overall mortality rate in COVID-19-confirmed patients was 7.2%. This value was 2.3% in China (11).

Of these deaths in our study, 263 were positive PCRs and were considered definitive COVID. If we consider the mortality of 2.3% for this disease, this number of PCR feet (positive and total death) in proportion to the representative of 11 to 21 thousand are affected, and a high percentage of this number of people are asymptomatic or have mild and actual symptoms. There were reservoirs of disease in the community, a conclusion that can be disputed with the results of a study by Hu et al. In the Hu study, the results showed that among those in close contact with a definite case of COVID who were examined and their PCR results were positive, 20.8% had a short interval, 50% had positive CT findings, while 20.8% of these cases were never symptomatic; These populations were significantly younger (12). Considering that all medical centers in Rasht at that time had dedicated special wards to patients suspected of having COVID-19, we suggest that a similar study be performed in all centers and by combining the results of these studies and conducting a review study. A clearer picture of the disease situation at that time can be obtained. In this study, 58.3% of hospitalizations and 65.1% of deaths were male OR (1.85:1). A total of 30.1% of hospitalized men and 22.6% of hospitalized women died. Similar findings were found in many studies (13, 14). Also, during the results of Nikpouraghdam M study with Logistic Regression analysis, age, male gender and underlying diseases have a significant effect on mortality in COVID-19 patients (5018 In MERS and SARS, men were more affected than women (15). Women are less likely to be infected due to the X chromosome and sex hormones that affect innate acquired immunity (16). According to Sunil S. Bhopal et al. study, although the number of male patients was not different from the number of female patients, COVID-19 mortality was twice as high in men as in women, which could be due to genetic and lifestyle differences (such as occupation, cigarettes and alcohol) and cultural and social differences. Of course, it is worth noting that the mortality rate of men to women in different age groups is different, for example, during this study, the mortality rate of men to women in the age group of 0-9 years was 0.8, while in the age group of 60-69 years 2 .6 was obtained (17). In the study of Caizheng Yu et al., The median age was 64.0 years (18). With increasing age and more production of type B cytokines, T-cell and B-cell function is impaired and causes a worse prognosis in elderly patients. In general, higher mortality in men can be due to social and economic factors and a more prominent presence of men in bioeconomic and social (19, 20).

The higher mortality of the rural population is consistent with the results of the Khan study. In Khan's study, this issue, which does not seem to be consistent with population density and the spread of more disease in cities, was attributed to the cumulative effects, differences and discrimination between urban and rural area (21).

Higher mortality in opium use indicates the association between opium use and the severity of the disease when hospitalized. These results are similar to the results of

a meta-analysis performed in China (22). We suggest comparing the course and clinical status of COVID-19 in these patients and comparing it with patients who are not addicted to opium and smoking. The results of such a study can be used to inform the whole community and create a negative factor about addiction.

21.1% of the total population have been hospitalized and died with a history of underlying disease. The most common diseases included hypertension and diabetes. 38.3% of all deaths were due to this disease, if this statistic is combined with the fact that 75% of people with improved blood pressure do not have the disease, the impact of this disease on more severe cases and weaker consequences associated with this disease can be Analyzed. In our study, there was a statistically significant relationship between hypertension and death outcome (P <0.001). In various studies such as meta-analysis by Yang et al. And meta-analysis by Zheng et al., The underlying diseases of diabetes, hypertension, cardiovascular disease and hyperlipidemia have been associated with a worse prognosis (23, 24). In our study, the highest death rate was among cancer patients undergoing radiotherapy, with 66.7% of the population dying. After that were patients with liver disease (57.9% feet, P <0.05) Next ranks of cancer (56.1%) Chemotherapy (43.3%) Neurological diseases (44.4%) History of CVA (40%), cardiovascular diseases (36.5%) and the use of immunosuppressive drugs (36.5%), respiratory diseases (34.3%), organ transplants (35.1%) and diabetes (32%). All of these are significantly associated with a weaker immune response to the presence of an infectious agent in the body. Also in the study of Chirag Shah et al., Kidney and heart disease were significantly associated with COVID's mortality (13)

Many other studies have shown an association between the incidence of Acute Kidney Injury and coronary mortality (25). Although the mechanism of kidney damage has not been elucidated in COVID-19, many studies have suggested an association between renal involvement and SARS-CoV-2 (26, 27).

In the Tehrani S. study, chronic kidney disease and previous (old) stroke are independent risk factors for coronary mortality. The association between previous stroke and mortality of COVID-19 may be due to disabilities or a high risk of coagulation disorders. The two most common underlying diseases in this study were hypertension (54%) and diabetes (31%) (7). This finding was confirmed by other studies (28, 29).

In some studies, hypertension was identified as an independent risk factor for severe COVID-19. It should be noted, however, that hypertension is a common disease worldwide with an incidence of 78% in people aged 65 to 74 in Sweden. After statistically adjusting for age, they found that there was no relationship between blood pressure and mortality (30).

Other studies confirm the findings that people with underlying diseases such as cardiovascular disease, hypertension, diabetes, congestive heart failure, cerebrovascular disease, chronic kidney and liver disease, cancer, COPD, asthma and HIV / AIDS have a higher risk of death from COVID-19 (31). As the number of articles and studies published increases, so does the difference between the results obtained. Some have confirmed the link between COVID-19 mortality and the underlying disease, and some have denied it. On the other hand, it is clear that in regions with higher mortality rates (such as the United States, Europe and China), the prevalence of underlying diseases was generally higher than in other regions (32). The SARS-CoV-2 virus is activated by ACE2, which binds to cells. ACE2 is expressed on heart, kidney and type 2 alveolar cell (33). There is a hypothesis that prior use of ARBs can increase ACE2 at the cellular level, leading to more morbidity and mortality in people with ARBs underlying diseases (34). The results of a meta-analysis by Ssentongo P. et al. Show that people with COVID-19 with cardiovascular disease, hypertension, diabetes, congestive heart failure, chronic kidney disease, and cancer are at higher risk for COVID-induced death. There are 19. According to this meta-analysis, patients with COVID-19 who have cardiovascular disease are twice as likely to die (35).

Another possible hypothesis for a high risk of mortality in patients with the underlying disease could be due to body depletion or allostatic load. In other words, chronic diseases disrupt the physiological function of the body and result in the accumulation of pro-inflammatory cytokines. These cytokines affect the cellular immune system. Due to the weakened immune system, these patients are at risk for severe forms of COVID-19 disease and death (36).

In the Yang JK study, plasma glucose levels and diabetes were independent predictors of mortality in SARS. In diabetic patients, affinity for cell binding and virus entry into the cell and the risk of cytokine syndrome are higher, virus clearance and T-cell function are lower (37).

Many of these diseases are strongly associated with the patient's lifestyle and are the result of the accumulation of the effects of various factors such as genetics, nutrition, mobility, smoking and drugs, the final effect of which usually occurs after prolonged exposure to risk factors. Considering the profound effect of this pandemic on human morale and following the news and cases related to this disease, a study can compare the effects of this disease between this group and healthy people without a history of underlying disease and by including items such as regular exercise. Mobility rate, consumption of fruits and vegetables among the study variables provided significant information to the community. Such studies will have a strong impact on the approach and mindset of the country's population in the present time. Indeed, an accident (pandemic) is not reported, but getting ready to increase the chance of survival is a human preoccupation.

Among the symptoms studied in this study, a group of symptoms that referred to pulmonary involvement, including shortness of breath and low O2Sat, along with a history of altered level of consciousness, were associated with worse outcomes, while constitutional symptoms and gastrointestinal symptoms were associated with improvement. These results are consistent with the results of a study by Zheng et al. In his study, often respiratory symptoms at the time of admission were associated with a worse prognosis (22). In our study, the worst symptom was a decrease in the patient's level of consciousness, which occurred in 70.2% of cases of hospitalization of patients with this symptom.

The main manifestation of COVID-19 during this pandemic was respiratory symptoms associated with hypoxia, followed by respiratory failure and mechanical support and extracorporeal failure (38). Of the two predictors, at least O2Saturation is stronger. Maximum body temperature during hospitalization is also an important predictor. However, not all patients with fever present (26). In a study by Z. Wu et al., Out of 44500 definitive cases of COVID-19, 80% presented with mild respiratory symptoms and 19% with severe respiratory symptoms and severe illness including respiratory failure. Some patients also progressed to severe complications, including multiple organ failure, septic shock, pulmonary edema, severe pneumonia, acute respiratory syndrome, and death (39).

Identifying predictors can help physicians prioritize patients and assign treatment options as well as vaccines.

During the Shah C. study, respiratory symptoms were the most common manifestation among deceased patients (72.11% shortness of breath, 51.70% cough). Also, the percentage of patients who initially presented with positive imaging findings was higher among the death group (82.31%). The incidence of active cancer was higher in the group of deaths, but this variable could not predict the mortality of COVID-19 due to the small number of samples (13).

In the Mehraeen E. 10 study, the most common manifestations in 310494 COVID-19 patients were fever, cough, olfactory dysfunction, postnasal drip, taste disturbance, and nasal obstruction (14).

In Iran, a study was performed on 2964 patients with COVID-19 admitted to the hospital between February to April 2020 (approximately corresponding to the time of this study) and showed that 14% of COVID-19 patients had a serious disease and 6 Severely ill and a total of 20% needed hospitalization. Among 239 feet, 66.94% were 60 years of age or older and 15.89% had underlying disease (such as diabetes, hypertension, and chronic lung disease, etc.) (9).

In a study, by separating the two populations, the difference in outcome and the relationship between different symptoms and the severity of the disease can be investigated. The results of such a study will be useful in setting a more up-to-date guideline in dealing with patients suspected of having COVID-19.

The use of paraclinical methods in the diagnosis and prognosis of the disease is helpful in many clinical conditions. In this study, lung involvement in plain chest radiography was most strongly associated with mortality. Comparison of CT scan and PCR results

showed no statistically significant relationship between their positivity and death. Whereas in plain chest X-ray data, only 4.7% of cases whose CXR lacked evidence of pulmonary involvement died.

A study by Tabatabaei S. et al. Showed that CT Scan severity, based on parenchymal involvement, could be a good predictor of mortality in healthy adolescents with COVID-19 pneumonia. Young patients are often healthy and present with shortness of breath and a mild fever, but their disease may worsen over time. This study emphasizes that in CT Scan reports, the number of lobes involved and the severity of the involvement along with its morphological pattern must be mentioned in order to measure the severity of the disease (40). Although routine use of CT scans to detect COVID-19 is not recommended, many studies have suggested its role in the follow-up of patients (40). Due to the higher cost of CT scans, it is recommended that after a thorough examination of the lungs to check for the presence and extent of pulmonary involvement, CXR is recommended. In the case of PCR, the high mortality rate among PCR-negative individuals and the lack of statistical differences between PCR-positive and PCR-negative deaths, it seems that the PCR result should have been more positive (41). It is recommended that a study be performed on the knowledge of the treatment staff about how to properly take and maintain the sample to evaluate SARS-CoV2. It is also possible to design and conduct a study to review the results presented by different laboratories to analyze the amount of error in both sampling and sample review. Also, due to the cluster spread of this disease among families and the existence of a very significant number of asymptomatic carriers of COVID-19, it is possible to randomly select several COVID-19 patients and perform PCR test among their asymptomatic family members. With a short two-week follow-up, it is possible to identify a proportion of asymptomatic people and inform the community of the danger that threatens them by publishing the results.

In our study, 86.7% of ICU patients died, which is consistent with Shah C.'s study. The ratio of the number of patients admitted to the ICU in the death group was higher than the recovery group (23.13% vs. 6.18%). Patients in the death group were older than the recovery group (mean 78.4 vs. 64.1) (13).

Conclusions

The results of the present study showed that male gender, older age, history of the underlying disease, simple chest X-ray involvement, drug use and pulmonary symptoms were associated with more adverse outcomes and natural and gastrointestinal symptoms were associated with improved outcomes in patients with COVID-19.

Author contribution

MRT managed the manuscript, study design, controlling the project and fulfilled the data processing and compiled some sections of the article. **AM**, **AB**, **HMK**, **SI**, **JK**, **SNS**, **FS**, **EBA** and **HEK** were involved in some sections of the manuscript like collected data, data processing and performed statistical analyses. All authors revised the article comprehensively and confirmed the final edited version of the paper

Conflict of interest

No potential conflict of interest was reported by the authors.

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