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Underlying Factors and Outcomes of COVID-19: A Retrospective Study

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Abstract

Background: COVID-19 is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Older age, male gender, chronic respiratory diseases, cardiovascular diseases, diabetes mellitus, high blood pressure, chronic kidney and liver disease, Immunocompromised conditions, malignancies, excessive obesity, disabilities, and pregnancy are risk factors for severe illness or death in COVID-19 patients.

Objectives: This study aimed to evaluate the results of medical care and factors affecting the recovery and death of patients hospitalized in three hospitals affiliated with the Islamic Azad University of Tehran/Iran.

Methods: This is a retrospective study, and the information is obtained from the files in the medical records unit of the hospitals. The study was conducted on 1255 COVID-19 patients hospitalized in 3 hospitals affiliated with the Islamic Azad University of Tehran Medical Sciences. In the retrospective study, information was obtained from the files in the medical records unit of the hospitals using the researcher's checklist. The checklist included demographic findings and variables related to the severity of the disease, immune status, underlying systemic diseases, cardiovascular and respiratory diseases, and variables related to the consequences of the disease. The data was analyzed using SPSS. Qualitative variables were analyzed using frequency and percentage. The chi-square test was used to examine the relationship between variables, and logistic regression was employed to assess this relationship.

Results: In this study, the following items were significantly more prevalent in those who recovered: Compliance with home quarantine, dry cough, positive CRP, and presence of ground glass opacity images in CT scan. Moreover, the following items were more evident in those who died: High blood pressure, cardiovascular diseases, headache, myalgia, arthralgia, weakness, fatigue, insomnia, hoarseness, purulent sputum, lobar pneumonia, low Glasgow Coma Scale (GCS), seizures, anemia, high erythrocyte sedimentation rate (ESR), increased prothrombin time (PT), decreased serum albumin, and the presence of crazy-paving on CT scan. In all of the above items, P-values were $\leq$ 0.05.

Conclusions: It is suggested that patients hospitalized with symptoms, signs, and conditions commonly seen in cases of dying patients should receive more frequent monitoring and care.

Keywords: COVID-19- Risk Factors, Facilitating Variables, Underlying Diseases, Outcomes, Hospital

1. Background

The COVID-19 pandemic is growing fast worldwide, resulting in emerging health problems (1, 2). Over time, with the progress and increase in the spread of the disease, the harmful effects of this disease on different societies in terms of social systems and economic development were determined (3). People should be advised to wash their hands thoroughly, practice respiratory hygiene (i.e., cover their coughs), and avoid gatherings and close contact with COVID patients, if possible, to reduce the risk of community transmission (4). Increasing knowledge in SARS-CoV-2, preventing the spread of this disease and its other variants, and better managing this disease require much clinical research (5).

Older adults, especially those with co-morbidities, are at a higher risk of becoming severely ill from the disease. More than 81% of deaths from this disease occur in individuals over 65 years old. Co-morbidities such as diabetes (Type 1 or 2), heart diseases (including heart failure, coronary artery disease, and cardiomyopathies),

hypertension, chronic lung diseases (such as asthma, bronchiectasis, COPD, emphysema, chronic bronchitis, pulmonary fibrosis, pulmonary embolism, and pulmonary hypertension), excessive obesity (BMI over 40 kg/m^2), and malignancies (with a history of cancer, chemotherapy, and radiotherapy) may increase the risk of disease. Chronic kidney disease, chronic liver disease, cystic fibrosis (affecting the lungs, kidneys, liver, intestines, heart, and pancreas), immunocompromised conditions (such as primary immunodeficiency, solid organ transplant, corticosteroid therapy, collagen vascular diseases, HIV infection, stress, tuberculosis, etc.), dementia or Alzheimer's disease, stroke or CV and disabilities (such as cerebral palsy, Down syndrome, etc.), mental health conditions (like schizophrenia), insomnia, sickle cell disease, thalassemia, smoking or substance use disorders, and pregnancy (pregnant women and neonates, if infected, are also susceptible to severe pneumonia (6-8).

The following people are susceptible to the disease: elderly individuals, men, caregivers of patients, family members, healthcare workers (HCWs), traders, merchants, travelers, immigrants, and sewage and waste workers (7). Overweight individuals (BMI = 25 - 30 kg/m^2) and obese individuals (BMI = 30 kg/m^2 or higher) are at risk, as well as those who are physically inactive (8), engage in gatherings (4), have a low level of education, have a low (or no) personal income (or were born in a country with a low or middle income), and are not married (9, 10).

In order to identify the groups at risk of this disease, the risk factors related to the severity and lethality of the disease should be identified. In a review study, the risk factors related to increasing the severity of the disease and its lethality are potential underlying diseases such as obesity, old age, high blood pressure, and diabetes (11-13). In another study, males, high blood pressure, old age, diabetes, and living in the US were risk factors for increased death in COVID-19 patients (10). The risk factors predicting death due to COVID-19 include being male, having a low level of education, having a low (or no) personal income, being born in a country with a low or middle income, and not being married (9). Several factors are involved in getting infected with COVID-19 and dying from it. Because timely identification of risk factors and clinical consequences related to various diseases, including COVID-19, leads to early identification of critically ill patients, provision of appropriate medical services, and prevention of deaths, the purpose of this study is to determine the underlying factors in the outcome of the disease of COVID-19 in patients admitted to the hospitals of Islamic Azad University, Tehran Medical Sciences.

2. Methods

This is a cross-sectional retrospective study. The research population includes patients admitted from the beginning of the epidemic, November 2019 to March 2021, in three hospitals: Amiralmomenin, Bouali, and Farhikhtegan, affiliated with Islamic Azad University of Medical Sciences, Tehran, and their files are available in these hospitals. In this study, sequential sampling was used, and 1255 cases were studied and analyzed. For data collection, medical students were divided into three groups, and each group went to a hospital, and questionnaires were provided to them.

The medical records unit of the aforementioned hospitals handed over the files of patients suffering from COVID-19 to medical students of the social medicine ward. While studying the files carefully, the medical students entered the information into the questionnaire, and in cases of defects in the files, the recovered patient was contacted. While inquiring about the patient's condition and answering their possible questions, the medical students completed the defects of the files and encouraged them to donate plasma. Map Spotting was performed according to the residence location of the patients.

The inclusion criteria for the study included all hospitalized patients with a definite diagnosis of COVID-19, clinical signs and symptoms and by a positive PCR test or a CT scan, and the exclusion criteria included patients whose PCR tests were negative or not performed or whose CT scan did not show the presence of disease. The data collection of the present study was done using a questionnaire and a checklist by the researcher. The data and information collection tool is a researcher-made tool that has ten sections, including patient's demographic information, special conditions, underlying diseases, symptoms, signs, laboratory test results, the results of lung imaging, protective, supportive, and therapeutic measures, general indicators related to the disease in the hospital and the consequences of the disease.

The validity of this questionnaire has been evaluated by using the opinions of 11 specialists in 7 fields (infectious diseases, emergency, internal medicine, surgery, epidemiology, SDH, and five social medicine specialists) and its reliability by completing the questionnaire for ten patients. The obtained findings were entered into SPSS v20 statistical software as a code sheet and master sheet, and data analysis was done with the above software. In data analysis, *t*-tests, chi-square, and logistic regression tests were used. In cases where more than 25% of the houses had a frequency of less than 5 or a frequency of 0, Fisher's Exact test was used, and a logistic regression test was used to

check the relationship between the investigated variables by answering the questions in the form of yes/no. The ethics committee of the Islamic Azad University of Medical Sciences approved the protocol of this study (Code of Ethics IR.IAU.TMU.REC.1400.341). Informed consent was obtained from all subjects and/or their legal guardian (s).

3. Results

Table 1 shows the demographic characteristics of the patients. The average age of the participants in this study was 66.7 ± 16.31, and most were women, with 67.6%. 99.4 of the patients were admitted from Tehran. Most hospitalized patients were from Farhikhtegan Hospital (44.2%) and in the internal ward (78.0%). Their residence was mostly in metropolitans (54.7%), 36.4% were housewives, and 82.4% were of Persian ethnicity. 77.3% were admitted as emergency cases in the COVID-19 unit (64.9%). 70.2% were hospitalized with moderate disease severity.

According to the study results, the variables are classified into four groups as follows (Tables 2 - 5):

1. Patient history 2. Underlying diseases 3. Symptoms and Signs 4. Laboratory and Imaging findings 5. Several variables have been evaluated in each group and the results with a significant outcome (P-value < 0.05) are listed as follows:

The following variables about the patient's history had a significant outcome (P-value < 0.05): History of being in home quarantine before hospitalization (more recovery than death), presence of illness in the family (more death than recovery), traveling in the last 14 days (more death than recovery), close contact with a person suspected of having the COVID-19 disease in the last 14 days (death more than recovery), history of going to the place where live animals are sold in the last 14 days (death more than recovery), history of heart attack (death more than recovery), history of drug sensitivity (recovery more than death), recent corticosteroid reception (recovery more than death) (Table 2).

In terms of variables about patient's underlying diseases or immunocompromising conditions, some of the variables had more recovery than death: high blood pressure, cardiovascular disease, having a cardiac stent, cured cancer, chronic lung disease (asthma - bronchitis - COPD- and...), immunodeficiency conditions such as HIV/AIDS, liver disease, chronic neurological and neuromuscular disease, presence of symptoms of anxiety, presence of symptoms of depression. Regarding the drug and tobacco use variable, the recovery outcome was significantly more in all cases with smoking, hookah, and opium use (Table 3).

Table 1. Demographic Characteristics of the Participants in the Study

Variables	No. (%)
Hospitals	
Amir	391 (31.2)
Bouali	309 (24.6)
Farhikhtegan	555 (44.2)
Inpatient wards	
Internal or infectious	979 (78.0)
ICU	259 (20.6)
CCU	17 (1.4)
Gender	
Female	848 (67.6)
Male	407 (32.4)
Education	
Illiterate	170 (13.5)
Primary	324 (25.8)
Secondary	653 (52.0)
University	108 (8.6)
Location	
Metropolis	687 (54.7)
City	256 (20.4)
Province	201 (16.0)
Province	
Tehran	1248 (99.4)
Qom	7 (0.6)
Job	
Seller	
Medical personnel	164 (13.1)
Official	43 (3.4)
Military	274 (21.8)
Teacher	96 (7.6)
Driver	114 (9.1)
Manual worker	186 (14.8)
Farmer and rancher	244 (19.4)
Others	134 (10.7)
Ethnic group	
Fars	1071 (85.3)
Turkish	161 (12.8)
Lor and Lak	14 (1.1)
Gilak	9 (0.7)
Inpatient unit	
Corona	814 (64.9)
Isolate	255 (20.3)
Pre-ICU	71 (5.7)
ICU	115 (9.2)
Illness severity	
Medium	636 (50.7)
Intense	306 (24.4)
Serious	313 (24.9)
Age (y)	66.7 ± 16.31
Weight (kg)	63.31 ± 29.41

Table 2. Frequencies and Percentages of History-Related Problems Affecting Morbidity and Mortality Among Understudied Population

History	No. (%)		P-Value
	Recovery (879)	Death (376)	
Home quarantine before hospitalization	348 (39.5)	62 (16.48)	< 0.001*
COVID patient in the family	57 (6.5)	62 (16.6)	< 0.001*
Travel history in the last 14 days	26 (2.9)	38 (10.2)	< 0.001*
Close contact with a person suspected of having COVID-19 in the last 14 days	11 (2.9)	84 (9.5)	< 0.001*
History of presence in the live animals market in the last 14 days	45 (5.1)	75 (20.1)	< 0.001*
History of myocardial infarction	31 (3.5)	49 (13.03)	< 0.001*
History of seasonal cough	26 (2.9)	14 (3.8)	0.483
History of seasonal allergy	26 (3.0)	5 (1.3)	0.093
History of drug sensitivity	33 (3.7)	6 (1.6)	0.047*
Influenza vaccine injection in 2020	26 (2.9)	8 (2.1)	0.423
Organ transplant	10 (1.1)	8 (2.1)	0.169
Recent receipt of corticosteroids	14 (1.6)	0 (0.0)	0.014*
Smoking cigarette	43 (4.9)	27 (7.18)	0.025*
Hookah consumption	18 (2.0)	0 (0.0)	0.005*
Opium use	31 (3.5)	0 (0.0)	< 0.001*

Table 3. Frequencies and Percentages of Underlying Disease or Immunocompromising Conditions Affecting the Under-Studied Population's Morbidity and Mortality

Underlying Diseases	No. (%)		P-Value
	Recovery (879)	Death (376)	
Diabetes mellitus	302 (34.2)	136 (36.5)	0.451
Hypertension	374 (42.4)	179 (47.60)	0.010*
Cardiovascular disease	310 (35.1)	155 (41.6)	0.032*
Angioplasty history	126 (14.3)	79 (21.2)	0.003*
Cancer in remission	34 (3.9)	26 (7.0)	0.018*
Cancer undergoing chemotherapy	16 (1.8)	10 (2.7)	0.324
Cancer undergoing radiotherapy	6 (0.7)	7 (1.9)	0.056
Chronic lung disease (asthma, bronchitis, COPD, etc.)	74 (8.4)	38 (10.10)	< 0.001*
Kidney failure (creatinine above 2)	69 (7.8)	33 (8.8)	0.544
Immunocompromised conditions such as HIV/AIDS	25 (2.8)	20 (5.4)	0.028*
Hepatic disease	15 (1.7)	33 (8.77)	0.011*
Chronic neurological and neuromuscular disease	55 (6.2)	37 (9.84)	< 0.001*
History of retinal disorders (to monitor chloroquine)	28 (3.2)	17 (4.6)	0.228
Presence of anxiety symptoms	65 (7.4)	0 (0.0)	< 0.001*
Presence of depression symptoms	52 (5.9)	22 (5.9)	0.999

Regarding general symptoms, headache, fever, muscle pains, extreme fatigue and weakness, insomnia, anorexia, stress, nausea, and vomiting, they had more recovery. However, in contrast, patients with joint pain had more death compared to recovery.

According to the findings related to mouth, throat, and nose symptoms, sinus pain, rhinorrhea, anosmia, and taste disorder were significantly more recovered. However, cases with a sore throat and hoarseness experienced more death than recovery.

In terms of respiratory symptoms, the outcome was significantly in favor of more recovery in patients with dry cough, colorless sputum, yellow or green sputum, bloody sputum, respiratory distress, respiratory failure, conjunctivitis, signs of dehydration, resistant hypoxia, lethargy, low GCS and convulsions.

In the variable of the general condition of the hospital, all the following variables are checked and lead to more recovery: the patient's doctor is known, the patient's nurse is known, there is an isolation room, the isolation room, and ICU have negative pressure ventilation, the special staff of the isolation room are known, the no-visit rule is observed, it is possible to contact the patient with his family through the phone or virtual networks, there is separate examination equipment for patients outside the isolation room, there is a safety box on the trolley, isolation room, ICU and the ward are regularly cleaned and disinfected, the progress of the patients is monitored, there is enough pulse oximeter (Table 4).

According to the results of lab tests, in all cases with Leukopenia, Leukocytosis, Lymphopenia, Anemia, Thrombocytopenia, CRP+, increased ESR, increased PT, increased BT, increased ALT, increased FBS, increased HbA1c, increased Cr recovery was more than death, However in patients with decreased serum albumin the death rate was significantly more than those who recovered.

According to imaging results, patients with lobar or multi-lobar pneumonia and ground-glass opacity in the lung parenchyma and air bronchogram showed a higher recovery rate than death. In contrast, in CT scans with a Crazy-paving view, death was more common than recovery (Table 5).

4. Discussion

As the results show, in each group, the outcome had a significant relationship with some cases, which in some cases caused more death and, in some cases, resulted in more recovery. In some cases, although the difference is significant, a statistically significant difference does not mean a big or important difference exists. For example, the use of opium, which is statistically significant and all users have recovered, does not mean that the use of opium is good and prevents death from Corona, but because of the difference in the number of people in the user and non-user groups. It is known that 31 recovered patients were opium users, and none of the deceased were users. The same goes for the presence of anxiety symptoms. That is, these symptoms do not cause more recovery in patients.

In most cases, the illness's clinical manifestations include fever, cough, fatigue, and nasal congestion (14). Although the primary organ system affected by the virus is the respiratory system, other organs, such as the kidneys and liver, are also involved. In the initial case series in Wuhan, Chin, patients' lower respiratory tract symptoms included fever, dry cough, and dyspnea (15). Having a patient in the family, traveling in the last 14 days, having close contact with a person suspected of having COVID-19 in the last 14 days, having a history of visiting a place where live animals are sold, and having a history of a heart attack in our study sample lead to an increased number of deaths. If such people use a mask as the most important protective measure, the possibility of contracting this disease will greatly reduce. Face masks can provide some protection for the user, but the extent of this protection depends largely on the type of mask. The effectiveness of any mask is not 100%, so it is incorrect to assume that individuals who wear masks are exempt from practicing social distancing and frequent handwashing.

When considering these benefits of wearing a mask, it can make a significant difference. These factors all depend on the type of mask, occupation, and weather conditions. In such circumstances, it may be necessary to use multiple face masks throughout the day to ensure proper protection. The use of masks should not create a false sense of security, which may lead to non-compliance with other infection control measures by members of the community. At the same time, masks should be visually and physically acceptable to individuals and not cause any negative mental or psychological effects (16). Due to the lack of effective treatments, the best way to deal with the SARS-CoV-2 epidemic is to control the sources of infection. Strategies including early detection, reporting, isolation, supportive treatments, timely dissemination of information related to the epidemic, and also personal protection measures such as using masks, gloves, proper ventilation, and adequate rest can prevent the new coronavirus. Therefore, in general, the prevention and control of infection and compliance with health principles by the general public are the priority of countermeasures in other countries (17). The proper use of masks at the community level significantly impacts the reduction of disease transmission among community members.

Table 4. Frequencies and Percentages of Symptoms and Signs Among Affected Patients

Symptoms and Signs	No. (%)		P-Value
	Recovery (879)	Death (376)	
Headache	317 (35.9)	301 (80.7)	< 0.001*
Fever	339 (38.4)	29 (7.8)	< 0.001*
Chills	268 (30.5)	120 (32.2)	0.548
Muscular pain (myalgia)	202 (22.9)	118 (31.6)	0.001*
Arthralgia	125 (14.2)	134 (35.9)	< 0.001*
Fatigue and weakness	226 (3.2)	45 (12.1)	< 0.001*
Insomnia	156 (17.7)	195 (52.3)	< 0.001*
Anorexia	17 (13.3)	5 (1.3)	< 0.001*
Anxiety	32 (3.6)	4 (1.1)	0.013
Nausea	137 (15.5)	30 (8.0)	< 0.001*
Vomiting	150 (17.0)	94 (25.2)	0.001*
Diarrhea	132 (15.0)	55 (14.7)	0.914
Heartburn	68 (7.7)	54 (14.5)	< 0.001*
RUQ pain	16 (1.8)	12 (13.2)	0.124
LUQ and epigastric pain	11 (1.2)	7 (1.9)	0.391
Pain in the umbilical region	21 (2.4)	9 (2.4)	0.973
Pain in hypogastric region	26 (2.9)	11 (2.9)	0.999
Lower limb pain	14 (1.6)	4 (1.1)	0.483
Sinus pain	23 (2.6)	20 (5.4)	0.014*
Rhinorrhea	126 (14.3)	125 (33.5)	< 0.001*
Anosmia	41 (4.6)	2 (0.5)	< 0.001*
Taste disorder	40 (4.5)	31 (8.3)	0.008*
Sore throat	85 (9.6)	96 (25.7)	< 0.001*
Clearing the throat	46 (5.2)	11 (2.9)	0.078
Hoarseness	274 (31.1)	339 (90.9)	< 0.001*
Dry cough	291 (33.0)	21 (5.6)	< 0.001*
Colorless sputum	239 (27.1)	223 (59.8)	< 0.001*
Green/yellow sputum	48 (5.4)	35 (9.4)	0.010*
Bloody sputum	16 (1.8)	15 (4.0)	0.021*
Wheezing	66 (7.5)	32 (8.6)	0.508
PND	28 (3.2)	20 (5.4)	0.065
Dyspnea	473 (53.6)	201 (53.9)	0.993
Respiratory distress	184 (20.9)	6 (1.6)	< 0.001*
Respiratory failure	125 (14.2)	105 (28.2)	< 0.001*
Respiratory sounds	93 (10.5)	23 (6.2)	0.014*
Palpitation	38 (4.3)	15 (4.0)	0.817
Conjunctivitis	20 (2.3)	17 (4.6)	0.028*
Cyanosis	11 (1.2)	2 (0.5)	0.256
Exudate	14 (1.6)	4 (1.1)	0.483
Restlessness	67 (7.6)	28 (7.5)	0.956
Sign of dehydration	91 (10.3)	61 (16.4)	0.003*
Resistant hypoxia	30 (3.4)	24 (6.4)	0.016*
Lethargy	48 (5.4)	8 (2.1)	0.010*
Confusion	0 (0.0)	1 (0.3)	0.302
Low GCS	61 (6.9)	43 (11.43)	0.018*
Convulsions	28 (3.2)	23 (6.2)	0.014*
Evidence of a cytokine storm	4 (0.5)	4 (1.1)	0.208
Coma	8 (0.9)	0 (0.0)	0.065

Table 5. Frequencies and Percentages of Lab and Imaging Findings Among Affected Patients

Para Clinic (Lab and Imaging) Findings	No. (%)		P-Value
	Recovery (879)	Death (376)	
Leukopenia	88 (10.0)	10 (2.7)	< 0.001*
Leukocytosis	149 (16.9)	45 (12.1)	0.031*
Lymphopenia	255 (28.9)	86 (23.1)	0.033*
Anemia	208 (23.6)	121 (32.4)	0.001*
Thrombocytopenia	75 (8.5)	54 (14.5)	0.001*
CRP+	378 (42.9)	14 (3.8)	< 0.001*
Increased ESR	458 (51.9)	269 (72.1)	< 0.001*
Increased prothrombin time	241 (27.3)	202 (54.2)	< 0.001*
Increased BT	68 (7.7)	42 (11.3)	0.042*
Increased CT	16 (1.8)	3 (0.8)	0.181
Increased ALT	67 (7.6)	4 (1.1)	< 0.001*
Increased AST	155 (17.6)	60 (16.1)	0.523
Increased LDH	160 (18.1)	77 (20.6)	0.300
Decreased albumin	90 (10.2)	104 (27.9)	< 0.001*
FBS	147 (16.7)	12 (3.2)	< 0.001*
HbA1C	107 (12.1)	93 (24.9)	< 0.001*
Increased Cr	101 (11.5)	20 (5.4)	0.001*
Lobar or multi-lobar pneumonia	172 (19.5)	89 (23.67)	< 0.001*
Ground-glass opacity	364 (41.3)	99 (26.32)	< 0.001*
Crazy-paving	188 (21.3)	249 (66.8)	< 0.001*
Consolidation	71 (8.0)	19 (5.1)	0.064
Lung parenchyma involvement	42 (4.8)	31 (8.3)	0.014*
Air bronchogram	26 (2.9)	20 (5.31)	0.008*

It is suggested that the general use of fabric masks is more effective than other health strategies, distancing, and patient diagnosis strategies in reducing the rate of disease transmission (18). Even surgical masks, which can filter much of an infected person's respiratory secretions and other public health measures at the community level, cannot reduce the rate of SARS-CoV-2 infection by more than 50% (19). Face masks are useful when the points related to the type of mask and the conditions of its use are followed along with social distancing and other personal and social health issues (20). Based on the advice of epidemiologists who emphasize that using face masks effectively stops the transmission of infectious agents into the air in society, government officials strongly recommend the general use of masks by citizens (21). During the first two years of the corona epidemic, using face masks was one of the most important health measures to control this virus worldwide, and it had the greatest effect in indoor public places with limited physical distancing (19). This study needed more power regarding the protective effect of masks on other viral infections, and more studies should be done on other viruses to ensure this effect (19). In the WHO's "Advice on the use of masks in the context of COVID-19" temporary recommendation, the prioritized use of medical masks by health personnel was underscored (18).

As the results of our study show, in patients with COVID who had a history of drug sensitivity and recently received corticosteroids, no more death was observed, and apparently, it was less important in the severity of the disease or the increase in mortality.

The use of tobacco and drugs did not cause more deaths in the people we studied, but those who use these things due to lung problems may be more likely to be infected with COVID than others. According to the World Health Organization and a large amount of available evidence, the severity of the disease and mortality caused by COVID-19 is related to smoking (22, 23). The

presence of general symptoms such as headache, fever, muscle aches, extreme fatigue and weakness, insomnia, anorexia, stress, nausea, and vomiting, which are seen in most patients, do not cause the death of most people infected with COVID, and there is a possibility of these symptoms occurring in people. Finally, patients recover after these symptoms are resolved, but patients with joint pain reported more deaths, perhaps because of the severe physical pains that COVID causes. According to the findings of our study regarding people with sinus pain, rhinorrhea, anosmia, and taste disorder, these symptoms did not lead to the death of more sufferers. However, Individuals who experience a sore throat and hoarseness may be at a higher risk of developing serious respiratory problems. They experienced a higher incidence of diseases and deaths.

The results of the present study indicate that hospitals equipped with facilities such as designated doctors and nurses for patients, isolation rooms, negative pressure ICUs, proper ventilation, specialized personnel in the isolation room, and the ability to communicate with patients and their families through telephone or virtual networks are better equipped to handle infectious diseases. If separate examination equipment is available for patients outside the isolation room, along with a safety box on the trolley and an adequate number of pulse oximeters, the number of recovered patients will exceed the number of fatalities. According to the hospital's facilities, the study found that patients had a higher chance of recovery than death if provided with an isolation room.

Effective infection control measures are crucial for preventing nosocomial outbreaks of COVID-19. These measures include actively monitoring and identifying cases early, isolating suspected and confirmed cases in airborne infection isolation rooms (AIIRs), and implementing the standard, contact, droplet, and airborne precautions to prevent the spread of infection. Additionally, contact tracing is necessary to identify potential secondary cases. Preventive strategies focus on isolating patients and implementing careful infection control measures, including appropriate protocols for diagnosing and providing clinical care to infected patients (4).

4.1. Chest CT Scans

Based on the imaging results of people in our study, in patients who had lobar or multiple lobar pneumonia and ground glass and lung parenchyma opacity and air bronchogram, the number of recovered people was more than death. However, in people with a CT scan with a crazy view, death was more than it was a recovery.

According to the results of the research, the sensitivity of the CT scan was reported to be 97.2% compared to the sensitivity of 83.3% of RT-PCR (24). According to the systematic review and meta-analysis of Farad infected with COVID-19, the most common clinical symptoms are

fever, cough, fatigue, shortness of breath, and chest discomfort. The criterion for the final diagnosis of COVID-19 was a positive RT-PCR test and lung imaging findings (25). CT scan of the chest has a high sensitivity for the diagnosis of COVID-19, which has made it the main tool widely used in the initial diagnosis of the disease and during the treatment and follow-up process, diagnosis, and treatment of possible secondary complications. Computed tomography (CT) scan was used as an early diagnosis tool for COVID-19 in many countries primarily due to a lack of testing kits (2).

4.2. Respiratory Symptoms

In our study, despite having respiratory symptoms such as dry cough, colorless sputum, yellow or green sputum, bloody sputum, respiratory distress, respiratory failure, conjunctivitis, signs of dehydration, resistant hypoxia, lethargy, decreased level of consciousness and seizures, Most of the people have recovered, and in fact, these symptoms have caused the severity of their illness. However, it did not increase the probability of their death, and the number of recoveries was more than the number of deaths.

Regarding respiratory symptoms, the outcome was significantly in favor of more recovery in patients with dry cough, colorless sputum, yellow or green sputum, bloody sputum, respiratory distress, respiratory failure, conjunctivitis, signs of dehydration, resistant hypoxia, lethargy, low GCS and convulsions.

COVID-19 is mainly regarded as a viral respiratory and vascular illness as its causative agent, SARS-CoV-2, primarily targets the respiratory and vascular systems (26). The 2-CoV-SARS coronavirus widely reproduces in the upper respiratory tract. It also tends to the cells located in the lower respiratory tract, and multiplying in these areas leads to creating lesions in the lower respiratory tract. Approximately 09% of patients develop mild symptoms that recover at home. In 90% of cases, the affected person shows severe symptoms, including pneumonia, shortness of breath, and respiratory distress. In 0% of cases, the patient's condition worsens, associated with respiratory failure, infectious shock, and failure in other body organs (27). Some of the symptoms can be related to COVID-19, but none of them are specific to this disease, and their diagnosis is confirmed by tests. Many studies are needed to identify the frequency of unusual clinical manifestations, and possible confounding factors such

as host factors (e.g., co-morbidities), onset of symptoms, time of onset of infection, and severity of illness should be fully explored. It is now widely recognized that respiratory symptoms of COVID-19 are incredibly heterogeneous, ranging from minimal symptoms to significant hypoxia with ARD (15). The 2019-nCoV infection caused severe respiratory conditions associated with ICU admission and high mortality. Future studies need to fulfill significant gaps in our understanding of the origin, epidemiology, duration of human transmission, and clinical spectrum of the disease (15). Most patients with COVID-19 show mild to moderate symptoms, but approximately 15% progress to severe pneumonia, and about 5% eventually develop acute respiratory distress syndrome (ARDS), septic shock, or multiple organ failure (28). Patients referred with acute respiratory distress syndrome (ARDS) are at risk of deterioration, and their dire condition can lead to various complications at different stages of treatment. Moreover, some individuals may die from a condition known as a "cytokine storm". Cytokine storm refers to the immune system's response to an invading virus, which can become so intense that it damages healthy tissues (1).

4.3. Laboratory Tests

Based on the results of our study, in the laboratory factors, despite leukopenia, leukocytosis, lymphopenia, anemia, thrombocytopenia, CRP+, increased ESR, increased PT, increased BT, increased ALT, increased FBS, increased HbA1c, the number of patients improved more than those who died. However, in patients with a decrease in serum albumin, the mortality rate was more improved than in patients. These tests are widely available and may be the only tests available to diagnose COVID-19 in some places. Laboratories of health centers, hospitals, and private companies perform a wide range of tests for prevention, diagnosis, treatment, and other purposes (29). Clinical observations suggest that the initial viral load in an individual is related to the severity of COVID-19. However, the current evidence of this relationship remains limited by the suboptimal quality of many of the studies, their retrospective nature, small sample sizes, and the potential for selection bias (30).

4.4. Underlying Disease

According to the results of our study, even individuals with underlying diseases did not experience fatal outcomes, and in some cases, they demonstrated significant improvement. Underlying diseases such as high blood pressure, cardiovascular disease, heart stent placement, treated cancer, chronic lung disease (including asthma, bronchitis, and COPD), immunodeficiency conditions such as HIV/AIDS, liver disease, chronic neurological and neuromuscular disease, as well as the presence of anxiety and depression symptoms, have not been found to cause more deaths in people with COVID-19. However, in our sample, these factors may increase the likelihood of COVID-19 infection and slow down recovery, but they do not necessarily increase the chance of death.

Researches on people with underlying diseases indicate that in these people, the risk of contracting the disease is higher, and the probability of death due to the disease is higher. Elderly individuals are more susceptible to certain health conditions compared to younger age groups. This is due to the higher prevalence of underlying diseases such as kidney failure, diabetes, high blood pressure, arthritis, heart disease, and chronic obstructive pulmonary disease among the elderly population (5). The relationship between some underlying diseases, such as diabetes and blood pressure, with corona disease severity has been investigated. In many studies, the effect of age and underlying diseases has been proven, and, with increasing age, it is possible that the effect of underlying diseases has an impact on the outcome (31).

4.5. Quarantine

According to the general results of the study, in the group of disease records, the probability of their recovery was higher than death for people who were quarantined at home before hospitalization, which shows the importance of quarantine.

Quarantine is one of the oldest and most effective methods to control various infectious diseases. This method can effectively reduce the number of patients and deaths caused by infectious diseases (4).

4.6. Conclusions

The COVID-19 pandemic has unprecedentedly stressed our healthcare systems and highlighted the importance of early detection and diagnosis of patients and suspected cases, as well as timely quarantine and treatment, in controlling the spread of the disease. Using the appropriate diagnostic tests enables doctors to promptly intervene for their patients. Therefore, selecting the appropriate laboratory method, ensuring proper sampling, and correct transfer are crucial. While molecular diagnosis is considered the most accurate method for diagnosing COVID-19, studies suggest that relying solely on the results of a single test may not be sufficient. A combination of different methods and tests should be utilized to overcome diagnostic challenges. Patients and their families should be encouraged to adhere to social distancing guidelines and wear masks.

Receive the necessary training regarding frequent hand washing for at least 20 seconds with soap and water in contact with contaminated surfaces. Patients should be informed that they can use remote healthcare services instead of physically visiting the doctor's office if necessary. Additionally, they should be provided with clear explanations regarding the efficacy of available vaccines and their advantages. The accurate publication of statistics on risk factors associated with COVID-19 can increase compliance with health protocols, ultimately leading to eradicating or eliminating the virus and limiting its destructive impact on socioeconomic situations and healthcare systems worldwide.

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Footnotes

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