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Clinical outcomes of COVID-19 in patients with chronic diseases

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ABSTRACT

OBJECTIVE: This study was carried out to evaluate the clinical outcomes of patients having chronic diseases (CD) and COVID-19 infection.

METHODS: The study was carried out retrospectively by including 1.516 patients with CDs who applied to two education and research hospitals between June 01, 2021, and August 01, 2021, and were diagnosed with COVID-19. As CDs; cardiovascular diseases, diabetes mellitus (DM), hyperlipidemia, asthma, chronic obstructive pulmonary diseases, rheumatological diseases, malignancy, cerebrovascular disease, and chronic kidney diseases (CKD) were screened and evaluated statistically.

RESULTS: A total of 1.516 patients with a mean age of 58.05±18.51 years were included in the study. It has been observed that 68.9% of COVID-19 patients have at least one CD. Women were more tend to have CDs than men (73.8% vs. 64.8%). Patients with a history of CD were significantly older and had a longer hospital stay than those without. Patients with CDs were 5.49 times more likely to be hospitalized in the intensive care unit (ICU) and their death rate was 2.52 times higher than the other patients. After the regression analysis, while hypertension (HT) (Odds Ratio [OR]: 2.39), DM (OR: 3.64), and any type of cancer (OR: 2.75) were seen as independent risk factors in hospitalizations in the ICU, cardiovascular diseases (OR: 2.27), CKD (OR: 3.69) and psychiatric disorders (OR: 2.18) were seen as independent risk factors associated with mortality.

CONCLUSION: The follow-up of COVID-19 patients with CDs should be done more cautiously than others. It should be kept in mind that patients with HT, DM, and cancer may need intensive care at any time of hospitalization, while those with cerebrovascular disease, CKD, and psychiatric problems may have a higher mortality rate than other patients.

Keywords: Chronic diseases; COVID-19; morbidity; mortality.

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COVID-19 disease was first reported in Wuhan, China on 30 December 2019. According to the data of the World Health Organization, 529.688.157 cases and 6.297.872 deaths were reported until June 5, 2022. Although the number of new cases and deaths continues to decline as 22% decrease as compared to the previous week, it still continues to affect the whole world with over 7.600 fatalities per week [1].

Chronic diseases (CD) stand out as the most effective factors in the morbidity and mortality rates of COVID-19 patients [2–5]. In the study of Aslaner et al., [6] Hypertension (HT), diabetes mellitus (DM),

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chronic obstructive pulmonary (COPD), hyperlipidemia, cerebrovascular diseases (CVD) and cancer were found to be associated with mortality, but no significant correlation was found between psychiatric diseases, rheumatological diseases, chronic kidney disease (CKD) and mortality. In the regression analyses conducted in this study, HT, chronic pulmonary disease and cancer were found to be independent risk factors for mortality [6]. In the study of Albitar et al. [7] another study, it was found that HT, DM, chronic lung disease, kidney, and cardiovascular disease were associated with mortality in univariate analyzes, while HT and DM were found to be independent risk factors in multivariate analyzes.

Although CDs have shown to be associated with COVID-19 mortality and morbidity, subgroup analyses show differences between these diseases. As an example, although diabetes is associated with mortality in some studies, this relationship could not be shown in other studies [8, 9]. Likewise, although asthma was shown as a factor in increasing mortality in some studies, it was stated that it may even be a factor in reducing mortality in other studies [10, 11].

Although many studies show that CDs increase mortality and morbidity, there are differences between CDs that are seen as factors causing mortality or morbidity. Our study aimed to reveal which CDs of the patients in our region are associated with the morbidity and mortality of COVID-19 disease.

Highlight key points

- The prevalence of chronic disease was significantly higher in women than in men. Patients with chronic disease were significantly older and had longer hospitalization period than the other patients.
- Patients with a chronic disease diagnosed with COVID-19 have a 2.5 times higher mortality rate than others.
- Hypertension, diabetes mellitus and cancer are independent risk factors for ICU admission of patients having COVID-19 disease.
- Cardiovascular diseases, chronic kidney disease, and psychiatric disorders are independent risk factors for mortality of patients having COVID-19 disease.

MATERIALS AND METHODS

Sample Collection

Patients diagnosed with COVID-19 in two hospitals of our region Umraniye Training and Research Hospital and Fatih Sultan Mehmet Training and Research Hospital between June 01, 2021 and August 01, 2021 were included in this cross-sectional study. The data of the patients were recorded retrospectively from the hospital registry system. As the CDs; cardiovascular diseases, DM, hyperlipidemia, asthma, COPD diseases, rheumatological diseases, malignancy (any type of cancer), cerebrovascular disease, and CKDs were screened. Coronary artery disease, congestive heart failure, and arrhythmias were classified as cardiovascular diseases. Schizophrenia-type disorders, anxiety, and mood disorders were classified as psychiatric disorders. Turkish Ministry of Health approval with the approval of the Umraniye Training and Research Hospital Ethics Committee was obtained in the date May 27, 2021; Decision No: 155. The Helsinki Declaration of Human Rights was followed.

Statistical Analysis

SPSS version 22.0 (IBM Corp., Armonk, NY, USA) was used to perform the analyses. Descriptive statistics for continuous variables were expressed as an average and standard deviation values. Data were given as mean±standard deviation. Kolmogorov–Smirnov test was used to determine whether numerical data belonging to the variables were compatible with the normal distribution. In the comparison of quantitative data, Student's t-test was used for comparisons of normally distributed parameters between two groups, and Mann–Whitney U test was used for comparisons between two groups of parameters that do not show normal distribution. The Chi-square test and Fisher's Exact Chi-square test were used in the comparison of qualitative data. Independent factors affecting results in COVID-19 infection were evaluated by logistic regression analysis. The significance level was accepted as a $p<0.05$ level.

RESULTS

1.516 inpatients diagnosed with COVID-19 were included in the trial. Of the participants, 829 (54.7%) were male and 687 (45.3%) were female. The average age of participants was 58.05±18.51 years. Cough (52.6%) and shortness of breath (41.3%) were the most common symptoms in COVID-19 patients, while loss of taste and smell was seen in only 2.8% of patients. Table 1 shows the demographic and clinical characteristics of patients with COVID-19 pneumonia.

Table 1. Demographic and clinical characteristics of patients with COVID-19 pneumonia (n=1516)

Characteristics	(%)
Gender	
Male	54.7
Female	45.3
Age, years	58.05±18.51
Signs and symptoms	
Cough	52.6
Shortness of breath	41.3
Myalgia and fatigue	20.7
Sore throat	13.7
Headache	8.8
Arthralgia	6.5
Diarrhea	6.4
Stomachache	4.4
Loss of taste and smell	2.8

COVID-19: Coronavirus disease-19.

While 475 (31.1%) of 1.516 patients included in the study did not have a CD, 1.044 (68.9%) had at least one CD. 73.8% (507/687) of women and 64.8% (537/829) of men had a CD (Table 2). The prevalence of CD in women was significantly higher than man (χ^2 (1, N: 1.516)=14.26 p=0.0002), (OR: 1.53 [95% CI: 1.22–1.91]). Those patients with CDs were significantly older and hospitalized longer than the patients having no CDs. The patients in the intensive care unit (ICU) seemed to have more CDs (92.1%) than others (χ^2 (1, N: 1.516)=16.49 p=0.000), (Odds Ratio [OR]: 5.49 [95% confidence interval [CI]: 2.18–13.78]). Patients with CDs have also 2.5 times higher mortality than others (χ^2 (1, N: 1.516)=12.48 p=0.000), (OR: 2.52 [95% CI: 1.48–4.29]) (Table 2).

When we evaluated the ICU admission of the patients the age of the patients was significantly higher in the ICU group than in the non-ICU group (69.77±13.17 vs. 57.54±18.55; p=0.000). Patients with HT (OR: 3.87 [95% CI: 2.11–17.07]), cardiovascular disease (OR: 2.89 [95% CI: 1.74–4.80]), DM (OR: 4.74 [95% CI: 2.78–8.05]), hyperlipidemia (OR: 1.88 [95% CI: 1. 13–3.13]), any type of cancer (OR: 2.34 [95% CI: 1.08–5.073]), cerebrovascular disease (OR: 2.44 [95% CI: 1.01–5.89]) and CKD (OR: 3.15 [95% CI: 1.44–6.90]) have more risk for ICU admission than the others. Patients with asthma, COPD, rheumatological diseases, chronic liver diseases, and psychiatric diseases have no more risk for ICU admission than the patients without having these diseases (p>0.05 for all parameters) (Table 3).

Table 2. Characteristic features of patients with and without chronic diseases

	Total	No chronic diseases	With chronic diseases	p*
Age (year)				0.000
Mean±SD	58.05±18.51	45.50±18.42	63.73±15.53	
Median (IQR)	60 (46–71)	45 (33–58)	65 (54–74)	
Gender				0.000
Male (%)	829 (54.7)	292 (35.2)	537 (64.8)	
Female (%)	687 (45.3)	180 (26.2)	507 (73.8)	
Hospitalization period (days)				0.001
Mean±SD	8.34±4.07	7.81±3.83	8.5±4.15	
Median (IQR)	8 (5–10)	7 (5–10)	8 (6–11)	
ICU admission				0.000
Non- ICU (%)	1.453 (95.8)	467 (32.1)	986 (67.9)	
ICU (%)	63 (4.2)	5 (7.9)	58 (92.1)	
Mortality				0.000
Discharged (%)	1.409 (92.9)	455 (32.3)	954 (67.7)	
Death (%)	107 (7.1)	17(15.9)	90 (84.1)	

Chi square test; Mann Whitney U test; SD: Standard deviation; IQR: Interquartile range; ICU: Intensive care unit; *: P<0.05.

Table 3. Characteristic features of patients with different chronic diseases in ICU

	Total (n=1516)	Non-ICU (n=1453)	ICU (n=63)	p*
Age (year)				0.000
Mean±SD	58.05±18.51	57.54±18.55	69.77±13.17	
Median (IQR)	60 (46–71)	59 (46–70)	71 (63–78)	
Gender				0.158
Male (%)	54.7	45.7	63.5	
Female (%)	45.3	54.3	36.5	
Hospitalization period (days)				
Mean±SD	8.34±4.07	8.26±3.97	10.26±5.58	0.005
Median (IQR)	8 (5–10)	8 (5–10)	9 (6–12)	
Hypertension (-), (%)	51.3	52.5	22.2	0.000
Hypertension (+), (%)	48.7	47.5	77.8	
Cardiovascular disease (-), (%)	72.7	73.7	49.2	0.000
Cardiovascular disease (+), (%)	27.3	26.3	50.8	
Diabetes mellitus (-), (%)	70.3	71.8	34.9	0.000
Diabetes mellitus (+), (%)	29.7	28.2	65.1	
Hyperlipidemia (-), (%)	68.3	68.9	54	0.013
Hyperlipidemia (+), (%)	31.7	31.1	46	
Asthma (-), (%)	88.2	88.1	90.5	0.566
Asthma (+), (%)	11.8	11.9	9.5	
COPD (-), (%)	94.1	94.2	93.7	0.784
COPD (+), (%)	5.9	5.8	6.3	
Rheumatological dis. (-), (%)	97.4	97.6	96.8	0.664
Rheumatological dis. (+), (%)	2.6	2.4	3.2	
Cancer (-), (%)	93.9	94.2	87.3	0.027
Cancer (+), (%)	6.1	5.8	12.7	
Cerebrovascular disease (-), (%)	95.6	95.9	90.5	0.040
Cerebrovascular disease (+), (%)	4.4	4.1	9.5	
Chronic kidney disease (-), (%)	95.3	95.6	87.3	0.002
Chronic kidney disease (+), (%)	4.7	4.4	12.7	
Chronic liver disease (-), (%)	99	99	98.4	0.636
Chronic liver disease (+), (%)	1	1	1.6	
Psychiatric diseases (-), (%)	86.7	86.8	84.1	0.543
Psychiatric diseases (+), (%)	13.3	13.2	15.9	
Psychiatric diseases (-), (%)	86.7	86.8	84.1	
Schizophrenia type dis. (+), (%)	0.4	0.4	0	0.240
Mood disorders (-), (%)	8.4	8.5	6.3	
Anxiety disorders (-), (%)	4.6	4.3	9.6	

Chi-square test; Mann–Whitney U test; SD: Standard deviation; IQR: Interquartile range; ICU: Intensive care unit; COPD: Chronic obstructive pulmonary; *: P<0.05.

As the logistic regression analysis performed with HT, cardiovascular diseases, DM, hyperlipidemia, cancer, CVD and CKD, it was observed that hospitalizations in the ICU were mostly associated with HT (OR: 2.39), DM (OR: 3.64) and any type of cancer (OR: 2.75) (Table 4).

When we evaluated the mortality of patients with CDs the age of the patients was significantly higher in the non-survivor group than the survivors (71.46±15.64 vs. 57.03±18.32; p=0.000). Patients with HT (OR: 2.50 [95% CI:1. 64–3.83]), cardiovascular disease (OR: 2.62

Table 4. Logistic regression analysis of chronic diseases for ICU admission

	B	SE	Wald	df	Sig.	Exp(B)
Hypertension	0.875	0.329	7.085	1	0.008	2.398
Diabetes mellitus	1.294	0.290	19.856	1	0.000	3.646
Cancer	1.012	0.409	6.119	1	0.013	2.751
Constant	-2.795	0.218	164.030	1	0.000	0.061

Hypertension, cardiovascular diseases, diabetes mellitus, hyperlipidemia, cancer, cerebrovascular diseases, and chronic kidney disease were taken into evaluation of regression analysis. ICU: Intensive care unit; SE: Standard error.

[95% CI:1.76–3.9]), hyperlipidemia (OR: 1.62 [95% CI: 1.08–2.41]), CVD (OR: 3.17 [95% CI: 1.64–6.12]), CKD have (OR: 4.24 [95% CI: 2.34–7.7]), and psychiatric diseases (OR: 2.38 [95% CI: 1.49–3.78]) have more risk for mortality than the others. When psychiatric disorders were examined in 3 main subgroups, the ratio of death in each psychiatric group was higher than the ratio of survivors (p=0.002) (Table 5). The mortality rates of those who have been reported as having DM, asthma, COPD, rheumatological diseases, chronic liver diseases, and cancer were not different from patients without these diseases (p<0.05) (Table 5).

When the logistic regression analysis was performed with the chronic disorders which have significant differences in univariate analysis (HT, cardiovascular disease, cerebrovascular disease, CKD, and psychiatric disorders), cardiovascular diseases (OR: 2.27), CKD (OR: 3.69), and psychiatric disorders (OR: 2.18) were found to be more effective on mortality than other diseases (Table 6).

DISCUSSION

This study gives valuable information on the effect of CDs on mortality and morbidity of COVID-19 disease. The age of the patients with CDs was significantly higher than the others (63.73±15.53 vs. 45.50±18.42). While the rate of CD among females was 73.8%, it was less common among males at 64.8%. Both ICU admission and mortality were higher in patients with CD. The presence of HT, cardiovascular diseases, diabetes, cancer, CVD and CKD were prominent in relation to admission to the ICU. HT, cardiovascular diseases, CVD, CKDs, and psychiatric diseases are the CDs that are mainly associated with mortality. Based on the regression analysis, the most effective factors in ICU admission were diabetes, HT, and the presence of any type of cancer. Furthermore, cardiovascular disease, CKD, and psychiatric disorders are the main factors of mortality-related regression results.

Whenever previous studies are reviewed, it is evident that the increase in the number of CDs is related to the morbidity and mortality of patients. In the study of Wang et al. [12] the presence of CD was observed to be significantly higher among ICU patients (ICU: 72.2% vs. Non-ICU: 37.3%; p<0.001). In the study of Aslaner et al. [6] while the case fatality rate is 0.2% in those who have no CD, the mortality increases as the number of CDs increases, respectively. for 1 CD: 6.8%, 2 CD: 8.3%, 3 CD: 12.5%, 4 CD: 14.8%, 5 CD: 54.5%, and 6 CD: 66.7%. In our study, in accordance with previous studies, the presence of CD was significantly higher with the ratio of 92.1% for ICU patients and 84.1% for deceased patients.

Although HT and cardiovascular disease are interlaced diseases, they are usually classified separately in the studies. Apart from their higher prevalence among CDs, the importance of HT and cardiovascular diseases is increasing with their higher morbidity and mortality rates [6, 13, 14]. In a study of 138 ICU patients, cardiovascular disease, primarily HT, was found to play a significant role in these hospitalizations [15]. Regarding the severity of the disease, Hu et al. [16] investigated that although the presence of HT was 25% in mild and 38.5% in patients with serious illness, no statistically significant differences were found. Furthermore, as the severity of the disease increased, the rate of cardiovascular disease increased considerably (5.3% for mild vs. 42.3% for critically ill patients) [16]. In their study, Aslaner et al. [6] mentioned that HT and CVD were both significantly related to mortality, but regression analysis indicated that HT was more significant factor than the others. In

Table 5. Mortality of patients with different chronic diseases with COVID-19

	Total (n=1.516)	Survivor (n=1.409)	Non-survivor (n=107)	p*
Age (year)				0.000
Mean±SD	58.05±18.51	57.03±18.32	71.46±15.64	
Median (IQR)	60 (46–71)	58 (45–70)	73 (66–82)	
Gender				0.269
Male (%)	829 (54.7)	765 (54.3)	64 (59.8)	
Female (%)	687 (45.3)	644 (45.7)	43 (40.2)	
Hospitalization period (days)				0.126
Mean±SD	8.34±4.07	8.23±3.77	9.75±6.75	
Median (IQR)	8 (5–10)	8 (5–10)	9 (5–13)	
Hypertension (-), (%)	51.3	52.8	30.8	0.000
Hypertension (+), (%)	48.7	47.2	69.2	
Cardiovascular disease (-), (%)	72.7	74.2	52.3	0.000
Cardiovascular disease (+), (%)	27.3	25.8	47.7	
Diabetes mellitus (-), (%)	70.3	70.3	69.2	0.798
Diabetes mellitus (+), (%)	29.7	29.7	30.8	
Hyperlipidemia (-), (%)	68.3	69.1	57.9	0.017
Hyperlipidemia (+), (%)	31.7	30.9	42.1	
Asthma (-), (%)	88.2	88.2	87.9	0.909
Asthma (+), (%)	11.8	11.8	12.1	
COPD (-), (%)	94.1	194.4	90.7	0.113
COPD (+), (%)	5.9	5.6	9.3	
Rheumatological dis. (-), (%)	97.6	97.5	98.1	0.691
Rheumatological dis. (+), (%)	2.4	2.5	1.9	
Cancer (-), (%)	93.9	94.2	89.7	0.063
Cancer (+), (%)	6.1	5.8	10.3	
Cerebrovascular disease (-), (%)	95.6	96.2	88.8	0.000
Cerebrovascular disease (+), (%)	4.4	3.8	11.2	
Chronic kidney disease (-), (%)	95.3	96	85	0.000
Chronic kidney disease (+), (%)	4.7	4	15	
Chronic liver disease (-), (%)	99	98.9	99.1	0.655
Chronic liver disease (+), (%)	1	1.1	0.9	
Psychiatric diseases (-), (%)	86.7	87.6	74.8	0.000
Psychiatric diseases (+), (%)	13.3	12.4	25.2	
Psychiatric diseases (-), (%)	86.7	87.6	74.8	
Schizophrenia type dis. (+), (%)	0.4	0.4	0.9	0.002
Mood disorders (-), (%)	8.4	7.9	14	
Anxiety disorders (-), (%)	4.6	4.1	10.3	

Chi-square test; Mann Whitney U test; SD: Standard deviation; IQR: Interquartile range; ICU: Intensive care unit; COPD: Chronic obstructive pulmonary; *: P<0.05.

another meta-analysis, cardiovascular disease and HT were found to be significantly associated with mortality (risk ratio for cardiovascular disease (RR): 2.25 and HT RR: 1.82) [13]. In our study, in correlation with other publications, HT and cardiovascular disease were found to be significantly higher in both ICU admissions and mortality. In the results of the regression analysis, the HT (OR: 2.39) in intensive care admission and cardiovascular disease (OR: 2.27) in mortality was found to be an independent risk factor.

Table 6. Regression analysis of chronic diseases for the mortality of COVID-19 patients

	B	SE	Wald	df	Sig.	Exp(B)
Cardiovascular diseases	0.823	0.208	15.663	1	0.000	2.277
Chronic kidney diseases	1.306	0.313	17.438	1	0.000	3.690
Psychiatric disorders	0.780	0.243	10.296	1	0.001	2.182
Constant	-1.672	0.170	96.639	1	0.000	0.188

Hypertension, cardiovascular diseases, diabetes mellitus, hyperlipidemia, cancer, cerebrovascular diseases, and chronic kidney disease were taken into evaluation of regression analysis. ICU: Intensive care unit; SE: Standard error.

Hyperlipidemia is frequently observed with HT and cardiovascular diseases. In patients with COVID-19, it is found to be related to disease severity and mortality. Although the mortality of hyperlipidemia in COVID-19 patients was seen more than in others, it was not among the independent risk factors as a result of the analyses performed [6, 17]. In our study, similar to the literature, patients with hyperlipidemia were found to be significantly higher both in ICU admission and in mortality, but they were not found to be an independent risk factor in regression analyses.

The global prevalence of diabetes among 20–79-year-old in 2021 was estimated at 10.5% (536.6 million people), reaching 12.2% (783.2 million) in 2045 [18]. In a study investigating the clinical course of those with diabetes in COVID-19 patients, 27.6% of those with DM were followed in the ICU, while this rate was 6.2% among those without diabetes [5]. Mortality over 28 days was significantly higher among diabetics than non-diabetics (17.2% vs. 1.2%). Similarly, in another study, the rate of diabetes among the patients hospitalized in the ICU was 22.2%, while this rate was 5.9% in the patients who were followed up outside the ICU [15]. In a study by Wang et al. [12] which is about the clinical course and outcomes of COVID-19 patients, the mortality rate was 26.3% in patients suffering from diabetes. In a meta-analysis, mortality among patients with and without DM was 21.3 versus 6.1%, respectively (OR: 2.39 $p< 0.001$) [8]. In contrast to the majority of studies, there are studies showing that diabetes may not be associated with mortality. In a study, while the presence of diabetes was not found to be associated with mortality, hospitalization in ICU was found to be significantly higher among these patients (34.8%) [9]. Furthermore, there are also some other studies demonstrating that diabetes is not related to the severity of the disease or mortality [14, 17, 19]. Consistent with the aforementioned studies, we found that the rate of DM was 65.1% in the ICU, and 28.2% among the non-ICU patients. The risk of admission to ICU was 3.64 times greater for patients with diabetes ($p<0.05$). Furthermore, we were unable to establish any relationship between mortality and the presence of DM (DM in survivors: 29.7% vs. DM in non-survivors: 30.8%; $p=0.798$).

Studies have found conflicting results in COVID-19 mortality and morbidity in patients with COPD and asthma. Especially in the case of asthma, many studies show that the severity and mortality of COVID-19 is not increasing and increases in mortality have been observed more frequently in patients with COPD [3, 6, 10, 13, 20–22]. In a meta-analysis by Ssentongo et al. [13] it was stated there was no increase in mortality in patients with both COPD and asthma. Lieberman-Cribbin et al. [20] in their study, indicated that asthma was not associated with COVID-19 mortality. In addition to all these studies, in a meta-analysis, they stated that asthma had a significantly lower risk of mortality compared to those without [10]. Contrary to these studies, in another study, the author reported that adults with asthma who have required two or more courses of oral corticosteroids were found to be at risk of hospitalization, ICU admission, and death [11]. In the study by Kant et al. [21] COPD has increased hospitalizations in ICU s by 1.88 times, but there has been no difference in prognosis. A number of studies have shown that COPD is an independent risk factor for all causes of mortality and disease severity [13, 22, 23]. In our study, although the rate of asthmatic patients hospitalized in the ICU was less than those hospitalized in the ward, it was not statistically significant (9.5% vs. 11.9%). On the other hand, the percentage of asthmatic patients was higher in those who died, but there was no significant difference in the mortality (12.1% vs. 11.8%). While ICU admission or mortality appears to be higher among

COPD patients, there were also no statistically significant differences. The differences in outcomes among the studies may be due to the need for close medical follow-up and the use of inhaled corticosteroids, allergenic immunotherapy and biological agents.

Due to immune modulation, patients with rheumatic diseases are theoretically more vulnerable to infection, but on the other hand, the agents used to treat these diseases may promote protection against the inflammatory process that favors the development of severe COVID-19 diseases [24, 25]. In another study, a combined group of patients with RA, SLE, or psoriasis had a slightly increased risk of death [26]. 38 patients with rheumatological conditions with COVID-19, 85.5% had not required hospitalization and only one patient died [27]. Although mortality is lower in patients using cytokine inhibitors, corticosteroid use in excess of 10 mg daily was found to be associated with hospitalization for severe COVID-19 [27]. In a study by Aslaner et al. [6] there was no correlation between the presence of rheumatological diseases and the case fatality rate. In our study, consistent with other studies, rheumatological diseases were not associated with ICU admission and mortality.

Cancer patients are more susceptible to infection than non-cancer patients due to their systemic immune suppressive state caused by malignancy and anticancer treatments, such as chemotherapy or surgery [28]. In a meta-analysis of 11 comorbid diseases, cancer had a significantly higher mortality risk due to COVID-19 (OR: 1.47) [13]. In the study of Galiero et al. [23] on hospital mortality in COVID-19 patients, male sex, presence of liver disease, and malignancy were found to be independent risk factors for poor prognosis. In the study of Liang et al. [29] cancer patients had higher critical care needs than other patients (39% vs. 8%). In addition to mentioned studies above, in some small-scale studies, it was stated that there was no difference between the presence of cancer with the mortality and morbidity of the patients [14, 30]. In our study, the rate of hospitalization in ICUs among the cancer patients (12.7%) was higher than the rate of hospitalization inwards (5.8%), and has also emerged as an independent risk factor after a multiple regression analysis. In the meantime, although the presence of cancer among the patients who died (10.3%) was significantly higher than the rate of cancer in the survivors (5.8%), it was not reached a statistically significant level (p=0.063). We think that the reason for this result in mortality may be related to the low number of cancer patients and the types of cancer diseases that we have not detailed.

While some small-scale studies have found that CVD do not cause mortality in patients with COVID-19, most studies have shown that they have significant effects on mortality [6, 13, 14, 31, 32]. In two meta-analyses with 4.448 and 14.558 patients, CVD were found to be associated with mortality (RR 2.38 and 2.48; p<0.05) [31, 32]. As well, in one of these meta-analyses, there was a limited association with the severity of the disease, while in the other, cerebrovascular disease was not associated with severity. In another study by Zhang et al. [14] cerebrovascular disease was found to be associated with severe COVID-19. In our study, the proportion of patients with cerebrovascular disease was significantly higher than others for ICU admission and death (ICU admission: 9.5% vs. 4.1%, mortality: 11.2% vs. 3.8%). Although the CVD have found to have an association with mortality and morbidity of COVID-19 when evaluated individually, this relationship could not be shown in regression analysis.

While COVID-19 is characterized by acute respiratory illness, several studies have shown a link between CKD and COVID-19 [13, 14, 23, 32]. In the meta-analysis of Menon et al. [33] CKD prevalence for patients with COVID-19 was 4%. In this study, CKD has been shown to play a major role in increasing the severity of the disease and mortality. Among eight hundred sixty-six patients who developed severe COVID-19, 39 (4.5%) of them had CKD (OR: 2.15 [95% CI: 1.16–4.01]). In the same study, out of 443 patients who died, 85 of them had CKD, with a prevalence of 19.18% (OR: 5.58 [95% CI: 3.27–9.54]). In a study by Galiero et al. [23] while CKD significantly increased mortality in univariate analyses (OR: 1.88; p=0.023), multivariable models on mortality outcomes did not show any significance between mortality and CKD (OR: 1.01; p=0.974). In our study, it was seen that CKD increased both ICU admission and mortality in univariate analysis in line with previous studies. Based on multivariate analyses, although no relationship could be demonstrated with ICU admission, a 3.69-fold increase in mortality was demonstrated.

Some studies on the effects of chronic liver disease on COVID-19 suggest that they are effective on mortality and morbidity, while others are not [6, 14, 34, 35]. In a study of 618 patients, especially to investigate the effects of liver disease on COVID-19, after multivariable analysis was performed, malignancy, male sex, and chronic liver disease were shown as independent risk factors (OR5.88 [95% CI: 2.39–14.46]) [23]. In another study, it was claimed that patients with mild liver disease, com-

pensated cirrhosis, and liver transplantation were not related to increased risk of COVID-19-related mortality on the other hand patient with alcohol use disorders, decompensated cirrhosis, or primary liver cancer were at increased risk of mortality [35]. In our study, it was seen that the presence of the chronic liver disease did not increase either ICU admission or mortality.

In a meta-analysis about the association between mental health disorders and mortality, mental health disorders were found to increase COVID-19-related mortality [36]. In another retrospective study that assessed 7.348 patients only schizophrenia-type disorders were found to be a risk factor for mortality other than mood and anxiety disorders [37]. In the study of Aslaner et al. [6] no significant difference was found between the rate of psychiatric illness among the all patients and those who died. In another study with 50.750 patients including 823 schizophrenic patients, schizophrenia increased the hospital mortality (25.6% vs. 21.7%, OR: 1.3) and decreased ICU admission rate (23.7% vs. 28.4%; OR: 0.75) [38]. In our study, it was seen that psychiatric disorders were not related to ICU admission, but were associated with mortality. In subgroup analysis, schizophrenia-type disorders, mood disorders, and anxiety disorders were all found to be related to mortality. Psychiatric disorders were also found to be an independent risk factor for mortality after regression analysis of all the other CDs.

Conclusion

As a result, the follow-up of COVID-19 patients with CD s should be done more cautiously. It should be kept in mind that patients with HT, DM, and cancer may need intensive care at any time of hospitalization, while those with cerebrovascular disease, CKD, and psychiatric problems may have a higher mortality rate than other patients.

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