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# Evaluation of Clinical Symptoms, Laboratory Findings, Radiological Characteristics, and Treatments of Adult Patients with Severe COVID-19 Pneumonia

## Şiddetli COVID-19 Pnömonisi Olan Yetişkin Hastaların Klinik Semptomlarının, Laboratuvar Bulgularının, Radyolojik Özelliklerinin ve Tedavilerinin Değerlendirilmesi

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## Abstract

**Introduction:** In this study, it was aimed to retrospectively evaluate the clinical course, laboratory findings and radiological features of patients with severe Coronavirus disease-2019 (COVID-19) pneumonia in a 200-bed secondary state hospital.
**Materials and Methods:** Male and non-pregnant female patients older than 18 years who were hospitalized with the diagnosis of COVID-19 pneumonia between 01.04.2020-01.07.2020 were included in our study. Severe pneumonia was defined as the presence of tachypnea (>30 breaths/min) and/or hypoxia ($SpO_2$ <90% room air) and/or bilateral diffuse ground-glass infiltrations. Conformity of continuous data to normal distribution was evaluated with Kolmogorov-Smirnov and Shapiro-Wilk tests. In the analysis of the relationship between laboratory parameters and mortality, independent groups t-test was used for parametric data and Mann-Whitney U test was used for non-parametric data.
**Results:** Sixty two (60.8%) of the patients were male, with a mean age of 60.2±16.1 years (n=102). Of the study group 76.5% had at least one or more comorbid diseases. The most common comorbidities were hypertension (60.3%), diabetes mellitus (42.3%) and coronary artery disease (26.9%). The most common symptoms observed in patients at the time of admission were cough (n=63, 61.8%), dyspnea (n=57, 55.9%), fever (n=33, 32.4%) and malaise (n=22, 21.6%). Severe acute respiratory syndrome-Coronavirus-2 polymerase chain reaction test was positive in 68% (n=70) of the patients. Blood culture was taken from 42.3% of the patients who were admitted with the complaint of fever and there was no detected culture growth. During the hospitalization period, the rate of patients who received any of the antibiotic treatments including azithromycin, clarithromycin, moxifloxacin was 90.2% and 66.7% (n=68) of them were treated with azithromycin. Of the patients 42.2% (n=43) required treatment in the intensive care unit. A favorable clinical response was observed in 74.5% (n=77) of the patients and nine of these patients were discharged with partial recovery and recommendation for home oxygen support therapy. The mortality rate was 24.5% (n=25). The mean of lactate dehydrogenase level and the mean urea level were higher in the group with mortality (p≤0.001).
**Conclusion:** Despite the low rates of bacterial coinfection and/or secondary bacterial infection in COVID-19, frequently given antibiotic treatments contribute to the problem of antimicrobial resistance, creating a serious public health problem and causing an economic burden. Large-scale randomized controlled trials are required for treatment protocols of which potential benefits have not yet been proven.
**Keywords:** COVID-19, severe pneumonia, favipiravir, azithromycin, mortality

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## Öz

**Giriş:** Bu çalışmada, 200 yataklı ikinci basamak bir devlet hastanesinde, şiddetli Koronavirüs hastalığı-2019 (COVID-19) pnömonisi olan hastaların klinik seyirlerinin, laboratuvar bulgularının ve radyolojik özelliklerinin retrospektif değerlendirilmesi amaçlanmıştır.

**Gereç ve Yöntem:** Çalışmamıza 01.04.2020-01.07.2020 tarihleri arasında COVID-19 pnömonisi tanısı ile yatarak tedavi edilen, ≥18 yaş erkek ve gebe olmayan kadın hastalardan şiddetli pnömonisi olanlar dahil edildi. Şiddetli pnömoni, takipne (>30 nefes/dakika) ve/veya hipoksi (SpO2 <%90 oda havasında) ve/veya iki taraflı yaygın buzlu cam infiltrasyonlarının varlığı olarak tanımlandı. Sürekli verilerin normal dağılıma uygunluğu Kolmogorov-Smirnov ve Shapiro-Wilk testleri ile değerlendirildi. Laboratuvar parametrelerinin mortalite ile ilişkisinin analizinde; parametrik veriler için bağımsız gruplarda t-testi, non-parametrik veriler için Mann-Whitney U testi kullanıldı.

**Bulgular:** Hastaların 62'si (%60,8) erkek olup, yaş ortalaması 60,2±16,1 yıldı (n=102). Çalışma grubunun %76,5'inde en az bir veya daha fazla komorbid hastalık vardı. Eşlik eden hastalıklar arasında en sık gözlenenler; hipertansiyon (%60,3), diabetes mellitus (%42,3) ve koroner arter hastalığı (%26,9) idi. Hastalarda başvuru anında gözlenen en sık belirtiler; öksürük (n=63, %61,8), dispne (n=57, %55,9), ateş (n=33, %32,4) ve halsizlik (n=22, %21,6) idi. Hastaların %68'inde (n=70) Şiddetli akut solunum yolu sendromu-Koronavirüs virüs-2 polimeraz zincir reaksiyonu testi pozitifti. Ateş şikayeti ile başvuran hastaların %42,3'ünden kan kültürü alınmış olup, üreme tespit edilen kültür mevcut değildi. Hospitalizasyon sürecinde azitromisin, klaritromisin, moksifloksasin antibiyotik tedavilerinden herhangi birinin uygulandığı hasta oranı %90,2 olup, bunların %66,7'sine (n=68) azitromisin tedavisi verildi. Hastaların %42,2'sinde (n=43) yoğun bakım ünitesinde tedavi gerekti. Hastaların %74,5'inde (n=77) olumlu klinik yanıt gözlenmiş olup, bu hastaların dokuzu kısmi iyileşme gösterdi ve evde oksijen destek tedavisi önerisi ile taburcu edildi. Mortalite oranı %24,5 (n=25) idi. Hastalardan ölüm gelişen grupta laktat dehidrogenaz ve üre ortalaması daha yüksekti (p≤0,001).

**Sonuç:** COVID-19 tanılı hastalarda bakteriyel koenfeksiyon ve/veya sekonder bakteriyel enfeksiyon oranlarının düşük olmasına rağmen sıklıkla verilen antibiyotik tedavileri antimikrobiyal direnç sorununa katkı sağlayarak hem ciddi bir halk sağlığı sorunu yaratmakta hem de ekonomik yüke sebep olmaktadır. Potansiyel yararları henüz kanıtlanmamış tedavi protokolleri için geniş ölçekli randomize kontrollü çalışmaların yapılması gerekmektedir.

**Anahtar Kelimeler:** COVID-19, şiddetli pnömoni, favipiravir, azitromisin, mortalite

## Introduction

In December 2019, the pandemic started with the detection of patients with pneumonia of unknown etiology in the city of Wuhan, China. One month later, the causative agent was identified as novel Coronavirus 2019 (2019-nCoV), and the disease it caused was defined as Coronavirus disease-2019 (COVID-19). In the second month of the pandemic, the agent was named Severe acute respiratory syndrome virus-2 (SARS-CoV-2) [1]. Although lifestyle and travel restrictions still continued due to the COVID-19 pandemic, as of May 6, 2021, the number of confirmed cases announced by the World Health Organization (WHO) was 155,506,494, and the number of COVID-19-related deaths was 3,247,228[2].

The disease spectrum can range from asymptomatic infection to Acute respiratory distress syndrome (ARDS) and severe pneumonia with death. According to the Chinese Center for Disease Control report, which evaluated 72,314 patients in China, 81% of patients were mild (no or mild pneumonia), 14% were severe (shortness of breath, respiratory rate ≥30/minute, $SpO_2$ ≤93%, $PaO_2/FiO_2$ <300 mmHg and/or lung infiltrates >50%) and 5% were defined as critical (respiratory failure, septic shock, and/or multiple organ dysfunction or failure)[3].

Since the WHO's declaration of the pandemic on March 11, 2020, treatment algorithms have been frequently updated, but there is still no effective specific treatment against SARS-CoV-2.

In this study, epidemiological features, clinical findings, laboratory test results and radiological findings, and clinical results of patients treated with the diagnosis of severe COVID-19 pneumonia in a 200-bed secondary state hospital in İstanbul were evaluated in detail.

## Materials and Methods

### Study Plan and Patients

Between April 1, 2020 and July 1, 2020, male and non-pregnant female patients aged ≥18 years with severe COVID-19 pneumonia that was confirmed by thoracic computed tomography (CT) and required hospitalization were included in this study. Nasopharyngeal and/or oropharyngeal swab samples were collected from all patients for SARS-CoV-2 reverse transcriptase polymerase chain reaction (PCR) testing. The diagnosis and treatment approach were made in accordance with the COVID-19 Guidelines published by the Ministry of Health of the Republic of Turkey[4]. According to the guideline, favipiravir was started in patients presenting with (or later developed) severe pneumonia [tachypnea (>30 breaths/minute) and/or hypoxia ($SpO_2$ <90% room air) and/or bilateral diffuse ground-glass infiltrations] unresponsive to first-line therapy with hydroxychloroquine (±azithromycin). After 1600 mg loading dose on the first day favipiravir was given 600 mg orally twice a day (5-7 days) for maintenance. Outpatients, patients with asymptomatic or mild disease, radiologically unconfirmed

patients, patients transferred to another center within the first 72 hours of hospitalization, and patients whose data could not be accessed were excluded from the study. Oxygen therapy was classified as oxygen delivery by face mask, non-invasive mechanical ventilation, and invasive mechanical ventilation (IMV). Response to treatment was evaluated as recovery, partial recovery (discharge with oxygen condenser) and no response (death). This study was carried out with the approval of the Haseki Training and Research Hospital Clinical Research Ethics Committee (decision number: 2020-168; date: 04/11/2020).

### Data Collecting

The data of 147 patients with severe COVID-19 pneumonia out of 820 patients who were hospitalized with the diagnosis of COVID-19 pneumonia were retrospectively analyzed through the hospital information management system, and 102 patients who did not meet the exclusion criteria were included in the study. Patient data were accessed through patient files, follow-up forms and hospital information management system. Demographic data, underlying diseases, presenting symptoms and physical examination findings, laboratory test results and radiological findings, treatments applied and clinical follow-ups were recorded through a follow-up data form.

### Statistical Analysis

The IBM Statistical Package for the Social Sciences (SPSS) (version 21.0) (SPSS, IBM Corp., Chicago, IL, USA) was used for statistical analysis. Descriptive statistics were expressed using mean, standard deviation, median, minimum-maximum values for continuous data, and using numbers and percentages for categorical data. Conformity of continuous data to normal distribution was evaluated with Kolmogorov-Smirnov and Shapiro-Wilk tests. In the analysis of the relationship between laboratory parameters and mortality, independent groups t-test was used for parametric data and Mann-Whitney U test was used for nonparametric data. A $p<0.05$ level was considered statistically significant in all tests.

## Results

### Demographic Characteristics and Comorbidities

Of the patients with severe pneumonia 60.8% (n=102) who did not respond to first-line treatment with hydroxychloroquine (±azithromycin) were male, with a mean age of 60.2±16.1 years. Of the study group 76.5% had at least one or more comorbid diseases. The most common comorbidities were hypertension (60.3%), diabetes mellitus (42.3%) and coronary artery disease (26.9%).

Demographic characteristics, comorbidities and clinical characteristics of the patients are shown in Table 1.

**Table 1. Demographic characteristics, comorbidities, clinical manifestations**

| | | n=102 (%) |
|---|---|---|
| Mean age | | 60.2±16.1 |
| Age groups | 18-64 | 64 (62.7) |
| | 65-74 | 16 (15.7) |
| | 75-84 | 14 (13.7) |
| | >84 | 8 (7.8) |
| Gender | Female | 40 (39.2) |
| | Male | 62 (60.8) |
| Comorbidities* | Yes | 78 (76.5)* |
| | No | 24 (23.5) |
| | Hypertension | 47 (60.3) |
| | Diabetes mellitus | 33 (42.3) |
| | CAD | 21 (26.9) |
| | COPD | 8 (10.3) |
| | Asthma | 8 (10.3) |
| | CHF | 9 (11.5) |
| | Malignancy | 4 (5.1) |
| | CRF | 3 (3.8) |
| | CVD | 2 (2.6) |
| Symptoms | Cough | 63 (61.8) |
| | Dyspnea | 57 (55.9) |
| | Fever | 33 (32.4) |
| | Weakness | 22 (21.6) |
| | Myalgia | 6 (5.9) |
| | Anorexia | 5 (4.9) |
| | Nausea | 6 (5.9) |

*At least one or more accompanying comorbidities.

CAD: Coronary artery disease, COPD: Chronic obstructive pulmonary disease, CHF: Congestive heart failure, CRF: Chronic renal failure, CVD: Cerebrovascular disease

### Clinical Symptoms at the Time of Application

The most common symptoms observed in the patients at presentation were cough (n=63, 61.8%), dyspnea (n=57, 55.9%), fever (n=33, 32.4%) and fatigue (n=22, 21.6%).

### Radiological Findings

Chest X-ray was performed in 23 (22.5%) patients, and bilateral lung involvement was detected in 87% of them.

Thorax CT was performed in all patients included in the study, and bilateral lung involvement was found in 87.3%. The most common radiological findings were ground glass (93.1%) opacities and consolidation (41.2%).

### Laboratory Findings

The SARS-CoV-2 PCR test was positive in 68% (n=70) of the patients.

Vital and laboratory findings of the patients at admission are shown in Table 2.

### Treatments and Side Effects

Hydroxychloroquine was not started in two patients who deteriorated clinically although they completed hydroxychloroquine treatment at home, and in the other two patients who had a contraindication (QT prolongation). Lopinavir-ritonavir was started in three patients who were unresponsive to hydroxychloroquine treatment. All patients in the study who were unresponsive to hydroxychloroquine or lopinavir-ritonavir received favipiravir alone or in combination with hydroxychloroquine. Tocilizumab was given to 13.7% (n=14) of the patients, steroids were given to 35.3% (n=36) and low molecular weight heparin was given to 96.1% of the patients.

During the hospitalization period, the rate of patients who received any of the antibiotic treatments such as azithromycin, clarithromycin, moxifloxacin was 90.2%, and 66.7% (n=68) of them were given azithromycin treatment. During the follow-up, ceftriaxone was started in 19.6% (n=20) of the patients, piperacillin-tazobactam in 54.9% (n=56) and another antibiotic in 52% (n=53).

In electrocardiography, QT prolongation due to hydroxychloroquine was detected in two patients. An increase

**Table 2. Examination and laboratory findings at admission**

| Parameters | Mean | Standard deviation | Median (minimum-maximum) | Reference values |
|---|---|---|---|---|
| Saturation $O_2$ (%) | 8.5 | 8.0 | 90 (40-98) | >97 |
| Body temperature (°C) | 37.1 | 0.9 | 36.8 (36-39) | 36.5-37.5 |
| Pulse (beats/min) | 86.4 | 12.2 | 83.5 (60-123) | 60-100 |
| Arterial $O_2$ (%) | 80.1 | 9.4 | 80.8 (56.9-95.2) | >97 arterial |
| Lactate (mmol/l) | 2.0 | 1.9 | 1.5 (0.5-14.1) | 0.0-2.0 |
| WBC (K/µl) | 6895.3 | 3329.9 | 5985.0 (2670-17940) | 4000-10 000 |
| Neutrophil (K/µl) | 5056.7 | 3027.2 | 3940.0 (1490-14150) | 2.00-7.00 |
| Lymphocyte (K/µl) | 1357.4 | 634.7 | 1285.0 (330-4570) | 0.80-4.00 |
| Glucose (mg/dl) | 151.1 | 74.4 | 127.5 (67-450) | 74-106 |
| CRP (mg/l) | 80.9 | 71.0 | 72.2 (3.9-510) | 0-5 |
| Urea (mg/dl) | 41.3 | 23.9 | 34.0 (13-134) | 17-43 |
| Creatinin (mg/dl) | 1.0 | 0.5 | 0.9 (0.5-4.0) | 0-1. 2 |
| Ferritin (ng/dl) | 306.5 | 390.8 | 156.6 (28.9-1500) | 30-400 |
| LDH (U/L) | 327.3 | 129.4 | 293.0 (143-605) | 0-448 |
| D-dimer (µg/ml) | 3.1 | 6.6 | 0.8 (0.3-26.5) | 0-0.50 |
| Albumin (g/dl) | 3.8 | 0.4 | 3.8 (2.5-4.9) | 3.9-4.9 |
| AST (IU/L) | 38.1 | 19.0 | 35.6 (11.5-113) | 0-40 |
| ALT (IU/L) | 23.0 | 12.2 | 21.9 (4.2-69.7) | 0-41 |

WBC: White blood cell, CRP: C-reactive protein, LDH: Lactate dehydrogenase, AST: Aspartate aminotransferase, ALT: Alanine aminotransferase

**Table 3. Mortality-related laboratory parameters**

| | Mortality | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | No (n=77) | | | Yes (n=25) | | | Mann-Whitney U value | p value |
| | Median | Minimum | Maximum | Median | Minimum | Maximum | | |
| WBC | 6085.0 | 2670.0 | 17940.0 | 5900.0 | 3260.0 | 16820.0 | 940.0 | 0.712 |
| Neutrophil | 3940.0 | 1530.0 | 12990.0 | 3965.0 | 1490.0 | 14150.0 | 977.5 | 0.936 |
| Lymphocyte | 1310.0 | 330.0 | 3810.0 | 1155.0 | 520.0 | 4570.0 | 865.5 | 0.347 |
| Monocyte | 480.0 | 90.0 | 2180.0 | 440.0 | 220.0 | 2930.0 | 895.5 | 0.477 |
| LDH | 248.5 | 143.0 | 511.0 | 434.0 | 162.0 | 605.0 | 130.5 | **≤0.001** |
| CRP | 64.8 | 3.9 | 272.0 | 82.0 | 10.6 | 510.0 | 785.0 | 0.192 |
| Urea | 31.5 | 13.0 | 134.0 | 51.0 | 21.0 | 131.0 | 234.5 | **≤0.001** |
| Creatinin | 0.8 | 0.5 | 4.0 | 1.0 | 0.6 | 1.6 | 379.5 | 0.063 |

CRP: C-reactive protein, LDH: Lactate dehydrogenase, WBC: White blood cell

in liver function tests [aspartate aminotransferase (AST), alanine aminotransferase (ALT)] was detected in 34% (n=35) of the patients after favipiravir use. HBsAg and anti-hepatitis C virus (HCV) tests were performed in 57% (n=20) of these patients, and the results were negative. The previous examinations of five of these patients were reached, and anti-HBs positivity was found in only two of them.

### Complications and Clinical Outcomes

Acute renal failure was found in 18.6% (n=19) of the patients, pleural effusion in eight, pulmonary thromboembolism in one, and ARDS in six patients. Blood cultures were taken from 42.3% of the patients who were admitted with the complaint of fever, and there was no culture in which growth was detected. Of the patients 42.2% (n=43) needed an intensive care unit (ICU). Non-invasive mechanical ventilation was applied to 9.8% (n=10) and IMV to 25.5% (n=26) of them.

The mean hospitalization period of the patients was 13±4 days (median: 13, minimum-maximum: 6-29) and death occured after 12.6±3 days (9-19 days) of hospitalization. Clinical improvement was observed in 74.5% (n=77) of the patients, and nine were discharged with partial recovery and recommendation for oxygen support therapy at home was made.

The mortality rate in our study was 24.5% (n=25). In the evaluation of laboratory parameters, reference values were included in the analysis. Mean lactate dehydrogenase (LDH) and urea were higher in the group of patients who died ($p \leq 0.001$). When the comorbidities of the patients who developed mortality and pre-COVID-19 kidney function tests (urea, creatinine) were evaluated, it was found that six of the 20 patients whose previous tests could be accessed had renal dysfunction. There were three patients with chronic renal failure, and two of them had mortality.

The mortality-related laboratory parameters of the patients are shown in Table 3.

## Discussion

In this study, clinical, laboratory and radiological findings of patients with severe COVID-19 pneumonia and their relationship with mortality were analyzed.

In a study including 29,479 (45.5%) outpatient and 35,302 (54.5%) inpatient patients with COVID-19 in the USA, hypertension (46.7%), hyperlipidemia (28.9%), diabetes mellitus (27.9%) and chronic lung disease (16.1%) were reported to be the most common comorbidities and their correlation with mortality was significant ($p<0.001$)[5]. Similarly, hypertension and diabetes mellitus were the most common comorbidities in our study. In addition, 76.5% of 102 patients with severe COVID-19 pneumonia had at least one or more underlying disease. Since the number of patients was small in our study, the relationship between comorbidities and mortality could not be evaluated. However, it was reported that immune dysfunctions, which were important in the fight against viral infections, such as dysfunction of CD8 T lymphocytes in hypertension, dysregulation of cytokine discharge and weak innate immunity in diabetes, and dysregulation of cytokine discharge contributed to mortality by increasing inflammation in the lungs[6,7]. The effects of comorbidities on mortality in patients with COVID-19 pneumonia can be clarified by further studies.

In a meta-analysis (n=1994) that analyzed clinical data of patients with COVID-19 in China, the most common symptoms were fever (88.5%), cough (68.6%), myalgia (35.8%), sputum (28.2%), and dyspnea (21.9%)[8]. In our study, the most common presenting symptoms were cough and dyspnea, and fever was the third most common symptom with a rate of 32.4%. These findings suggested that COVID-19 should be considered in the differential diagnosis in every patient presenting with nonspecific symptoms during the pandemic period.

In a meta-analysis (n=3338) evaluating the prevalence of bacterial co-infection and secondary infection in patients with COVID-19, bacterial co-infection was reported in 3.5% of patients and secondary bacterial infection in 14.3%. In the same study, it was reported that the overall rate of patients with COVID-19 and bacterial infection was 6.9% and bacterial infections were more common in critically ill patients (13.8%), but 71.9% of patients with COVID-19 received antibiotic therapy[9]. In our study, the percentage of those who received any of the azithromycin, clarithromycin and moxifloxacin treatments was 90.2%, and 66.7% of the patients received azithromycin treatment. Despite the low rates of secondary bacterial infection or co-infection in COVID-19, the high rates of antibiotic use may lead to the spread of antimicrobial resistance, thus leading to medical, economic and public health problems. Factors causing inappropriate antibiotic use were interpreted as; the lack of culture and antibiotic susceptibility test results of clinical samples, continuation with empirical treatment, clinicians not having sufficient knowledge and experience about the clinical course and treatment of COVID-19 at the beginning of the pandemic, excessive workload, inadequacy of microbiologists and infectious disease specialists.

In a study evaluating the clinical outcomes of hospitalized patients with COVID-19 (n=2634) in the USA, it was reported that 373 patients (14.2%) required treatment in the ICU, of whom 320 (12.2%) underwent IMV. It was reported that 282 (24.5%) of the patients died[10]. The mortality rate in our study was 24.5% (n=25). When the causes of mortality were

examined, it was observed that five patients died due to non-COVID reasons and 20 patients died due to COVID-19 related causes.

An increase in liver function tests was detected after favipiravir use in 34% (n=35) of the 102 patients included in the study. Although none of the patients included in the study had a history of chronic liver disease, HBsAg, anti-HCV tests were studied in 57% (n=20) of the patients with increased AST and ALT, and the results were negative. It was observed that anti-HBc and anti-HBs tests were not studied because they could not be performed in our hospital.

In a study that included 5776 patients with COVID-19 in the USA, increases in LDH (76.2%), ferritin (63.2%), C-reactive protein (CRP) (8.4%) and D-dimer (80%) levels were reported. In the same study, it was reported that treatment with a combination of corticosteroids and tocilizumab showed lower mortality and improved hospital survival compared to patients receiving standard maintenance therapy (symptomatic treatment without corticosteroid, tocilizumab or anakinra) and patients treated with corticosteroids alone or in combination with anakinra[11]. In our study, 13.7% (n=14) of the patients were given tocilizumab and 35.3% (n=36) steroids. The average duration of treatment with steroids was three days, only three (8.3%) patients who received steroids (35.3%) had chronic lung disease. Of the patients treated with steroids, 16 (44.4%) died, and three of them died due to non-COVID-19 causes. According to the RECOVERY study conducted in the United Kingdom (n=2104), the 28-day mortality rate was lower in the dexamethasone group compared with standard care[12]. Since our study was designed retrospectively, the efficacy of the drugs used in the treatment could not be evaluated.

In the study (n=3062), in which the personal mortality risk calculation was made through an algorithm in hospitalized patients with COVID-19 by the Hellenic COVID-19 study group, which included 33 centers from Southern Europe and America, the observed mortality rate was reported as 26.84%. It was reported that decreased oxygen saturation (≤93%), high CRP levels (≥130 mg/L), high blood urea nitrogen (≥18 mg/dL) and creatinine (≥1.2 mg/dL) were the primary risk factors supporting clinical findings[13]. In our study, LDH and urea levels were higher in the group with mortality (p≤0.001). Only three of the patients included in the study had a diagnosis of CRF, and mortality developed in two of them. In the group with mortality, D-dimer and ferritin tests were not statistically included in the evaluation because they were studied in very few patients.

There were some limitations of our study. Since it was a retrospective study, an evaluation of the efficacy of the drugs used in the treatment could not be made. Comorbidities and the relationship of some parameters with mortality could not be evaluated because the number of patients was small. Viral clearance time could not be determined because nasopharyngeal swab samples were taken at discharge for control PCR tests.

## Conclusion

In conclusion, our study will contribute to understanding the COVID-19 disease that requires hospitalization and/or resulting in mortality and to better manage patients at risk. Despite the low rates of bacterial co-infection and/or secondary bacterial infection in COVID-19, frequently given antibiotic treatments contribute to the problem of antimicrobial resistance, creating both a serious public health problem and an economic burden. Large-scale randomized controlled trials are required for treatment protocols of which potential benefits have not yet been proven.

### Ethics

**Ethics Committee Approval:** This study was conducted with the approval of the Haseki Training and Research Hospital Clinical Research Ethics Committee (decision number: 2020-168; date: 04/11/2020).

**Informed Consent:** Retrospective study.

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Concept: Y.K., Design: Y.K., Data Collection or Processing: Y.K., Analysis or Interpretation: Y.K., H.H.G., E.E., Literature Search: Y.K., Writing: Y.K., H.H.G.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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