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Presenting characteristics, comorbidities, and outcomes among 390 patients hospitalized with COVID-19 pneumonia in a tertiary hospital

Songül Araç[1], Mehmet Özel[1], Aydın Aslan[2], Süleyman Alpar[3], Eşref Araç[4]

[1]Department of Emergency Medicine, University of Health Sciences, Diyarbakır Gazi Yaşargil Training and Research Hospital, Diyarbakır, Turkey
[2]Department of Radiology, University of Health Sciences, Diyarbakır Gazi Yaşargil Training and Research Hospital, Diyarbakır, Turkey
[3]Department of Emergency Medicine, Diyarbakır Ergani State Hospital, Diyarbakır, Turkey
[4]Department of Internal Medicine, University of Health Sciences, Diyarbakır Gazi Yaşargil Training and Research Hospital, Diyarbakır, Turkey

ABSTRACT

Objectives: In this study, demographic characteristics, comorbidities, presenting symptoms, physical examination findings, laboratory findings, and administered drugs of the discharged or deceased patients admitted to our hospital and hospitalized with the COVID-19 diagnosis were compared to investigate the factors that affect mortality.

Methods: A retrospective study was performed and included COVID-19 pneumonia patients. 390 consecutive discharged or deceased patients, who were hospitalized in our hospital between March 20 and May 20, 2020, after detection of pneumonia and diagnosis of COVID-19, were included in the study.

Results: Of the 390 patients included in the study, 352 (90.25%) were discharged after recovery, while 38 (9.75%) were deceased. The average age of all the patients was 49.46 ± 17.86 years, the average age of the discharged patients was 47.19 ± 16.76 years, and the average age of the deceased patients was 70.42 ± 13.7 years. The average age of deceased patients was significantly higher. Of all the patients, 40.8% was PCR positive.

Conclusions: The present study revealed that the drugs that patients take due to their comorbidities have no effect on the prognosis of the disease and that the presence of comorbidity itself is indicative of the poor prognosis. Taking into account the PCR positivity of 57.9%, even in deceased patients, we believe PCR is inadequate in the diagnosis, and CT is much more valuable in this regard.

Keywords: COVID-19 disease, CT images, pneumonia, reverse transcription polymerase chain reaction

Since December 2019, the new Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) outbreak has turned from a small unknown atypical pneumonia cluster into a global pandemic. Coronavirus disease 2019 (COVID-19) now affects over 200 countries with more than 11 669 259 confirmed cases and nearly 539 906 deaths worldwide [1]. SARS-CoV-2 has similar features to Severe Acute Respiratory Syndrome (SARS-CoV) and Middle East Respiratory Syndrome (MERS) coronavirus, and enters the cells through Angiotensin-Converting Enzyme 2 (ACE2) receptor, as the main entry point to infect cells [2, 3].

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Address for correspondence: Eşref Araç, MD., Associate Professor, University of Health Sciences, Diyarbakır Gazi Yaşargil Training and Research Hospital, Department of Internal Medicine,, Elaziğ Yolu 10. Km, Üçkuyular Mevki, 21070 Kayapınar, Diyarbakır, Turkey
E-mail: esrefarac@gmail.com, Phone: +90 553 6848621, Fax: +90 412 2580060

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Its mortality rate varies according to age and the presence of a chronic disease. While the mortality rate is 0.2% in healthy young adults, this rate is >10% in the elderly with chronic diseases [4]. Limited information has been available to describe the presenting characteristics and outcomes of COVID-19 patients requiring hospitalization in Turkey. In a retrospective cohort study from China, hospitalized patients were predominantly men with a median age of 56 years; 26% required intensive care unit (ICU) care, and there was a 28% mortality rate [5]. Italy is among the most severely affected countries, with 242.173 confirmed cases, 34.026 deaths, and an observed lethality rate of 14.1%, according to the most recent estimates of July 9th, 2020 [6]. Turkey has reported total of 209.962 confirmed cases along with 5300 deaths due to COVID-19 until July 9th, 2020 [7]. Although it is not yet possible to say anything about the differences between mortality rates, there are differences between demographic characteristics and comorbidity prevalences[8]. Research on the potentially modifiable risk factors related to the increased susceptibility to infection or worse outcomes among those infected, focuses on cardiovascular comorbidity, cerebrovascular diseases, hypertension, and diabetes [8, 9].

In this study, demographic characteristics, comorbidities, presenting symptoms, physical examination findings, laboratory findings, and administered drugs of the discharged or deceased patients admitted to our hospital and hospitalized with the COVID-19 diagnosis were compared to investigate the factors that affect mortality.

METHODS

Following the approval of the ethics committee of our hospital for this retrospective research, 390 consecutive discharged or deceased patients, who hospitalized in our hospital between March 20 and May 20, 2020, after detection of pneumonia and diagnosis of COVID-19, were included in the study. Patients whose hospitalization continued, patients under the age of 18, patients with CT findings incompatible with COVID-19 pneumonia, and patients whose data were not available were excluded from the study.

All the patients had specific symptoms of COVID-19 infection, specific signs of viral pneumonia were present in computerized thoracic tomography (CT) in addition to laboratory findings. Infection in 159 patients was confirmed using reverse transcription polymerase chain reaction (RT-PCR). Two hundred thirty-one patients with negative RT-PCR results were diagnosed with COVID-19 by clinical, laboratory and imaging findings in accordance with Ministry of Health COVID-19 guidelines. In line with our hospital protocol, all COVID-19 patients underwent a detailed history, electrocardiography, standard biochemical and hematological tests after their admission to the emergency room. Patients included in the study were treated in accordance with the COVID-19 guidelines of the Ministry of Health. The patients were divided into two groups: those who were recovered and discharged and those who were deceased.

Clinical data of all patients, including gender, age, risk factors (coronary artery disease, chronic obstructive pulmonary disease, etc.) drugs used were collected through the hospital information management system and Social Security Institution Medulla system.

The institutional ethics board of the Gazi Yasargil Training and Research Hospital, an affiliate of the University of Health Science, reviewed and approved this retrospective study.

Statistical Analysis

The SPSS Version 22.0 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.) was used for statistical analysis. The normality of data was tested by using the Kolmogorov Smirnov test, continuous variables were compared with the Mann Whitney U test, and categorical variables were compared using the chi-square test. A p - value of < 0.05 was considered significant.

RESULTS

Of the 390 patients included in the study, 352 (90.25%) were discharged after recovery, while 38 (9.75%) were deceased. The average age of all the patients was 49.46 ± 17.86 years, the average age of the discharged patients was 47.19 ± 16.76 years, and the average age of the deceased patients was 70.42 ± 13.7 years. The average age of the deceased patients was significantly higher ($p < 0.001$). Of all the patients,

Table 1. Clinical findings of patients with COVID-19 pneumonia

	All patients (n = 390)	Discharged (n = 352)	Exitus (n = 38)	*p* value
Age (years)	49.46 ± 17.86	47.19 ± 16.76	70.42 ± 13.7	< 0.001
Sex				
Female	188 (48.2)	171 (48.6)	17 (44.7)	0.652
Male	202 (51.8)	181 (51.4)	21 (55.3)	
PCR result, n (%)				
Negative	231 (59.2)	215 (61.1)	16 (42.1)	0.024
Positive	159 (40.8)	137 (38.9)	22 (57.9)	
First symptom onset to admission, days	5.32 ± 2.81	5.33 ± 2.89	5.18 ± 1.93	0.733
Symptoms, n (%)				
Fever	149 (38.2)	133 (37.8)	16 (42.1)	0.602
Cough	203 (52.1)	183 (52.0)	20 (52.6)	0.94
Dispne	88 (22.6)	70 0 (19.9)	18 (47.4)	**< 0.001**
Sputum	9 (2.3)	8 (2.3)	1 (2.6)	0.88
Sore throat	40 (10.3)	34 (9.7)	6 (15.8)	0.23
Myalgia	47 (12.1)	41 (11.6)	6 (15.8)	0.45
Chest distress	13 (3.3)	11 (3.1)	2 (5.3)	0.48
Smell and taste disorders	8 (2.1)	8 (2.3)	0	0.34
Diarrhea	12 (3.1)	10 (2.8)	2 (5.3)	0.41
Headache	20 (5.1)	19 (5.4)	1 (2.6)	0.46
Nausea, vomiting	19 (4.9)	19 (5.4)	0	0.14
Fatigue	117 (30.0)	107 (30.4)	10 (26.3)	0.6
Systolic blood pressure	116.53 ± 13.26	116.12 ± 12.8	120.32 ± 16.69	0.560
Diastolic blood pressure	72.1 ± 8.43	72.08 ± 8.26	72.24 ± 10	0.41
Temperature (°C)	37.1 ± 0.61	37.11 ± 0.61	37.09 ± 0.68	0.58
Pulse rate	84.22 ± 12.64	84.25 ± 12.49	83.97 ± 14.15	0.47
Oxygen saturation	96,17 ± 4.15	96.84 ± 3.49	90.03 ± 4.78	**< 0.001**
Underlying comorbidities, n (%)	153 (39.2)	122 (34 7)	31 (81.6)	**< 0.001**
Hypertension	82 (21.0)	59 (16.8)	23 (60.5)	**< 0.001**
Diabetes	59 (15.2)	47 (13.4)	12 (31.6)	**0.003**
Chronic obstructive pulmonary disease	42 (10.8)	34 (9.7)	8 (21.1)	**0.032**
Chronic Heart Disease	39 (10.0)	33 (9.4)	6 (15.8)	0.211
Malignancy	6 (1.5)	5 (1.4)	1 (2.6)	0.56
Chronic Kidney Disease	12 (3.1)	11(3.1)	1 (2.6)	0.86
Cerebrovascular diseases	9 (2.3)	6 (1.7)	3 (7.9)	**0.016**
Dementia	4 (10)	2 (0.6)	2 (5.3)	**0.006**
Medications Used by COVID-19 Patients Before Admission, n (%)				
Antithrombotic	61 (15.6)	43 (12.2)	18 (47.4)	**< 0.001**
Diuretic	31 (7.9)	22 (6.3)	9 (23.7)	**< 0.001**
Beta blocker	44 (11.3)	35 (9.9)	9 (23.7)	**0.011**
Calcium channel blockers	48 (12.3)	34 (9.7)	14 (36.8)	**< 0.001**
ACE inhibitor	25 (6.4)	21 (6.0)	4 (10.5)	0.27
Angiotensin receptor blocker	34 (8.7)	22 (6.3)	12 (31.6)	**< 0.001**
Oral antidiabetic	43 (11.1)	35 (9.9)	8 (21.6)	**0.031**
Insulin	20 (5.1)	13 (3.7)	7 (18.4)	**< 0.001**
Inhaled drugs	40 (10.3)	32 (9.1)	8 (21.1)	**0.021**
Stay at hospital (days)	10.18 ± 8.02	9.65 ± 5.87	15.08 ± 17.94	0.224

Data are shown as mean ± standard deviation or n (%)

Table 2. Laboratory findings of patients with COVID-19 pneumonia

	All patients (n = 390)	Discharged (n = 352)	Exitus (n = 38)	*p* value
WBC (10^9 /L)	8.1 ± 5.59	7.63±4.22	12.5 ± 11.73	**0.001**
Neutrophil (10^9 /L)	5.77 ± 4.46	5.54 ± 4	7.86 ± 7.21	0.46
Lymphocyte (10^9 /L)	1.78 ± 2.47	1.67 ± 0.76	2.8 ± 7.57	**< 0.001**
Platelets (10^9 /L)	232.92 ± 83.52	232.84±79.92	233.66 ± 112.9	0.638
Hb (g/dL)	13.49 ± 2.05	13.59±1.95	12.61 ± 2.69	**0.011**
Htc (%)	41.74 ± 5.67	42.1±5.04	38.43 ± 9.23	**0.003**
Albumin (g/L)	42.43 ± 5.62	43.36 ± 4.48	33.79 ± 7.58	**< 0.001**
ALT (U/L)	28.88 ± 32.05	28.32 ± 26.42	34.08 ± 64.39	0.69
AST (U/L)	31.28 ± 34.61	29.39 ± 26.34	48.76 ± 75.25	**0.002**
CRP (mg/L)	51.33 ± 68.44	40.95 ± 58.55	147.51 ± 78.7	**<0.001**
Ca (mg/dL)	8.58 ± 0.5	8.63 ± 0.46	8.1 ± 0.56	**< 0.001**
Cl (mmol/ L)	103.48 ± 4.2	103.34 ± 3.29	104.84 ± 8.95	0.905
Creatinin (mg/dL)	0.96 ± 0.78	0.91 ± 0,76	1.4 ± 0.84	**< 0.001**
LDH (U/L)	280.75 ±1 29.05	267.69 ± 116.95	401.68 ± 169.41	**< 0.001**
K (mmol / L)	4.11 ± 0.51	4.09 ± 0.49	4.28 ± 0.66	0.167
Na (mEq/L)	137.16 ± 3.53	137.16 ± 2.74	137.08 ± 7.71	0.02
Urea (mg/dL)	33.33 ± 28.03	29.25 ± 20.02	71.11 ± 53.27	**< 0.001**
D-dimer (ng/mL)	395,05 ± 553,88	342,24 ± 480,2	884,21 ± 875,02	**< 0.001**
Troponin (ng/mL)	0.14 ± 0.39	0.13 ± 0.35	0.25 ± 0.66	**< 0.001**

Data are shown as mean ± standard deviation or n (%)

40.8% was PCR positive. PCR positivity was significantly higher by 57.9% in deceased patients (p = 0.024). There were no gender differences between the two groups and in all patients (Table 1).

The duration between symptom onset and hospitalization was 5.32 ± 2.81 days in all patients included in the study. The most common symptoms were cough by 52.1%, fever by 38.2%, and fatigue by 30%, respectively. In the comparison of the symptoms of the patient groups, there was no significant difference between symptoms other than dyspnea, and the incidence of dyspnea was found to be higher in deceased patients (47.4%) than in the discharged patients (19.9%) ($p < 0.001$).

According to the results of the physical examination between the groups, the mean saturation in deceased patients was 90%, and 96% in the discharged patients. The mean saturation was significantly lower in the deceased group ($p < 0.001$).

The presence of comorbidity was significantly

Tablo 3. CT features of patients with COVID-19 pneumonia

	Total	Discharged	Exitus	*p* value
Ventral and dorsal	62 (15.9)	41 (11.6)	21 (55.3)	**< 0.001**
Bilateral	291 (74.6)	254 (72.2)	37 (97.4)	**0.001**
Perihilar	89 (22.8)	72 (20.5)	17 (44.7)	**0.001**
Peripheral	359 (92.1)	325 (92.3)	34 (89.5)	0.536

Data are shown as n (%)

higher in the deceased group ($p < 0.001$).). The most common additional disease in the deceased group was hypertension by 60%. HT, DM, cerebrovascular disease and dementia were significantly higher in the deceased group ($p < 0.001$, $p = 0.003$, $p = 0.016$ and $p = 0.006$, respectively) (Table 1).

Considering the drug use in the deceased group, antithrombotic, diuretic, beta blocker, ARB, calcium channel blocker, oral antidiabetic and insulin use was significantly higher ($p < 0.001$, $p < 0.001$, $p = 0.011$, $p < 0.001$, $p < 0.001$, $p = 0.031$ and $p < 0.001$, respectively), whereas there was no statistical difference in the use of ACE inhibitors compared to the discharged patients ($p = 0.27$).

In the examination of the laboratory findings of the patient groups, hemogram parameters leukocyte and lymphocyte counts were significantly higher in the deceased patients ($p = 0.001$ and $p < 0.001$, respectively), while hemoglobin and hematocrit levels were significantly lower ($p = 0.011$, $p = 0.003$, respectively) (Table 2).

Of the biochemical parameters, albumin was significantly lower, while CRP, LDH, urea, creatine, D-dimer and troponin were significantly higher ($p < 0.001$).

In the evaluation of lung involvement in thoracic CT, perihilar involvement, ventral and dorsal involvement, and bilateral lung involvement were significantly higher in the deceased patients ($p < 0.001$) (Tablo 3) (Fig. 1).

DISCUSSION

In the study, advanced age and comorbid factors such as hypertension and diabetes were found to be significantly higher in deceased patients in line with the literature. In deceased patients, the most common comorbidity was hypertension by 60%, in line with the literature [8, 10]. Although preliminary studies reported higher COVID-19 incidence in the male gender, subsequent studies found no difference between

Fig.1. CT scan of 53-year old female with COVİD-19. Bilateral ventral and dorsal located ground glass opacities.

the genders as in the present study [11, 12]. We believe, the higher infection incidence in the male gender in the preliminary research was due to the fact that most of affected patients associated with the seafood wholesale market were male workers.

The most common presenting symptoms of the patients were cough by 52.1%, fever by 38.2%, and fatigue by 30%, respectively, in line with the literature [8, 13]. As expected, dyspnea incidence was higher in the deceased group, and thus saturations were lower. Some studies have reported that ACE/ARB use increases mortality [3, 14-16]. However, many studies and meta-analysis studies have shown no such risk [17–19], and major cardiology scientific associations, including the ACC, HFSA, AHA, and ESC Hypertension Council, have rejected these correlation hypotheses [20]. The significantly higher use of antithrombotics, diuretics, beta blockers, ARBs, calcium channel blockers, oral antidiabetics and insulin in the deceased group in the study is believed to be due to the presence of hypertension and diabetes, not the drugs used. Although the use of all antihypertensives was significantly higher in the deceased group compared to the discharged group, it is important to note that the use of ACE inhibitors did not differ between the groups, indicating that the use of ACE inhibitors does not increase the risk of mortality.

In the laboratory findings, the infection indicators CRP, leukocyte and albumin (as negative acute phase reactants) were significantly different between the two groups as expected. (Table 2). In the deceased group, CRP, LDH, urea, creatine, D-dimer, troponin, leukocyte and lymphocyte levels were significantly higher, while albumin, hemoglobin, and hematocrit levels were significantly lower. Many studies have shown similar results to our findings, but despite the fact that lymphopenia was observed in COVID-19 patients with particularly poor prognosis and in many patients in our study, the mean lymphocyte levels in both groups were within the normal limits, but the lymphocyte count in deceased patients was found to be significantly higher compared to discharged patients [10–12].

Laboratory values suggest that COVID-19 infection may be associated with cellular immunodeficiency, coagulation activation, myocardial damage, hepatic damage, and kidney damage. We believe that the cause of mortality in COVID-19 pneumonia is hypoxia and shock caused by the direct effect of the virus, and the cytokine storm that develops due to inflammatory response.

In the evaluation of lung involvement in thoracic CT, perihilar involvement, ventral and dorsal involvement, and bilateral lung involvement were significantly higher in the deceased patients. In the literature review, it was found that there are findings indicating that bilateral lung involvement increases mortality, similar to the results of this study [21]. However, there was no study of perihilar involvement in particular.

CONCLUSION

The present study suggests that advanced age, presence of comorbidity, the levels of laboratory parameters such as CRP, creatine, D-dimer, troponin, hemoglobin and albumin, and bilateral and perihilar involvement in CT can be considered as a sign of poor prognosis in COVID-19 patients. The present study revealed that the presence of comorbidity itself is indicative of the poor prognosis. More comprehensive and detailed studies are needed to determine the death effect of drug use. Taking into account the PCR positivity of 57.9%, even in deceased patients, we believe PCR is inadequate in the diagnosis, and CT is much more valuable in this regard.

Authors' Contribution

Study Conception: EA, SA, MÖ, SA, AA; Study Design: EA, SA, MÖ, SA, AA; Supervision: EA, SA, MÖ, SA, AA; Funding: EA, SA, MÖ, SA, AA; Materials: EA, SA, MÖ, SA, AA; Data Collection and/or Processing: EA, SA, MÖ, SA, AA; Statistical Analysis and/or Data Interpretation: EA, SA, MÖ, SA, AA; Literature Review: EA, SA, MÖ, SA, AA; Manuscript Preparation: EA, SA, MÖ, SA, AA and Critical Review: EA, SA, MÖ, SA, AA.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

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