Original Article
http://mjiri.iums.ac.ir
Medical Journal of the Islamic Republic of Iran (MJIRI)

Med J Islam Repub Iran. 2021(13 Jan);35.7. https://doi.org/10.47176/mjiri.35.7

Clinical features of 50 cases of 2019 novel coronavirus in Bandar Abbas, Iran

Hashem Jarineshin[1], Fateme Saljoughi[2], Hamideh Estabraghnia Babaki[1], Mehdi Hassaniazad[3], Masoumeh kheirandish[4], Amin Ghanbarnejad[5], Shahla Sohrabipour*[4]

Received: 5 Jun 2020 Published: 13 Jan 2021

Abstract

Background: There is sparse information to describe the clinical features and outcomes of patients infected with coronavirus disease 2019 (COVID-19).

Methods: In a single-center retrospective observational study, 50 patients infected with COVID-19 were studied. Epidemiological, demographic, clinical, laboratory, radiological, and treatment data were collected and analyzed. Outcomes of critically ill patients and noncritically ill patients were compared.

Results: The mean age of the patients was 48.8 years, with male predominance. Dry cough, fever, and dyspnea were the most complaining symptoms on admission. Chronic medical illnesses before admission were present in 56% of the patients. The most common laboratory abnormalities were lymphopenia, neutrophilia, thrombocytopenia, increased aspartate aminotransferase, high serum creatinine level, elevated lactate dehydrogenase, and increasing ESR and CRP levels. Bilateral mixed ground-glass opacity and consolidation were observed in chest CT scan of most patients. Some patients required supplemental oxygen and some needed invasive mechanical ventilation. Blood oxygen saturation was different between survivors and nonsurvivors. 10% of patients died, of whom 60% were men. 40% of dead cases had chronic medical illnesses; 60% underwent invasive mechanical ventilation.

Conclusion: Among the patients diagnosed with COVID-19 infection, the frequent clinical presentation was with a wide range of signs and symptoms. The laboratory changes suggest that COVID-19 infection may be related to cellular immune deficiency, myocardial, hepatic, and kidney injury. Additional research is needed to elucidate COVID-19 pathogenesis.

Keywords: SARS-CoV-2, Coronavirus disease 2019, COVID-19, Clinical features, Laboratory, Chest CT scan, Outcomes

Conflicts of Interest: *None declared*
Funding: *Hormozgan University of Medical Sciences*

Cite this article as: Jarineshin H, Saljoughi F, Estabraghnia Babaki H, Hassaniazad M, kheirandish M, Ghanbarnejad A, Sohrabipour S. Clinical features of 50 cases of 2019 novel coronavirus in Bandar Abbas, Iran. *Med J Islam Repub Iran.* 2021 (13 Jan);35:7. https://doi.org/10.47176/mjiri.35.7

Introduction

During the past 20 years, the world has been affected by 3 coronaviruses epidemics. The mortality rate of COVID-19 was more than others (1). Primary data revealed that more than 80% of patients did not show any symptoms or had light symptoms (2). The outbreak of COVID-19 has alarmed the health authorities worldwide (3).

Corresponding author: *Dr Shahla Sohrabipour, sh.sohrabipour@hums.ac.ir*

1. Critical Care and Pain Management Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran
2. Student Research Committee, Faculty of Medicine, Hormozgan University of Medical Sciences, Bandar Abbas, Iran
3. Infectious and Tropical Diseases Research Center, Hormozgan Health Institute, Hormozgan University of Medical Sciences, Bandar Abbas, Iran
4. Endocrinology and Metabolism Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran
5. Social Determinants in Health Promotion Research Center, Hormozgan Health Institute, Hormozgan University of Medical Sciences, Bandar Abbas, Iran

↑What is "already known" in this topic:
There is sparse information to describe the clinical features and outcomes of patients infected with coronavirus disease 2019 (COVID-19).

→What this article adds:
Most COVID-19 patients were male, and most admission signs and symptoms were dry cough, fever, and dyspnea. Lymphopenia, neutrophilia, thrombocytopenia, increased aspartate aminotransferase (AST), high serum creatinine level, elevated lactate dehydrogenase, and increased erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) levels were common. Ground-glass opacity were observed. Most of the mortalities occurred in men.

The clinical manifestations of the disease included a wide range of fever, cough, dyspnea, myalgia, confusion, headache, sore throat, rhinorrhea, chest pain, diarrhea, nausea, and vomiting (4-6). Chest computed tomography (CT) findings include lower lobe peripheral subpleural ground-glass opacity, crazy paving pattern, and consolidation (7).

The most common changes in laboratory tests were lymphopenia, increase in prothrombin time (PT) and lactate dehydrogenase (LDH). In patients who died of the disease, neutrophils, D-dimer, blood urea nitrogen (BUN), and serum creatinine elevated and lymphocytes count decreased (8). In another study, lymphopenia and elevated C-reactive protein (CRP) were reported (6).

Because of the wide range of clinical picture of patients, from uncomplicated respiratory infection to multiorgan failure and death (5, 9), in this study, we assessed the clinical features and outcomes of patients with confirmed COVID-19 pneumonia who were admitted to a hospital in Iran.

Methods

This was a single-center, retrospective, observational study done at Mohamadi hospital in Bandar Abbas, Iran, from January 31 to March 19, 2020. All patients diagnosed as having clinical features of COVID-19 infection and whose polymerase chain reaction (PCR) tests confirmed COVID-19 infection were enrolled. Our ethics permission code was IR.HUMS.REC.1398.469. All data were collected from the patients' medical record.

We retrospectively evaluated and analyzed the medical history, physical examination, demographics, signs and symptoms, first laboratory results, pulse oximeter oxygen saturation (O_2 SAT) on triage, CT findings on admission, comorbidities, treatment received for COVID-19, and clinical outcomes obtained from 51 patients. Blood groups, BCG vaccination, and history of malaria infection were also recorded.

Medications and supportive therapies, including supplemental oxygen, and invasive and noninvasive treatments were also described. Data collection forms were reviewed independently by 2 researchers. The patients were divided into 2 groups based on the following factors: receiving supplemental O_2 or not; sex; age; and the survival and non-survival. The related results were compared, and the data were checked by 2 physicians.

Statistical analysis

Continuous measurements were presented as mean if they were normally distributed, or median, if they were not, and categorical variables were presented as count (%). For laboratory results, we also assessed whether the measurements were outside the normal range. Categorical variables were expressed as number (%) and compared by $\chi 2$ test or Fisher exact test and Mann Whitney test between the groups. P values less than .05 were considered statistically significant. Statistical analyses were done using SPSS software version 17.0.

Results

Patients' demographics and baseline characteristics

Our first patient was admitted with multiple traumas. During the hospital admission, his CT was suggestive of COVID-19, and his PCR test result was positive. Because of his complications, we excluded his data from analysis.

The mean age of the patients was 48.8 years. The youngest patients aged 18 and the oldest was 87 years. Most of the patients were male (60% vs 40%). Compared with patients who did not require supplemental O_2, patients who did require O_2 were older (Table 1). Two patients were medical staff, 1 physician, and 1 nurse who recovered.

Table 1. Baseline Characteristics of Patients Infected With SARS-CoV-2

	All patients (n=50)	Required supplemental O_2 (n=37)	Did not require supplemental O_2 (n=13)	p[a]
Age, mean y (range)	48.80 (18-87)	49.97 (18-87)	45.46 (34-62)	0.18
Male, No (%)	30 (60%)	21 (56.8)	9 (69.2)	0.52
Female, No (%)	20 (40%)	16 (43.2)	4 (30.8)	
Chronic medical illness, No (%)	28 (56)	20 (54.1)	8 (61.5)	0.44
Diabetes	16 (32)	13 (35.1)	3 (23.1)	0.33
Hypertension	12 (24)	8 (21.6)	4 (30.8)	0.37
Respiratory system disease	6 (12)	5 (13.5)	1 (7.7)	0.5
*Cardiovascular disease	6 (12)	5 (13.5)	1 (7.7)	0.5
Malignancy	3 (6)	2 (5.4)	1 (7.7)	0.6
Chronic kidney disease	2 (4)	1 (2.7)	1 (7.7)	0.45
*Endocrine disease	2 (4)	1 (2.7)	1 (7.7)	0.45
Cerebrovascular disease	1 (2)	1 (2.7)	0	0.7
Psychological system disease	1 (2)	1 (2.7)	0	0.7
Autoimmune system disease	1 (2)	1 (2.7)	0	0.7
Hematologic system disease	1 (2)	0	1 (2.7)	0.25
Antihypertensive drug taking ARB medication	7 (14)	6 (16.2)	1 (7.7)	0.4
Symptoms on presentation, N(%)				
Cough	41 (82)	29 (78.4)	12 (92.3)	0.13
Dry	20 (40)			
Productive	12 (24)			

* Cardiovascular disease (all cardiovascular disease except hypertension)
*Endocrine disease (all endocrine disease except diabetes)
a. P values indicate differences between O_2 supplemented and non- O_2 supplemented patients.
P < .05 was considered statistically significant.

Table 1. Ctd

	All patients (n=50)	Required supplemental O_2 (n=37)	Did not require supplemental O_2 (n=13)	p[a]
Fever	35 (70)	25 (67.6)	10 (76.9)	0.39
Dyspnea	34 (68)	26 (70.3)	8 (61.5)	0.4
Myalgia	24 (48)	16 (43.2)	8 (61.5)	0.2
Malaise	15 (30)	11 (29.7)	4 (30.8)	0.6
Chills	10 (20)	4 (10.8)	6 (46.2)	0.01
Headache	8 (16)	5 (13.5)	3 (23.1)	0.34
Sore throat	7 (14)	5 (13.5)	2 (15.4)	0.59
Rhinorrhea	4 (8)	3 (8.1)	1 (7.7)	0.72
Vomiting	3 (6)	2 (5.4)	1 (7.7)	0.6
Diarrhea	3 (6)	3 (8.1)	0	0.39
Dizziness	3 (6)	2 (5.4)	1 (7.7)	0.6
Perspiration	3 (6)	3 (8.1)	0	0.39
Anorexia	2 (4)	1 (2.7)	1 (7.7)	0.45
Chest pain	2 (4)	2 (5.4)	0	0.54
Abdominal pain	1 (2)	1 (2.7)	0	0.74
Arthralgia	1 (2)	1 (2.7)	0	0.54
Hemoptysis	1 (2)	0	1 (7.7)	0.54
Vital sign at presentation, median(range)				
Temperature, °C	37 (36-39.8)	37 (36-39)	37 (36.5-38.5)	
Respiratory rate, breaths/min	16 (12-30)	16 (12-30)	18 (14-20)	0.93
Pulse oximeter O2 saturation*%*,	96 (80-99)	95.50 (80-99)	97 (93-99)	0.06
Systolic blood pressure, mm Hg	120 (80-160)	120 (80-160)	110 (90-160)	0.41
Diastolic blood pressure, mm Hg	70 (40-97)	76.50 (40-97)	70 (60-90)	0.24
Heart rate, /min	86.50 (36-125)	85.50 (70-125)	88 (36-104)	0.26
Chest CT Findings %				
Pattern				0.37
Ground glass opacity & consolidation mix	84%	81%	92.3%	
Just Ground glass opacity	2%	2.7%	0%	
Just consolidation	8%	10.8%	0%	
Location of consolidation				
Upper lobe	4%	5.4%	0%	
Lower lobe	28%	27%	30.8%	
Both lobe	60%	59.5%	61.5%	
Unilateral	16%	18.9%	7.7%	
bilateral	74%	70.3%	84.6%	
Location of ground glass opacity				
Upper lobe	0%	0%	0%	
Lower lobe	6%	2.7%	15.4%	
Both lobe	80%	81.1%	76.9%	
Unilateral	0%	0%	0%	
Bilateral	84%	81.1%	92.3%	
Unilateral Plural effusion	2%	0%	7.7%	
Plural thickening	4%	5.4%	0%	
Treatment, N (%)				
Oxygen therapy	37 (74)	37 (74)	-	
Mechanical ventilation	3 (6)	3 (6)	-	0.39
Antibiotic treatment	48 (96)	37 (100)	12 (92.3)	0.26
Antiviral treatment	42 (84)	31 (83.8)	12 (92.3)	0.4
Hydroxychloroquine	47 (94)	36 (97.3)	12 (92.3)	0.45
Acetaminophen	33 (66)	25 (67.6)	9 (69.2)	0.6
Naproxen	2 (4)	2 (5.4)	0	0.54
Clinical outcome, N (%)				0.6
Discharged	45 (90)	33 (89.2)	12 (92.3)	-
Died	5 (10)	4 (10.8)	1 (7.7)	-

* Cardiovascular disease (all cardiovascular disease except hypertension)
*Endocrine disease (all endocrine disease except diabetes)
a. P values indicate differences between O_2 supplemented and non- O_2 supplemented patients.
P < .05 was considered statistically significant.

Of the patients, 56% had 1 or more concurrent medical illnesses. Diabetes (32%) and hypertension (24%) were the most coexisting medical illnesses. Also, 7 patients (14%) were taking angiotensin II receptor blocker (ARB), of whom 6 needed oxygen therapy and had less O_2 SAT (Table 1).

The most common symptoms at the beginning of the illness were cough (82%) and fever (68%). Most of the patients had a dry cough. Abdominal pain, hemoptysis, and arthralgia were the less common symptoms (Table 1). One of the patients was just admitted with abdominal pain and vomiting without dyspnea, fever, or cough, but with high serum troponin levels. Another patient was admitted with anorexia without cough, fever, and dyspnea.

Vital Signs and laboratory parameters

The patients' temperature ranged from 36°C to 39.8°C. Also, 20% of the patients on triage were febrile (≥37.8°C). O_2 saturation of the patients who did not need oxygen supplementation was 93% and more. The range of O_2 saturation in patients with O_2 therapy was 80% to 99%, and 72% had O_2 saturation <93%.

Leukocytopenia were presented in 12% and leukocytosis in 6% of the patients. Neutrophilia was observed in 54%, lymphopenia in 52%, and thrombocytopenia in 32% of the patients. 70% decrease was detected in hemoglobin (<13.5gr/dL). PT 10% and partial thromboplastin time (PTT) 2% were higher than the normal level (Tables 2 and 3). Women had more lymphocytes and less PTT levels than men (Table 4).

Aspartate aminotransferase (AST) (34%), alanine aminotransferase (ALT) (2%), and total bilirubin (6%) increased, and alkaline phosphatase (ALP) was at normal level (Table 3). Patients older than 60 years had higher AST levels (Table 5).

Serum creatinine increased by 14% and serum urea by 10% above the normal level. LDH increased by 44%, and non-fasting blood glucose by 10%. ESR and CRP were increased in 82% and 80% of the patients, respectively. Creatinine and urea levels were higher in men than in women (Table 4). Older patients also had higher urea, creatinine, and LDH levels (Table 5).

Troponin level was measured in 10 cases, but it was elevated in 2 cases. The serum ferritin level was evaluated in 8 patients, which was increased in 6 patients (Table 3). In 13 cases the median of serum PH was normal with the range of 7.32 to 7.50 (Table 2).

Imaging

At the CT, the features of pneumonia were predominantly bilateral ground-glass opacity (84%), bilateral consolidation (74%), pleural thickening (4%), and unilateral pleural effusion (2%). One patient had normal features in chest CT (Table 1).

Organ dysfunctions and main interventions

A 63-year-old female patient without a past medical illness was intubated because of decreased O_2 saturation a day after admission, and invasive mechanical ventilation was started for her. A day later, she developed acute respiratory distress syndrome (ARDS) and died on the next day.

Another patient with end-stage renal disease (ESRD) had a past medical history of cardiac arrhythmia. Eight days after admission, he developed atrial fibrillation and died 2 days later. Three other patients who died had an acute renal injury; of them 1 had ESRD.

A total of 37 patients received oxygen therapy, of whom 3 underwent invasive mechanical ventilation. Most patients received antibiotic treatment (96%), hydroxychloroquine (94%), and antiviral therapy (84%), including oseltamivir, ribavirin, lopinavir/ritonavir. Acetaminophen was used in 66% and naproxen in 4% of the patients (Table 1).

Blood group, BCG vaccination, and history of malaria infection

Most of our patients' self-reported blood group was O+ (20%) as the norm of the population. With respect to the

Table 2. Laboratory Findings of Patients Infected With SARS-CoV-2

	All patients (n=50)	Required supplemental O_2 (n=37)	Did not require supplemental O_2 (n=13)	p[a]
Blood routine, median (range)				
Leucocytes (× 10^3 per µl; normal range: 3·5–9)	5.80 (2.40-9.80)	6.10 (2.60-9.80)	4.70 (2.40-8.10)	0.18
Neutrophils %; normal range: 40-70	72.20 (48.2-86.7)	70.60 (48.2-86.7)	72.90 (59.4-85.6)	0.32
Lymphocytes %; normal range: 20-50	19.10 (7.3-42.0)	20.15 (8.8-42)	18 (7.3-33.6)	0.33
Platelets (× 10^3 per µl; normal range 150–450)	176 (100-436)	185 (100-436)	154 (105-228)	0.07
Hemoglobin (g/dl; normal range 13.5-18)	12.5 (3.2-18.1)	12.3 (7.7-18.1)	12.8 (3.2-14.7)	0.85
Coagulation function				
Prothrombin time (s; normal range 12-14)	13.20 (12-15.3)	13.2 (12-15.3)	12.95 (12-14.3)	0.61
partial thromboplastin time (s; normal range 25-45)	33 (25-64)	31.60 (25-64)	34 (31-36)	0.86
International Normalized Ratio (S)	1.10 (1-1.40)	1.10 (1.00-1.40)	1.06 (1.00-1.25)	0.54
Blood biochemistry, median(range)				
Alanine aminotransferase (U/L; normal range: up to 41)	31 (15-237)	31 (15-237)	32.50 (22-46)	0.73
Aspartate aminotransferase (U/L; normal range: up to 37)	36 (14-203)	37 (14-203)	35.50 (21-53)	0.43
Alkaline phosphatase(U/L; normal range: 98- 279)	157 (59-273)	158 (85-273)	133.50 (59-167)	0.04
Total bilirubin (mg/dl; normal range 0·1–1.2)	0.8 (0.4-3.3)	0.8 (0.5-3.5)	0.55 (0.4-0.7)	<0.001
Serum creatinine (mg/dl; normal range 0.6-1.3)	0.90 (0.6-5.6)	0.9 (0.6-5.6)	1.05 (0.7-1.7)	0.32
Urea(mg/dl; normal range: 11-55)	34 (13-128)	33 (19-128)	37 (13-64)	0.73
Lactate dehydrogenase (U/L; normal range 120–460)	476.50 (284-1247)	516 (340-1274)	409 (284-625)	0.02
Glucose (mg/dl; normal range<140)	95 (71-409)	97 (72-324)	90 (71-409)	0.85
Albumin (gr/dl; normal range 3.5-5): n=3	4 (3.7-4.1)	4 (3.7-4.1)	-	-
Troponin I (ng/l; normal range<19): n=10	5.2 (1.20-29.20)	5.4 (1.40-29.20)	1.6 (1.20-6.90)	0.28
Creatine phosphokinase (CPK)(mg/dl; normal range 24-195): n=5	163 (58-501)	163 (76-225)	279 (58-501)	0.67
Ferritin (ng/ml; normal range: 4.63-204) n=8	589.85 (87.99-2560)	589.850 (87.99-2560)	-	-
PH (normal range 7.35-7.45): n=13	7.44 (7.32-7.50)	7.44 (7.32-7.50)	7.42 (7.40-7.46)	0.54
$HCO3^-$ (mmol/l; normal range 24): n=13	23.20 (16.80-30.5)	23.10 (16.80-27.10)	29 (23.10-30.5)	0.06
Infection-related biomarkers				
Erythrocyte sedimentation rate (mm/h; normal Range 0·0–15·0)	38 (4-108)	38 (4-108)	38 (22-68)	0.9
C-reactive protein (qualitative; normal range 0)	2.50 (0-3)	2 (0-3)	3 (0-3)	0.95

a. P values indicate differences between O_2 supplemented and non- O_2 supplemented patients. P < .05 was considered statistically significant.

Table 3. Laboratories changes of Patients Infected with SARS-CoV-2

	Increased N (%)	Decreased N (%)
Leucocytes (× 10^3 per µl); normal range: 3.5–9	3 (6%)	6 (12%)
Neutrophils (%); normal range: 40-70	27 (54%)	0
Lymphocytes (%); normal range: 20-50	0	26 (52%)
Platelets (× 10^3 per µl); normal range: 150–450	0	16 (32%)
Hemoglobin (g/dl); normal range: 13.5-18	1 (2%)	35 (70%)
Prothrombin time (s); normal range: 12-14	5 (10%)	-
partial thromboplastin time (s); normal range: 25-45	1 (2%)	-
Alanine aminotransferase (U/L); normal range: up to 41	1 (2%)	-
Aspartate aminotransferase (U/L); normal range: up to 37	17 (34%)	-
Total bilirubin (mg/dl); normal range 0.1–1.2	3 (6%)	-
Serum creatinine (mg/dl); normal range 0.6-1.3	7 (14%)	-
Urea (mg/dl); normal range: 11-55	5 (10%)	-
Lactate dehydrogenase (U/L); normal range: 120–460	22 (44%)	-
Glucose (mg/dl); normal range<140	5 (10%)	-
Troponin I (ng/l); normal range<19 (n=10)	2 (4%)	-
Ferritin (ng/ml); normal range: 4.63-204 (n=8)	6 (12%)	-
Erythrocyte sedimentation rate (mm/h); normal range: 0.0–15.0	41 (82%)	-
C-reactive protein (qualitative); normal range: 0	40 (80%)	-

Table 4. Laboratory Findings of Patients Infected with SARS-CoV-2 according to sex

	All patients (n=50)	Male (n=30)	Female (n=20)	p[a]
Blood routine, median (range)				
Leucocytes (× 10^3 per µl); normal range: 3.5–9	5.80 (2.40-9.80)	6.00 (2.50-9.60)	5.65 (2.40-9.80)	0.41
Neutrophils (%); normal range: 40-70	72.20 (48.2-86.7)	73.00 (48.2-85.7)	70.25 (50.4-86.7)	0.21
Lymphocytes (%); normal range: 20-50	19.10 (7.3-42.0)	16.6 (7.3-41)	25.2 (9.7-42.0)	0.04
Platelets (× 10^3 per µl); normal range 150–450	176 (100-436)	178 (100-436)	162 (105-285)	0.53
Hemoglobin (g/dl); normal range 13.5-18	12.5 (3.2-18.1)	13.2 (7.9-18.1)	11.5 (3.2-15.7)	0.008
Coagulation function				
Prothrombin time (s); normal range 12-14	13.20 (12-15.3)	13.2 (12-15.3)	13.1 (12-14.3)	0.53
partial thromboplastin time (s); normal range 25-45	33 (25-64)	34.60 (28-64)	30.7 (25-39)	0.025
International Normalized Ratio (S)	1.10 (1-1.40)	1.10 (1.00-1.40)	1.1 (1.00-1.25)	0.59
Blood biochemistry, median (range)				
Alanine aminotransferase (U/L); normal range: up to 41	31 (15-237)	37 (15-237)	26 (18-48)	0.017
Aspartate aminotransferase (U/L); normal range: up to 37	36 (14-203)	39.5 (14-203)	35.50 (20-49)	0.28
Alkaline phosphatase(U/L); normal range: 98- 279	157 (59-273)	158 (59-273)	144 (94-251)	0.64
Total bilirubin (mg/dl); normal range 0.1–1.2	0.8 (0.4-3.3)	0.8 (0.5-1.5)	0.7 (0.4-3.3)	0.86
Serum creatinine (mg/dl); normal range 0.6-1.3	0.90 (0.6-5.6)	1.1 (0.7-5.6)	0.7 (0.6-1.4)	<0.001
Urea(mg/dl); normal range: 11-55	34 (13-128)	39 (18-90)	29 (13-128)	0.019
Lactate dehydrogenase (U/L); normal range 120–460	476.50 (284-1247)	496 (340-820)	464 (284-1247)	0.95
Glucose (mg/dl); normal range<140	95 (71-409)	95 (75-409)	94 (71-213)	0.41
Albumin(gr/dl); normal range 3.5-5 (n=3)	4 (3.7-4.1)	4.1	3.85 (3.7-4.00)	0.22
Troponin I (ng/l); normal range<19 (n=10)	5.2 (1.20-29.20)	5.4 (1.20-29.20)	5.0 (1.6-23.1)	0.91
Creatine phosphokinase (CPK)(mg/dl); normal range 24-195 (n=5)	163 (58-501)	194 (58-501)	76	0.48
Ferritin (ng/ml); normal range: 4.63-204 (n=8)	589.85 (87.99-2560)	870.9 (450.8-2560)	359.9 (88.0-1403.9)	0.25
PH; normal range 7.35-7.45 (n=13)	7.44 (7.32-7.50)	7.46 (7.32-7.50)	7.44 (7.42-7.49)	0.77
HCO_3^- (mmol/l); normal range 24 (n=13)	23.20 (16.80-30.5)	23.15 (16.80-30.5)	23.3 (21.6-26.8)	0.88
Infection-related biomarkers				
Erythrocyte sedimentation rate (mm/h); normal Range 0·0–15·0	38 (4-108)	38 (7-108)	38 (4.0-75)	0.77
C-reactive protein (qualitative); normal range: 0	2.50 (0-3)	3 (0-3)	2 (0-3)	0.71

a. P values indicate differences between Male and Female patients. P < .05 was considered statistically significant.

self-reported BCG vaccination, 42% of the patients had injected a BCG vaccine; and of the 32 histories of malaria infection, 6% had been infected in the past and used hydroxychloroquine. All the 3 patients that had malaria infection survived. Their signs and symptoms were fever, dyspnea, and cough. O_2 SAT was more than 93% on admission. All of the patients had elevated ESR, 2 neutrophilia and lymphopenia, 1 thrombocytopenia, 1 elevated AST, and another one creatinine rise. The CT of the 2 of the patients showed a typical presentation of COVID-19, and the other one had a normal CT.

Mortalities

Of our patients, 10% died and 90% were discharged. The mean age of the deceased patients was 64.6 years, with a range of 34 to 78 years. Most of them were male. Surprisingly, dead cases had fewer chronic medical illnesses (40% vs 57.8%) and did not take ARB and angiotensin converting enzyme (ACE) inhibitors. The medians of the body temperature and respiratory rate in these patients were more than the patients who survived, and their O_2 saturation detected by pulse oximeter was less (Table 6).

Discussion

The prevalence of COVID-19 in male patients is high. In other studies, in Iran or other countries, it was found that male patients were more than female patients (3, 5, 8, 10, 11). Among the dead cases, men were also more than

Table 5. Laboratory Findings of Patients Infected with SARS-CoV-2 according to age

	All patients (n=50)	Age<60 years (n=37)	Age≥60 years (n=13)	p[a]
Blood routine, median (range)				
Leucocytes (× 10^3 per µl); normal range: 3·5–9	5.80 (2.40-9.80)	6.1 (2.4-9.8)	5.7 (3.0-9.0)	0.67
Neutrophils (%); normal range: 40-70	72.20 (48.2-86.7)	69.95 (48.7-86.7)	73.0 (48.2-83.8)	0.58
Lymphocytes (%); normal range: 20-50	19.10 (7.3-42.0)	21.65 (7.3-42)	18.7 (8.8-40.4)	0.44
Platelets (× 10^3 per µl); normal range: 150–450	176 (100-436)	181.5 (105-390)	164 (100-436)	0.17
Hemoglobin (g/dl); normal range: 13.5-18	12.5 (3.2-18.1)	12.8 (3.2-18.1)	11.5 (7.9-15.7)	0.15
Coagulation function				
Prothrombin time (s); normal range: 12-14	13.20 (12-15.3)	13.2 (12-14.5)	13.1 (12.1-15.3)	0.76
partial thromboplastin time (s); normal range: 25-45	33(25-64)	33 (25-39)	31.8 (28-64)	0.94
International Normalized Ratio (S)	1.10 (1-1.40)	1.10 (1.00-1.34)	1.1 (1.00-1.40)	0.77
Blood biochemistry, median (range)				
Alanine aminotransferase (U/L); normal range: up to 41	31 (15-237)	31 (18-92)	33.5 (15-237)	0.68
Aspartate aminotransferase (U/L); normal range: up to 37	36 (14-203)	31.5 (14-77)	48.5 (33-203)	0.019
Alkaline phosphatase (U/L); normal range: 98- 279	157 (59-273)	157.5 (85-273)	146 (59-251)	0.64
Total bilirubin (mg/dl); normal range: 0.1–1.2	0.8 (0.4-3.3)	0.75 (0.4-2.6)	0.8 (0.5-3.3)	0.91
Serum creatinine (mg/dl); normal range: 0.6-1.3	0.90 (0.6-5.6)	0.9 (0.6-1.7)	1.0 (0.7-5.6)	0.08
Urea(mg/dl); normal range: 11-55	34 (13-128)	30 (13-64)	39 (29-128)	0.005
Lactate dehydrogenase (U/L); normal range: 120–460	476.50 (284-1247)	443 (284-1247)	540 (340-820)	0.042
Glucose (mg/dl); normal range <140	95 (71-409)	91 (71-409)	99 (79-324)	0.63
Albumin(gr/dl); normal range: 3.5-5 (n=3)	4 (3.7-4.1)	4.0 (3.7-4.1)	-	-
Troponin I (ng/l); normal range<19 (n=10)	5.2 (1.20-29.20)	3.4 (1.2-23.1)	7.9 (5-29.2)	0.18
Creatine phosphokinase (CPK) (mg/dl); normal range: 24-195 (n=5)	163 (58-501)	119.5 (58-501)	225	0.80
Ferritin (ng/ml); normal range: 4.63-204 (n=8)	589.85 (87.99-2560)	589.9 (88.0-1403.9)	1505.4 (450.8-2560)	0.51
PH; normal range: 7.35-7.45 (n=13)	7.44 (7.32-7.50)	7.45 (7.40-7.50)	7.44 (7.32-7.49)	0.94
HCO_3^- (mmol/l); normal range: 24 (n=13)	23.20 (16.80-30.5)	25 (21.6-30.5)	23 (16.8-25.9)	0.28
Infection-related biomarkers				
Erythrocyte sedimentation rate (mm/h); normal range: 0·0–15·0	38 (4-108)	34 (4-85)	38 (15-108)	0.29
C-reactive protein (qualitative); normal range: 0	2.50 (0-3)	2 (0-3)	3 (0-3)	0.65

a. P values indicate differences between age<60 years and Age≥60 years patients. P < .05 was considered statistically significant.

Table 6. Clinical measures for patients discharged alive and dead

Demographics	Death	Discharge
Age, mean (range) y	64.6 (34-78)	47.04 (18-70)
Male (%)	60%	60%
Female (%)	40%	40%
Chronic medical illness (%)	40%	57.8%
hypertension	20%	24.4%
diabetes	20%	33.3%
Cardiovascular disease	0%	13.3%
Cerebrovascular disease	0%	2.2%
malignancy	20%	4.4%
Respiratory system disease	0%	13.3%
Chronic kidney disease	20%	2.2%
Endocrine system disease	20%	2.2%
nervous system disease	0%	2.2%
autoimmune system disease	0%	2.2%
hematologic system disease	0%	2.2%
Antihypertensive drug		
taking ARB medication	0%	15.6%
Vital sign at presentation, median		
Temperature, °C	37.7	37
Respiratory rate, breaths/min	20	16

women. In a meta-analysis, the mean age of the patients was 51.97 years, of them 55.9% were male patients (12). Eshrati et al showed that men had 11.5% more risk of death than women (13).

In Chen et al study (5), 23.8% of all patients and 50% of the deceased patients had hypertension and all were male.

Of our patients, 14% had a medical history of taking Angiotensin II receptor blockers (ARB) medication. Angiotensin-converting enzyme (ACE) is an enzyme that converts angiotensin I to angiotensin II. Angiotensin-converting enzyme 2 (ACE2) is a transmembrane protein that has been recognized as a new member of the renin-angiotensin system (RAS) system. ACE2 expresses in the cell membrane of many cells (14). Actually, ACE2 is a receptor for COVID-19 to enter into the host cells (15, 16). The use of ARB and ACE inhibitors increases ACE2 levels (17) and may increase the risk of COVID-19 infection or its complications. However, out of our 5 dead cases, no one used

Table 6. Ctd

Demographics		Death	Discharge
Pulse oximeter O_2 saturation% ,		91	96
Systolic blood pressure, mm Hg		119.5	120
Diastolic blood pressure, mm Hg		79.50	70
Heart rate, /min		85.50	86.50
Blood routine, median (range)			
Leucocytes (× 10^3 per µl); normal range: 3.5–9		5.70	5.90
Neutrophils (%); normal range: 40-70		73	70.55
Lymphocytes (%); normal range: 20-50		15.10	20.15
Platelets (× 10^3 per µl); normal range: 150–450		160	177
Hemoglobin (g/dl); normal range: 13.5-18		11.50	12.65
Coagulation function			
Prothrombin time (s); normal range: 12-14		12.85	13.20
partial thromboplastin time (s; normal range 25-45		37.50	32.50
International Normalized Ratio (S)		1.05	1.10
Blood biochemistry, median(range)			
Alanine aminotransferase (U/L); normal range: up to 41		28	31
Aspartate aminotransferase (U/L); normal range: up to 37		49	34.50
alkaline phosphatase(U/L); normal range: 98- 279		162	156
Total bilirubin (mg/dl); normal range: 0.1–1.2		0.8	0.75
Serum creatinine (mg/dl); normal range: 0.6-1.3		1.20	0.9
Urea(mg/dl); normal range: 11-55		52	32.50
Lactate dehydrogenase (U/L); normal range: 120–460		663	472
Glucose (mg/dl; normal range<140)		97	93.5
Troponin I (ng/l); normal range <19 (n=10)		29.20	5
Creatine phosphokinase (cpk) (mg/dl); normal range 24-195 (n=5)		501	119.5
Ferritin (ng/ml); normal range: 4.63-204 (n=8)		2560	569.16
Infection-related biomarkers			
Erythrocyte sedimentation rate (mm/h); normal range: 0.0–15.0		52	36
C-reactive protein (qualitative); normal range: 0		1.50	3
Chest CT Findings (%)			
Ground glass opacity & consolidation mix		100%	82.2%
Just Ground glass opacity		0%	2.2%
Just consolidation		0%	8.9%
Location of consolidation			
Upper lobe		0%	4.4%
Lower lobe		0%	31.1%
Both lobe		100%	55.6%
Unilateral		20%	15.6%
bilateral		80%	73.3%
Location of ground glass opacity			
Upper lobe		0%	0%
Lower lobe		0%	6.7%
Both lobe		100%	77.8%
Unilateral		0%	0%
Bilateral		100%	82.2%
Unilateral Plural effusion	0%		2.2%
Plural thickening	0%		4.4%
Treatment (%)			
Oxygen Therapy	80%		73.3%
Mechanical ventilation	60%		0%
Antibiotic treatment	100%		97.8%
Antiviral treatment	80%		86.7%
Hydroxychloroquine	100%		95.6%
Acetaminophen	100%		64.4%

ARB medication, and we did not find any significant relation between ARB and the outcomes, although more studies are recommended. In our 7 patients who took ARB, 6 needed oxygen therapy and had less O_2 saturation. Also, there are conflicting studies that indicate males have a higher ACE2-expressing cell ratio than females with wider distribution in different cells, explaining the higher severity and mortality rate of COVID-19 in men (16, 18).

The most common clinical symptom at the admission time was dry cough, fever, dyspnea, myalgia, malaise, chills, headache, and sore throat. Rhinorrhea, vomiting, diarrhea, dizziness, perspiration, anorexia, chest pain, abdominal pain, hemoptysis, and arthralgia were less common. In a meta-analysis, fever (88.7%), cough (57.6%), and dyspnea (45.6%) were the most prevalent clinical signs and symptoms as well as in a study in Iran (10). In our study, diarrhea was 6%, but it reported to be less than 7% in different studies and case reports (11). In a study in Shiraz, the incidence of diarrhea was 22% and this is because their study was one month after our study (11). In the early-onset of the disease, the prevalence of diarrhea was low, possibly

due to genetic changes in the virus over time.

Leukocytosis was 6% and leukocytopenia was 12%. The median range of neutrophils was increased, and neutrophilia was shown in 54% of the patients, but this rate was more among the deceased cases. Lymphopenia was more common in severe cases, in men, and in deceased patients than the others. In a meta-analysis, leukopenia was reported as 18.7%, and leukocytosis was 16.8%, with 43.1% lymphopenia. The lymphopenia suggests that COVID-19 might act on lymphocytes, especially T cells. Virus particles spread through the respiratory tract and then infect other cells. This increases cytokine release and induces a series of immune responses that cause changes in lymphocytes (11).

We had 32% thrombocytopenia. In Huang et al study, platelet count ($\times 10^9$ per L) less than 100 was reported in 5% of the cases (19) and another study reported it to be 4.8% less than 100×10^9 /L (5). In Young et al study the median range of platelet count was normal (7).

Our patients' hemoglobin level was less than normal, but, anemia is common in our city, especially iron deficiency and thalassemia. One of our patients had severe anemia with hemoglobin level 3.2 gr/dL in early admission, which is related to iron deficiency anemia. So the decreased level of hemoglobin may not be related to COVID-19 infection. Also, Chen et al (4) reported a 51% decrease in hemoglobin level. In Arentz et al study, hemoglobin level was in the normal range (20).

The median range of the coagulation profile was normal. But PT and PTT were elevated in 10% and 2% of the patients, respectively. PTT in men was higher than in women. In a study, PT was in the normal range, but PTT was elevated in severe cases (5). In Chen et al study, the median ranges of PT and PTT were normal, but PT and PTT were elevated in 5% and 6% of the patients, respectively (4). In another study, there was no difference between PT and PTT of the patients admitted to intensive care unit (ICU) and those who were not admitted to the ICU (8).

The median of ALT, AST, ALP, and total bilirubin were normal, but AST increased in deceased cases and in 34% of all patients. In Chen et al study the median number of AST and ALT levels were normal, but there was a significant difference between severe and moderate cases (6). In one meta-analysis, AST increased by 33.3% and ALT increased by 24.1% (11).

The median of serum creatinine and serum urea were normal, but creatinine increased in 14% and urea in 10% of the cases, and their levels were more in dead cases than survived patients. Two of our patients had chronic kidney disease, one of them, whose serum creatinine at admission was 5.6, was diagnosed as having ESRD. The other one, whose serum creatinine at admission was 1.6 mg/dL, had a kidney transplantation a year earlier. In Chen et al study, blood urea nitrogen (BUN) and creatinine levels were in the normal range, and there was a 6% increase in serum BUN and a 3% increase in serum creatinine (4). In another study, the median levels were in the normal range with an increase in severe cases (5). In a meta-analysis study, there was about 1.6% increase in the creatinine level (11).

Albumin concentrations were measured in 3 patients and were in the normal range. In another study, hypoalbuminemia was more frequent in severe cases (5). In 99 COVID-positive patients hypoalbuminemia was reported to be 98% (4), and hypoalbuminemia was reported to be 75.8% in a meta-analysis (11).

Serum troponin was checked in 10 patients, in 2 patients, troponin levels were higher than normal, but they were not greater than the 99th percentile. One of them had epigastric pain and vomiting, and electrocardiography (ECG) suggested non-ST elevation myocardial infarction. Another patient who died had just fever, dyspnea, and cough with normal ECG. None of these patients had typical chest pain.

Also, in 2 patients, troponin levels were higher than normal, but they were not greater than the 99th percentile. In Arentz et al study, 14% of the patients had a troponin level higher than 300 ng/L, which shows cardiac injury (15). In another study, troponin level was 12% higher than the 99th percentile upper reference. In ICU cases, the level was 31% higher (19).

The serum ferritin level was evaluated in 8 patients, which showed an increase in 6 of them. In all these 8 patients, hemoglobin level was below the normal level in admission time, and the mean corpuscular volume (MCV) was below 80 femtoliter in 4 patients, which was in favor of microcytic anemia. A total of 5 patients had RDW more than 15%, which is in favor of iron deficiency anemia. As expected, in iron deficiency, serum ferritin decreases. Also, serum ferritin is recognized as an acute phase reactant (21), so increased ferritin in these patients may be related to acute infection arising from the corona virus.

Elevated CRP and ESR suggest an increased level of systemic inflammation in severe cases. Also, there was no significant difference between the patients who needed oxygen and those who did not. In a meta-analysis, CRP increased by 58.3% and ESR in 41.8% (11). In another study, 70% of all patients and 100% of severely ill cases had CRP >60 mg /L (5). Another publication reported an elevation as well (4).

Lactate dehydrogenase was elevated in our study in cases that required oxygen and this elevation was significantly more in older patients than in others. The data are similar to the data of a study on Singapore (6). In Chen et al study, the median number was higher than normal and correlated with the severity of illness. LDH > 300U/L was reported in 52% of all patients and in 90% of the severe cases (5). In a meta-analysis, out of 126 patients, a 6.3% high LDH was detected in 8 patients (10). In one study, venous lactate, (normal range, <1.9 mmol/L) was measured, with a mean of 1.8 (range, 0.8-4.9) (20). In a study, cytokines were measured and revealed that both proinflammatory and anti-inflammatory cytokines, including interleukin (IL)-2R, IL-6, tumor necrosis factor-alpha (TNF-α), and IL-10, increased and the increase was proportional to the severity of illness. There was also a decrease in CD4+ and CD8+ T cells without a reduction in B cells (5).

The most common laboratory abnormalities observed in this study were lymphopenia, neutrophilia, thrombocytopenia, increased AST, high serum creatinine level, elevated LDH, and increased ESR and CRP level. These abnormalities suggest that COVID-19 infection may be associated

with cellular immune deficiency, myocardial injury, hepatic injury, and kidney injury.

Most studies reported bilateral pneumonia and bilateral ground-glass opacities on CT (8, 10) that resemble our study. In all of the deceased patients, CT showed bilateral mixed ground-glass opacity and consolidation, which was fewer in survivors. Lung involvement in CT can predict the patients' outcomes. In Arentz et al study in Washington, pleural effusion was more than our study (20).

Of our patients, 74% needed oxygen therapy, and 6% required invasive mechanical ventilation.

Although the median number of O_2 saturation was normal, in deceased patients, it was less than 93%. The median of pulse oximeter O_2 saturation in deceased cases was 91% versus 96% in survivors, which is statistically significant. In Chen et al's study, 52.4% of the patients with moderate to severe disease and 100% of the severe cases O_2 SAT was less than 93%. Just 30% of all patients had PaO/FiO >300 and 30% ≤100 (6). Therefore, it seems that pulse oximeter O_2 SAT is a key factor in the prognosis of patients. In Arentz et al's study, noninvasive positive pressure ventilation in 19%, high-flow oxygen therapy >15 L/min in 4.8%, and invasive mechanical ventilation in 71% patients were reported (20).

Five (10%) patients died in our study, which is almost similar to Chen et al study that reported a mortality rate of 11% (4). In another study, 19% mortality rate was reported from hospitalized patients, all of whom were male aged 50 years and older, and 2 of them had hypertension (5). In our study, 60% of the dead cases were male and 40% were female. An outcome reported from 7 studies included in a meta-analysis describing 632 hospitalized patients, showed 52.9% survival and 13.9% nonsurvival (11).

BCG vaccination has been reported to offer broad protection to respiratory infections (22). In our study, all of the patients who reported that had vaccine injection survived.

Limitation

Some data are missing in medical records.

Conclusion

In this single-center study patients with confirmed COVID-19 positive test with the predominance of male patients had mostly symptoms of dry cough, fever, and dyspnea. The most common laboratory abnormalities were lymphopenia, neutrophilia, thrombocytopenia, increased AST, high serum creatinine level, elevated lactate dehydrogenase, and increased ESR and CRP level. Bilateral mixed ground-glass opacity and consolidation in all lobes were observed in most cases. Most of the deceased patients were men.

These abnormalities suggest that COVID-19 infection may be associated with cellular immune deficiency, myocardial, hepatic, and kidney injury. Additional research is needed to elucidate COVID-19 pathogenesis.

Acknowledgement

This study was supported by Hormozgan University of Medical Sciences, Bandar Abbas Iran. The authors thank the staff at the department of medical records at Shahid Mohamadi Hospital.

Conflict of Interests

The authors declare that they have no competing interests.

References

1. Guarner J. Three emerging coronaviruses in two decades: the story of SARS, MERS, and now covid-19. Am J Clin Pathol. 2020;153(4):420–21.
2. Razai MS, Doerholt K, Ladhani S, Oakeshott P. Coronavirus disease 2019 (covid-19): a guide for UK GPs. BMJ. 2020;5;368:m800.
3. Sohrabia C, Alsafib Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, et al. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). Int J Surg. 2020;76:71-6.
4. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y. et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020;395 (10223):507-13.
5. Chen G, Wu D, Guo W, Cao Y, Huang D, Wang H, et al. Clinical and immunological features of severe and moderate coronavirus disease 2019. J Clin Invest. 2020;130(5):2620–29.
6. Young BE, Ong SWX, Kalimuddin S, Tan SY, Loh J, Ng OT, et al. Epidemiologic features and clinical course of patients infected with SARS-CoV-2 in Singapore. JAMA. 2020;323(15):1488-94.
7. Fang Y, Zhang H, Xie J , Lin M, Ying L, Pang P, et al. Sensitivity of Chest CT for COVID-19: Comparison to RT-PCR. Radiology. 2020;Feb 19:200432.
8. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus–Infected Pneumonia in Wuhan, China. JAMA. 2020;323(11):1061-69.
9. Sahin AR, Erdogan A, Agaoglu PM, Dineri Y, Cakirici AY, Senel ME et al. 2019 novel coronavirus (covid-19) outbreak:a review of the current. EJMO. 2020;1:4:1–7.
10. Nouri-Vaskeh M, Khalili N, Sharifi A, Behnam P, Soroureddin Z, Ahmadi Ade A, et al. Clinical Characteristics of Fatal Cases of COVID-19 in Tabriz, Iran: An Analysis of 111 Patients. Adv J Emerg Med. 2020.
11. Shahriarirad R, Khodamoradi Z, Erfani A, Hosseinpour H, Ranjbar K, Emami Y, et al. Epidemiological and clinical features of 2019 novel coronavirus diseases (COVID-19)in the South of Iran. BMC Infect Dis. 2020;20:427-39.
12. Rodriguez-Morales AJ, Cardona-Ospina JA, Gutiérrez-Ocampo E, Villamizar-Peña R, Holguin-Rivera Y, Escalera-Antezana JP, et al. Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis. Travel Med Infect Dis. 2020;34:101623.
13. Eshrati B, Baradaran HR, Erfanpoor S, Mohazzab A, Moradi Y. Investigating the factors affecting the survival rate in patients with COVID-19: A retrospective cohort study. Med J Islam Repub Iran. 2020:34:88-96
14. Ingelfinger JR. Angiotensin-converting enzyme 2: implications for blood pressure and kidney disease. Curr Opin Nephrol Hypertens. 2009;1:18:79-4.
15. Ji HL, Zhao R, Matalan S, Matthay MA. Elevated plasmin(ogen) as a common risk factor for COVID-19 susceptibility. Physiol Rev. 2020;7:100:1065-75.
16. Kenarkoohi A, Maleki M, Safari T, Kafashian M, Saljoughi F, Sohrabipour S. Angiotensin-converting Enzyme 2 roles in the Pathogenesis of COVID-19. Curr Hypertens Rev. 2020.
17. Wan Y, Shang J, Graham R, Baric RS, Li F. Receptor recognition by the novel coronavirus from Wuhan: an analysis based on decade-long structural studies of SARS coronavirus. J Virol. 2020;7:94.
18. Falahi S, Kenarkoohi A. Sex and gender differences in the outcome of patients with COVID-19. J Med Virol. 2020;30:10.1002/jmv.26243.
19. Huang C, Wang Y, Li X, Ren L, Zhao, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395(10223):497-06.
20. Arentz M, Yim E, Klaff L, Lokhandwala S , Riedo F , Chong M, et al. Characteristics and Outcomes of 21 Critically Ill Patients with COVID-19 in Washington State. JAMA. 2020;16:323:1612-14.
21. Wang W, Knovich MA, Coffman LG, Torti FM, Torti SY. Serum ferritin: Past, present and future. Biochim Biophys Acta Gen Subj.

2010;8(1800):760-69.
22. Miller A, Reandelar MJ, Fasciglione K, Roumenova V. Correlation between universal BCG vaccination policy and reduced morbidity and mortality for COVID-19: an epidemiological study. medRxiv. 2020;03(24):20042937.