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The Comparison of Demographic Indicators and Clinical Risk Factors in Discharged and Dead Patients Due to COVID-19

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ABSTRACT

Introduction: SARS-Covid 2 is a new type of coronavirus which is a serious threat to all countries. Identifying the risk factors and investigating cases between deaths and discharge can increase public awareness to deal with this virus more easily.

Methods: We conducted a case-control study on 274 patients with COVID-19 between March 1, 2020, and April 30, 2020. The cases were 137 COVID-19 patients discharged from the hospital, and the controls were patients who died due to COVID-19. Patient's information was obtained with demographic, clinical risk factors questionnaire, and their medical records.

Result: The results showed that the age over 70, overweight, and high body mass index were significant predictors of death due to COVID-19. Opium use was associated with the death of COVID-19; however, it was not a significant predictor as an independent variable. Histories of chronic disease, as well as clinical signs of dyspnea, were significantly associated with death due to COVID-19. Fever and myalgia were introduced as the supportive clinical signs, so fever and myalgia were significantly more common in discharged individuals.

Conclusion: Given that in this study, age over 70, overweight, obesity, opium use, and having clinical symptoms such as chronic diseases and dyspnea have been introduced as the risk factors for death due to COVID-19, so it is recommended due to lack of access to the appropriate vaccine to prevent COVID-19, during the outbreak of the virus. To prevent infection and spread of the virus, further training is required in the use of face masks, reducing traffic in public places, and proper handwashing.

Keywords: COVID-19, Severe acute respiratory syndrome, Coronavirus 2, Risk factors, Mortality

Introduction

Acute Respiratory Syndrome Corona Virus-2 (SARS-Covid 2) is a new type of coronavirus that was first identified in Wuhan, China, which led to the development of Coronavirus 2019 (COVID-19) and has spread to other parts of China and 37 countries, including the United States, Japan, Australia, and France (1, 2). Since the virus was first diagnosed, more than 4000 COVID-19 cases have been confirmed worldwide, and the first case reported in the United States was on January 19, 2020, in Washington. Early reports of the disease in China and Italy point to high

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mortality and an emphasis on the capacity of the intensive care unit bed (1). SARS-CoV-2 belongs to the subgenus sarbecovirus subfamily Orthocoronavirinae, known as the pathogen of the coronavirus 2019 (COVID-19) in January 2020(2).

Studies in several human pathogens have been most closely linked to severe acute respiratory syndrome (SARS) coronavirus (SARS-CoV) SARS, a new bacterivorous in Guangdong in southern China in 2002, which has caused 8,000 infections and 774 deaths in 37 countries during 2002-2003; and the Middle East respiratory syndrome (MERS) coronavirus (MERS-CoV), which was reported in 2012 in Saudi Arabia, and caused 2949 infections according to laboratory findings. In December 2012, there were 858 deaths, 38 of which were in South Korea (3). On January 30, 2020, the World Health Organization (WHO) announced the outbreak of the new coronavirus as the sixth public health emergency of international concern, posing a threat not only to China but to all countries. On February 11, 2020, the World Health Organization officially chose the new name for coronavirus, COVID-19 (4). The International Committee on Taxonomy of Viruses renamed the disease-causing virus from COVID-19 to (SARS- Covid- 2) (5). Transmission of SARS Covid 2 is through respiratory droplets and physical contact, and the latency period is 3-7 days but can be more than 24 days (6). According to a study of patients with the new coronavirus SARS Covid 2, the latency period of the virus has been announced as five days with an average range of 4-7 days (7).

The time interval between exposure to the virus and the onset of clinical symptoms is called the incubation period or latent period of the virus. The World Health Organization estimates the incubation period for the virus between 2 to 10 days (8), the Chinese Health Commission between 10 to 14 days (9), and the US Centers for Disease Control and Prevention between 2 to 14 days (10).

Presenting symptoms (SARS-CoV-2) typically include fever, dyspnea, myalgia, and cough. Although most patients are thought to have a desirable prognosis, older patients with chronic and underlying conditions may eventually have a worse outcome. Patients with underlying and severe problems may develop shortness of breath and hypoxia one week after the disease's onset, which may lead to acute respiratory distress syndrome or end-organ failure. Since studies have been performed on relatively few samples, the risk factors are unknown (2). Given that in recent months the disease has caused severe anxiety in society and changes in people's lifestyles, disability, rising costs, recession, and increased mortality, and now there is no sufficient knowledge, effective drugs, and vaccines to eliminate the virus. The aim of this study was to compare the demographic indicators and underlying risk factors among discharged and dead patients with COVID-19 to provide a more straightforward response by increasing awareness of risk factors and reduce the mortality

Materials and Methods

Participants and sampling

This case-control study was performed on people suspected of having the COVID-19 virus. A total of 274 patients were enrolled in the study from May 1 to April 30, 2020. Only 138 patients with critical illness were tested with PCR, as the corona diagnosis kit was not readily available. Out of 274 patients, only 42 were positive. However, negative PCR can be due to inaccurate sampling. In the case group, 137 patients with COVID-19 who were discharged from the hospital were compared with 137 patients in the control group who died from COVID-19 regarding demographic indicators and underlying risk factors. All participants were selected by convenience sampling methods from Tamin Ejtemaee hospital, which only admitted COVID-19 patients during these days. The hospital's CCU and ICU wards admitted critically ill patients with eight beds in each ward. The ICU patients were hospitalized for 7-10 days. Eighty patients were in the hospital's CCU and ICU. A total of 11 ventilators were available in ICU wards and 6 in the hospital emergency and general wards. There were 6 BIPAP devices in the hospital. Demographics and

clinical risk factors information of individuals were collected by a researcher-made questionnaire and medical records. Inclusion criteria included all patients with a diagnosis of COVID-19 who have been referred to a hospital with clinical, laboratory, and radiological symptoms and admitted with the opinion of an infectious or internal medicine specialist. Demographic characteristics, social status, social habits, underlying diseases, clinical manifestations, and laboratory indicators of all patients were examined. The present study had no Code of Ethics.

Data analysis

In the present study, categorical variables were presented as numbers (percentage). Simple and

multiple logistic regression analyses were undertaken to determine the predictors of death among patients with COVID-19. The crude and adjusted odds ratio (OR) and 95% confidence interval (CI) were calculated. Statistical analysis was performed with IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA), and the level of significance was set at 0.05

Results

A total of 274 people were included in the study. Demographic indices and risk factors were compared between the two groups, discharged and died from COVID-19, as case and control groups, respectively.

In the case group, out of 137 discharged patients, 62.8 % and in the control group, 57.7% were men. In fact, the majority of people in both groups were men. In terms of marital status, the majority of people (96.4%) in both groups were married. Unadjusted analysis of the data showed that the odds of death increased with rising age. As compared to patients aged < 50 years, those aged 50-70 and >70 years were 3.26 (95% CI: 1.77-6.01) and 5.22 (95% CI: 2.57-10.61) times more likely to die from COVID-19, respectively. In addition, people who died from COVID-19 were more likely to be more overweight and obese than those who were discharged. Overweight and obesity compared to the normal body mass index significantly increase the odds of death by 2.43 (95% CI: 1.16-5.11) and 3.01 (95% CI: 1.56-5.82) times, respectively. Compared with employed patients, patients who were retired were at significantly increased risk of death (OR=1.83, 95% CI: 1.01-3.33)

The percentage of opium use in people who died from COVID-19 was higher than those who were discharged (13.9% vs. 5.1%). In fact, opium use increases the odds of death due to COVID-19 by 3.23 times, which was statistically significant (95% CI: 1.30-8.01 P=0.011)

Examining the relationship between chronic diseases with discharge and death due to COVID-19 showed that the percentage of chronic diseases in dead patients was higher than those discharged. Chronic diseases significantly increased the odds of death by 1.84 times (95% CI: 1.10-3.08 P = 0.028). Other variables were not significantly associated with death. Based on multiple logistic regression analysis (i.e., adjusted analysis), age of 50-70 and >70 years (OR_{Adj}=2.82, 95% CI: 1.34-5.94 and OR_{Adj}=5.35, 95% CI: 2.15-13.29, respectively) and being overweight and obese (OR_{Adj}=2.42, 95% CI: 1.07-5.45 and OR_{Adj}=3.26, 95% CI: 1.58-6.72, respectively) increased the likelihood of death. Opium consumption increased the odds of death (OR=2.33, 95% CI: 0.87-6.26), although the difference was not statistically significant (P=0.094) [Table 1].

Table 1. Logistic regression analyses for relationship between demographic/clinical factors and death among patients with COVID-19

Demographic		Discharge, n (%)	Death, n (%)	Simple Logistic Regression		Multiple Logistic Regression	
				OR (95% CI)	P	OR (95% CI)	P
Age (y)	<50	11 (8.0)	7 (5.1)	1		1	
	50-70	63 (46.0)	40 (29.2)	3.26 (1.77-6.01)	<0.001	2.82 (1.34-5.94)	0.006
	>70	63 (46.0)	90 (65.7)	5.22 (2.57-10.61)	<0.001	5.35 (2.15-13.29)	<0.001
Sex	Male	86 (62.8)	79 (57.7)	1		1	
	Female	51 (37.2)	58 (42.3)	1.24 (0.76-2.01)	0.388	1.55 (0.53-4.58)	0.423
Marital Status	Single	5 (3.6)	5 (3.6)	1		1	
	Married	132 (96.4)	132 (96.4)	1.00 (0.28-3.54)	1.000	0.30 (0.06-1.43)	0.129
BMI (Kg/m^2)	Normal	39 (29.3)	17 (12.9)	1		1	
	Overweight	33 (24.8)	35 (26.5)	2.43 (1.16-5.11)	0.019	2.42 (1.07-5.45)	0.033
	Obese	61 (45.9)	80 (60.6)	3.01 (1.56-5.82)	0.001	3.26 (1.58-6.72)	0.001
Occupation	Employed	48 (35.0)	32 (23.4)	1		1	
	Retired	45 (32.8)	55 (40.1)	1.83 (1.01-3.33)	0.046	1.04 (0.49-2.21)	0.925
	Housewife	44 (32.1)	50 (36.5)	1.70 (0.93-3.12)	0.083	0.99 (0.29-3.35)	0.988
Smoking	Non-Smoker	113 (82.5)	95 (69.3)	1		1	
	Smoker	17 (12.4)	23 (16.8)	1.61 (0.81-3.19)	0.173	1.93 (0.87-4.30)	0.106
	Opium	7 (5.1)	19 (13.9)	3.23 (1.30-8.01)	0.011	2.33 (0.87-6.26)	0.094
Chronic Disease	No	53 (38.7)	35 (25.5)	1		1	
	Yes	84 (61.3)	102 (74.5)	1.84 (1.10-3.08)	0.021	1.08 (0.58-2.02)	0.811

BMI: Body Mass Index

As presented in Table 2, underlying diseases such as diabetes (OR=1.58, 95% CI: 0.97-2.58) and respiratory diseases (OR=2.28, 95% CI: 0.90-5.79) increased the likelihood of death, although these increases were not statistically significant (P=0.065 and P=0.082, respectively).

No significant association was found between death and discharged patients in other underlying diseases such as cardiovascular disease, cancer, immune deficiency, respiratory diseases, myocardial infarction, and stroke (p>0.05) [Table 2].

In examining the relationship between clinical manifestations of COVID-19 with death and discharge, having dyspnea significantly increased the odds of death among patients with COVID-19 by 2.01(95% CI: 1.09-3.70) times.

Fever and myalgia were higher among discharged patients than dead patients due to COVID-19. In fact, fever and myalgia significantly increased hospital discharge by 0.52 (95% CI: 0.29-0.93) and 0.5 (95% CI: 0.27-0.92) times, respectively [Table 3].

In terms of laboratory, positive PCR, decreased WBC, increased troponin, increased CPK, decreased lymphocytes significantly increased the odds of death by 8.38, 6.18, 7.9, 3.21, 3.04 times, respectively (P <0.05) [Table 4].

Table 2. Simple logistic regression analysis for relationship between chronic diseases and death among patients with COVID-19

chronic diseases		Discharge, n (%)	Death, n (%)	Simple Logistic Regression OR (95% CI)	*P*
Chronic Disease	No	53 (38.7)	35 (25.5)	1	
	Yes	84 (61.3)	102 (74.5)	1.84 (1.10-3.08)	0.021
CVD	No	107 (78.1)	105 (76.6)	1	
	Yes	30 (21.9)	32 (23.4)	1.09 (0.62-1.91)	0.773
Diabetes	No	90 (65.7)	75 (54.7)	1	
	Yes	47 (34.3)	62 (45.3)	1.58 (0.97-2.58)	0.065
Blood pressure	No	75 (54.7)	70 (51.1)	1	
	Yes	62 (45.3)	67 (48.9)	1.16 (0.72-1.86)	0.545
Cancer	No	133 (97.1)	134 (97.8)	1	
	Yes	4 (2.9)	3 (2.2)	0.74 (0.16-3.39)	0.703
Immune System Defect	No	133 (97.1)	130 (94.9)	1	
	Yes	4 (2.9)	7 (5.1)	1.79 (0.51-6.26)	0.362
Respiratory Disease	No	130 (94.9)	122 (89.1)	1	
	Yes	7 (5.1)	15 (10.9)	2.28 (0.90-5.79)	0.082
Myocardial Infarction	No	135 (98.5)	135 (98.5)	1	
	Yes	2 (1.5)	2 (1.5)	1.00 (0.14-7.20)	1.000
Stroke	No	134 (97.8)	134 (97.8)	1	
	Yes	3 (2.2)	3 (2.2)	1.00 (0.20-5.04)	1.000

OR: Odds Ratio; CI: Confidence Interval.

Table 3. Simple logistic regression analysis for relationship between clinical manifestations and death among patients with COVID-19

clinical manifestations		Discharge, n (%)	Death, n (%)	Simple Logistic Regression OR (95% CI)	*P*
Lung Congestion	No	136 (99.3)	135 (98.5)	1	
	Yes	1 (0.7)	2 (1.5)	2.01 (0.18-22.48)	0.569
Cough	No	36 (26.3)	33 (24.1)	1	
	Yes	101 (73.7)	104 (75.9)	1.12 (0.65-1.94)	0.676
Runny nose	No	133 (97.1)	135 (98.5)	1	
	Yes	4 (2.9)	2 (1.5)	0.49 (0.09-2.73)	0.418
Dyspnea	No	35 (25.5)	20 (14.6)	1	
	Yes	102 (74.5)	117 (85.4)	2.01 (1.09-3.70)	0.025
Sore Throat	No	135 (98.5)	135 (98.5)	1	
	Yes	2 (1.5)	2 (1.5)	1.00 (0.14-7.20)	1.000
Pneumonia	No	128 (93.4)	133 (97.1)	1	
	Yes	9 (6.6)	4 (2.9)	0.43 (0.13-1.42)	0.166
Acute Respiratory Syndrome	No	136 (99.3)	137 (100)	NA	
	Yes	1 (0.7)	0 (0)	NA	NA
Renal Sign Decrease	No	137 (100)	135 (98.5)	NA	
	Yes	0 (0)	2 (1.5)	NA	NA
Renal Sign KF	No	133 (97.1)	133 (97.1)	1	
	Yes	4 (2.9)	4 (2.9)	1.00 (0.24-4.08)	1.000
Circulation Sign Leukocytosis	No	128 (93.4)	129 (94.2)	1	
	Yes	9 (6.6)	8 (5.8)	0.88 (0.33-2.36)	0.802
Circulation Sign Leukopenia	No	120 (87.6)	75 (54.7)	1	
	Yes	17 (12.4)	62 (45.3)	5.84 (3.17-10.73)	<0.001
Digestive Sign Diarrhea	No	130 (94.9)	130 (94.9)	1	
	Yes	7 (5.1)	7 (5.1)	1.00 (0.34-2.93)	1.000
Digestive Sign vomiting	No	127 (92.7)	129 (94.2)	1	
	Yes	10 (7.3)	8 (5.8)	0.79 (0.30-2.06)	0.626
Digestive Sign hematemesis	No	136 (99.3)	136 (99.3)	1	

clinical manifestations		Discharge, n (%)	Death, n (%)	Simple Logistic Regression OR (95% CI)	*P*
	Yes	1 (0.7)	1 (0.7)	1.00 (0.06-16.15)	1.000
Digestive Sign smell	No	136 (99.3)	137 (100)	NA	
	Yes	1 (0.7)	0 (0)	NA	NA
Systemic Sign fever	No	22 (16.1)	37 (27.0)	1	
	Yes	115 (83.9)	100 (73.0)	0.52 (0.29-0.93)	0.029
Systemic Sign fatigue	No	127 (92.7)	131 (95.6)	1	
	Yes	10 (7.3)	6 (4.4)	0.58 (0.21-1.65)	0.308
Systemic Sign Headache	No	128 (93.4)	128 (93.4)	1	
	Yes	9 (6.6)	9 (6.6)	1.00 (0.38-2.60)	1.000
Systemic Sign Myalgia	No	102 (74.5)	117 (85.4)	1	
	Yes	35 (25.5)	20 (14.6)	0.50 (0.27-0.92)	0.025
Systemic Sign shivering	No	68 (49.6)	66 (48.2)	1	
	Yes	69 (50.4)	71 (51.8)	1.06 (0.66-1.70)	0.809

OR: Odds Ratio; CI: Confidence Interval. ; NA: Logistic regression analysis not applicable due to small cell count.

Table 4. Simple logistic regression analysis for relationship between laboratory tests and death among patients with COVID-19

laboratory tests		Discharge, n (%)	Death, n (%)	Simple Logistic Regression OR (95% CI)	*P*
PCR Positive	No	131 (95.6)	99 (72.3)	1	
	Yes	6 (4.4)	38 (27.7)	8.38 (3.41-20.61)	<0.001
WBC Decrease	No	126 (92.0)	127 (92.7)	1	
	Yes	11 (8.0)	10 (7.3)	0.90 (0.37-2.20)	0.820
WBC Increase	No	114 (83.2)	61 (44.5)	1	
	Yes	23 (16.8)	76 (55.5)	6.18 (3.53-10.82)	<0.001
ESR Increase	No	58 (42.3)	55 (40.1)	1	
	Yes	79 (57.7)	82 (59.9)	1.09 (0.68-1.77)	0.713
ESR Decrease	No	134 (97.8)	136 (99.3)	1	
	Yes	3 (2.2)	1 (0.7)	0.33 (0.03-3.20)	0.338
CRP Increase	No	57 (41.6)	42 (30.7)	1	
	Yes	80 (58.4)	95 (69.3)	1.61 (0.98-2.65)	0.060
CRP Decrease	No	136 (99.3)	136 (99.3)	1	
	Yes	1 (0.7)	1 (0.7)	1.00 (0.06-16.15)	1.000
LDH Increase	No	83 (60.6)	70 (51.1)	1	
	Yes	54 (39.4)	67 (48.9)	1.47 (0.91-2.38)	0.114
LDH Decrease	No	137 (100)	137 (100)	NA	
	Yes	0 (0)	0 (0)	NA	NA
Sputum	No	135 (98.5)	137 (100)	NA	
	Yes	2 (1.5)	0 (0)	NA	NA
CK Increase	No	137 (100)	137 (100)	NA	
	Yes	0 (0)	0 (0)	NA	NA
Tro Increase	No	132 (96.4)	108 (78.8)	1	
	Yes	5 (3.6)	29 (21.2)	7.09 (2.65-18.94)	<0.001
ALT Increase	No	113 (82.5)	105 (76.6)	1	
	Yes	24 (17.5)	32 (23.4)	1.43 (0.79-2.59)	0.232
AST Increase	No	111 (81.0)	99 (72.3)	1	
	Yes	26 (19.0)	38 (27.7)	1.64 (0.93-2.89)	0.088
CRK Increase	No	126 (92.0)	107 (78.1)	1	
	Yes	11 (8.0)	30 (21.9)	3.21 (1.54-6.71)	0.002
Lymphocytes Increase	No	135 (98.5)	136 (99.3)	1	
	Yes	2 (1.5)	1 (0.7)	0.50 (0.04-5.54)	0.569
Lymphocytes Decrease	No	91 (66.4)	54 (39.4)	1	
	Yes	46 (33.6)	83 (60.6)	3.04 (1.86-4.98)	<0.001
Lung	No	10 (7.3)	13 (9.5)	1	
	Yes	127 (92.7)	124 (90.5)	0.75 (0.32-1.78)	0.514

OR: Odds Ratio; CI: Confidence Interval.;

NA: Logistic regression analysis not applicable due to small cell count.

Discussion

In the present study, we compared demographic characteristics and clinical risk factors in discharged and deceased patients due to COVID-19. Items such as demographic, laboratory, and clinical indicators were compared between discharged and deceased individuals. Among the results, most of the deaths due to COVID-19 occurred in patients over 70 years old, and the majorities were men. The results are consistent with several other studies that support the association between old age and death due to COVID-19 (1, 11-13). For example, Ganji et al. found that COVID-19 was associated with demographic status, with the highest mortality occurring in older people over the age of 75 with a history of the underlying disease. Some studies in line with the present study found that deaths from COVID-19 were higher in men than in women (11, 13, 14).

Most deaths in the elderly and men due to COVID-19 may be due to the weakening of the cellular immune system, which is the most important arm of the immune system against viral infections, in the elderly (12). Men also have more unhealthy lifestyles and underlying diseases than women, leading to more critical conditions or dying. On the other hand, it may be due to X chromosomes and sex hormones that play an important role in innate immunity and adaptation and reduce women's susceptibility to viral infections (15).

In terms of body mass index, obese people are more likely to develop COVID-19 than people with a normal body mass index. Gupta et al. also reported that a high body mass index is an independent risk factor for death in people with COVID-19 (13).

The Centers for Disease Control and Prevention in the United States currently consider severe obesity a high-risk factor for COVID-19. Other studies in France and New York have shown that obesity is a major risk factor for hospitalization due to COVID-19. Research in China also shows that obese people are 142% more likely to develop severe COVID-19-induced pneumonia (16). One of the reasons for the association between obesity and COVID-19 is that obese people have more resistance in the airways, smaller lungs, and weaker respiratory muscles, making a person more prone to pneumonia (17).

In examining lifestyle factors, no significant relationship was found with smoking between discharged and deceased individuals. However, some studies suggest that death from COVID-19 is associated with smoking (12, 15, and 17). For example, studies conducted in China showed that smoking history is associated with the development of COVID-19. People who were smokers and people who were not even smokers who came in contact with secondhand smoke had more severe and deadly symptoms when they contracted it because the smoke prevents reaching oxygen to the lungs (17). The results of the present were inconsistent with the results of the mentioned studies.

Italy has one of the highest incidences of patients with a history of smoking, lung disease, and ischemic heart disease. Therefore, the mortality rate of COVID-19 is higher in this country than in other countries (12).

In this study, opium use increased the chance of death three times, but it was not a significant independent predictor of COVID-19-induced mortality. In a study by Khoshab et al., patients who used opium did not develop COVID-19, and it was suggested that opium use could have preventive effects on COVID-19 (18).

Examining underlying diseases among discharged and deceased individuals with COVID-19 showed that the incidence of chronic diseases in deceased patients was significantly higher than in discharged patients. Chen et al. reported that half of the COVID-19 patients had chronic diseases such as cardiovascular diseases, cerebrovascular diseases, endocrine, gastrointestinal, tumors, and nervous system diseases (14). The results of Zheng et al.'s meta-analysis also showed that people with chronic diseases such as high blood pressure, diabetes, cardiovascular disease, and respiratory diseases had a worse prognosis than other patients with COVID-19 (15).

Examination of the clinical manifestations among COVID-19 patients showed that the majority of patients who died had dyspnea. Having dyspnea increased the chances of death from COVID-19. Nevertheless, the discharge of COVID-19 patients who experienced fever and myalgia was higher than other patients. The results of this study were in line with Zheng et.al. In their study, patients with dyspnea or shortness of breath experienced the worst conditions, and there was even more death.

Furthermore, patients with fever have a better prognosis than patients without fever (15). However, Wu Chaomin et al. reported that high fever caused the development of adult respiratory distress and a worse prognosis for the death of patients with COVID-19 (2). It seems that because fever and myalgia are annoying clinical symptoms, the patient goes to medical centers earlier, and in fact, fever is the first warning sign for the patient to see a doctor. Therefore, the occurrence of these symptoms in people with COVID-19 causes faster referral and faster treatment than asymptomatic carriers and has a better prognosis.

Laboratory indicators showed that COVID-19 patients with positive PCR, high WBC, high troponin, high CPK, and low lymphocytes had a higher chance of mortality. Several studies have shown a relationship between laboratory indicators and mortality in COVID-19 patients

Henry et al. reported that patients with COVID-19 who had severe and fatal disease had a significant increase in WBC, a decrease in lymphocytes and platelets. An increase in heart, liver, kidney biomarkers, and coagulation tests were observed more in patients with a severe and lethal form of COVID-19. Patients who died had higher cardiac enzymes (19). According to a study by Mika mi et al. in New York, an increase in troponin is associated with an increased risk of death (20).

The present study had some limitations. The study was performed in only one medical center, and the sample size was limited, which could reduce the statistical power for a significant difference between the deceased and discharged groups.

Conclusion

The findings indicated that age over 70, overweight body mass index and opium use independently predict mortality from COVID-19. It seems that due to the fact that a vaccine has not yet been developed to prevent COVID-19 at the time of the widespread outbreak of the virus, these people need more training to prevent COVID-19, such as wearing face masks, reducing traffic in public, and washing hands properly to avoid infection and prevention of virus spread. In this study, having chronic diseases and having clinical symptoms such as dyspnea increases death risk due to coronavirus. Therefore, it is recommended that patients pay more attention if they have symptoms such as dyspnea and laboratory symptoms such as positive PCR, high white blood cells, increased cardiac enzyme troponin, increased creatine phosphokinase, and decreased lymphocyte.

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Conflicts of interest

None of the authors had any financial or personal conflicts of interest associated with this manuscript.

Authors' contributions

MM, GhM, and KhS designed research; MM and GhM conducted research; MS analyzed data; GhM, KhS wrote the paper; ESH and TM collected Data; MM had primary responsibility for final content. All authors read and approved the final manuscript.

List of abbreviations

COVID-19, Coronavirus disease 2019; SARS-CoV-2, Severe acute respiratory syndrome coronavirus 2; MERS, the Middle East respiratory syndrome; WHO, World Health Organization

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