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Comparison of demographic and laboratory data of young and elderly patients who deceased due to COVID-19

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ABSTRACT

Introduction: Differences between young and elderly patients who deceased due to COVID-19 require further elucidation. The present study aimed to compare the differences between young and elderly patients who died from COVID-19.

Material and Method: In this single-center cross-sectional study, patients included who had been diagnosed with COVID-19 and had died in the course of hospital follow-up. The following data were recorded. Demographic characteristics of the patients, date of diagnosis, length of diagnosis to death, the first place of hospitalization, duration of hospitalization at the clinical service and intensive care unit, blood parameters. Patients included in the study were divided into 2 groups, i.e., patients aged <65 and ≥65 years, and the relationship between the study data and these two groups were examined.

Results: We included 369 patients. Prevalence of comorbid chronic diseases was significantly higher in the ≥65 years group (81.3% vs. 90.1%, p = 0.034). Prevalence of hypertension and chronic obstructive pulmonary disease was higher in the ≥65 years group (respectively, 72% vs. 84.4%, p = 0.013; 10.7% vs. 30.6%, p < 0.001). Intergroup comparison of laboratory parameters indicated that alanine aminotransferase and lactate dehydrogenase levels were higher in the <65 years group (respectively, p = 0.004; p = 0.020), whereas the creatinine levels were higher in the ≥65 years group (p < 0.001).

Conclusion: This study captured the comorbidities, laboratory parameters, and duration of hospitalization of young and elderly patients, who died due to COVID-19. In the light of the study data, there was no significant intergroup difference.

Keywords: SARS-CoV-2, elderly, young, comorbidity, hematological test

INTRODUCTION

Since December 2019, there is an outbreak of a novel coronavirus infectious disease (COVID-19) that first emerged in China and spread thereafter to the entire world (1). The virus is a RNA virus and it has become a major public concern after epidemic of Severe Acute Respiratory Syndrome-CoV (SARS-CoV), and was named Severe Acute Respiratory Syndrome-CoV-2 (SARS-CoV-2) (2). Studies showed that SARS-CoV-2 is close to beta-coronaviruses family and like other coronaviruses, the SARS-CoV-2 has a positive-sense single-stranded RNA (3). Common clinical symptoms of the disease include fever, dry cough, fatigue, myalgia, shortness of breath, normal or decreased leukocyte counts, and radiographic pneumonia (4-7). A number of studies showed that age and comorbidities, including hypertension (HT) and chronic heart disease, were risk factors for a higher rate of mortality in patients with COVID-19 (8). A study described the clinical features of young and elderly patients who died due to COVID-19 and suggested that the likelihood of acute heart damage was higher in the middle-aged, and younger patients (9-11). Differences between young and elderly patients who died due to COVID-19, are still not fully known.

The present study aimed to compare the differences between young and elderly patients who died from COVID-19.

MATERIAL AND METHOD

Study Design

The study was carried out with the permission of Karabük University Non-interventional Clinical Researches Ethics Committee (Date: 18.11.2021, Decision No: 2021/719). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. This study was designed as a single-center cross-sectional study.

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Patient Enrollment

Patients, aged >18 years, who had been diagnosed with COVID-19 through the Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) test and had subsequently died in the course of the hospital follow-up, between 01.04.2020 and 13.01.2021 were included in the study. Exclusion criteria were a negative RT-PCR result, pregnancy, and age of <18 years.

Data Collection

Patient data were retrieved from the hospital information system. Data retrieved from electronic medical records were then captured on a standardized form. Patient age, sex, comorbid diseases, diagnosis (RT-PCR positive), length of hospitalization, length of diagnosis to death, admission place, total duration of hospitalization, duration of stay at clinical service, and duration of stay at the intensive care unit (ICU) were recorded. Furthermore, the system-related biochemical parameters, including coagulation parameters, kidney, and liver function tests, and hemogram parameters were recorded. The laboratory parameters that were used in the study were acquired from the tests conducted at the time of the patients' admission to the emergency medicine department.

Patients included in the study were divided into 2 groups according to their age, i.e., <65- and ≥65- year groups. The relationship between the duration of stay, time to death, comorbidities, and laboratory parameters were statistically compared between these two groups.

Statistical Analysis

The study data were analyzed using the IBM Statistical Package for the Social Sciences (SPSS) Version 20.0. The normality hypothesis for the distributions of continuous variables was tested via the Shapiro–Wilk test. Data were presented as mean±standard deviation or median (min-max), as appropriate. Additionally, the intergroup differences were compared using the Student's t or Mann–Whitney U-test, as appropriate. Categorical data were analyzed by Pearson's chi-squared test. Statistical significance was indicated by $p < 0.05$.

RESULTS

Among the 381 patients initially included in the study, 12 were excluded owing to a lack of data. Therefore, the study was performed using data of 369 patients (159 [43.1%] women and 210 [56.9%] men). The patients' mean age at death was 73.62±12.19 years. The demographic characteristics and laboratory parameters of the patients included in the study are summarized in **Table 1**.

Prevalence of comorbid chronic diseases was significantly higher in the ≥65-year group (81.3% vs. 90.1%, $p = 0.034$). Furthermore, the prevalence of hypertension (HT) and chronic obstructive pulmonary disease (COPD) was higher in the ≥65 years group (respectively, 72% vs. 84.4%, $p = 0.013$; 10.7% vs. 30.6%, $p < 0.001$). There was no significant intergroup difference in terms of the total duration of hospitalization and clinical service stay, time from diagnosis to death (respectively, 12 vs. 11 days, $p = 0.269$; 3 vs. 3.5 days, $p = 0.218$; 14 vs 14.5 days $p=0.854$), nevertheless, the duration of ICU stay was longer in the <65-years group (6 vs. 4 days, $p = 0.028$). Intergroup comparison of the laboratory parameters indicated that alanine aminotransferase (ALT) and lactate dehydrogenase (LDH) levels were higher in the <65-years group (respectively, $p = 0.004$; $p = 0.020$). However, the creatinine levels were higher in the ≥65-years group ($p < 0.001$), no significant intergroup difference was noted in the other recorded parameters (ferritin, c-reactive protein (CRP), d-dimer, lower lymphocyte levels, troponin, and other parameters) ($p > 0,05$) (**Table 1**).

DISCUSSION

Data recorded since December 2019 on COVID-19 has paved the way for taking key steps to elucidate the pathophysiological and clinical features of the disease. We believe that the present study contributes to the relevant literature by comparing the demographic and laboratory data of the patients who died due to COVID-19 according to age groups.

Previous studies suggested that COVID-19 was a dangerous disease with high rates of fatality not only in the elderly patients but also in the middle-aged patient group (12-14). Since the very beginning, the researchers focused on identifying the conditions that could be considered as risk factors for mortality. Despite differences reported in the published studies, advanced age, HT, cardiovascular diseases, diabetes mellitus, and COPD were identified as high-risk factors for mortality (15-17). In the present study, the prevalence of comorbidities in all the age groups was 88.3%, while that of COPD was 81.8%. An intergroup comparison indicated the presence of statistical significance in terms of comorbid diseases and especially HT and COPD. Although consistent with the literature, this can be explained by the increase in the rate of comorbidities with advanced ages.

Elevated ferritin, c-reactive protein (CRP), d-dimer, lower lymphocyte levels, and troponin parameters can be utilized for risk stratification in severe and fatal COVID-19 cases (18-20). However, a number of relevant studies compared mild–moderate–severe COVID-19 cases. In the present study, both study groups comprised of patients who died due to COVID-19 in the course of the follow-up. The ALT and LDH levels were statistically significantly higher in patients aged <65 years, whereas the creatinine values were significantly higher in the ≥65

years group. This differentiates the present study from other studies in the literature.

In our study, no difference was noted in terms of the total duration of hospitalization, whereas the length of stay at ICU was higher in the <65-years group. On the contrary, Al-Omari et al. found that younger patients' length of stay in hospital is lesser than elderly patients. But this study was conducted with non-ICU patients and patients were divided into 3 subgroups (18-50, 50-60, bigger than 60 years) (21). This can be explained by the fact that younger patients could more easily achieve the pro-inflammation-anti-inflammation balance and that they were healthier than the elderly patients in biochemical, cytological, and endocrinological terms. Also, we performed our study on all patient groups (ward, ICU). However, the outcome was still mortality.

Our study has limitations. We didn't calculate prognosis scores such as APACHE II, SAPS II in our study due to the lack of patients' data who deceased in the ward. The study does not encompass the period after vaccination, so different results may be obtained in studies to be conducted during this period.

Table 1. Comparison between <65 years old and ≥65 years old patient

Variables	Total n (%) 369	<65 years old n(%) 75 (20.3)	≥65 years old n(%) 294 (79.7)	p value
Male sex, n (%)	210 (56.9)	39 (52)	171 (58.2)	0.336
Chronic diseases, n (%)	326 (88.3)	61 (81.3)	265 (90.1)	0.034
Diabetes mellitus	154 (41.7)	32 (42.7)	122 (41.5)	0.854
Coronary artery disease	14 (3.8)	4 (5.3)	10 (3.4)	0.496
Hypertension	302 (81.8)	54 (72)	248 (84.4)	0.013
COPD	98 (26.6)	8 (10.7)	90 (30.6)	<0.001
Asthma	45 (12.2)	14 (18.7)	31 (10.5)	0.055
Chronic renal failure	65 (17.6)	8 (10.7)	57 (19.4)	0.077
Cerebrovascular disease	23 (6.2)	14 (18.7)	87 (29.6)	0.058
Malignancy	101 (27.4)	6 (8)	17 (5.8)	0.434
Time from diagnosis to hospitalization, median (IQR)	1 (4)	1 (4)	1 (4)	0.923
Admission place, n (%)				
Isolation ward	254 (68.8)	49 (65.3)	205 (69.7)	0.463
Intensive care unit	115 (31.2)	26 (34.7)	89 (30.3)	
Time from diagnosis to death, median (IQR)	14 (13)	14 (14)	14.5 (12)	0.854
Total length of stay in hospital, median (IQR)	11 (11)	12 (13)	11 (11)	0.269
Length of stay in isolation ward	3 (9)	3 (7)	3.5 (10)	0.218
Length of stay in intensive care unit	5 (11)	6 (13)	4 (10)	0.028
Hematological Test				
D-dimer, µg/mL, median (IQR)	1.43 (2.71)	1.34 (1.57)	1.46 (2.88)	0.089
Ferritin, , ng/mL, median (IQR)	488.9 (684.7)	468 (674)	491 (686)	0.264
C-reactive protein, mg/L, median (IQR)	120.1 (142.7)	110 (142)	126 (148)	0.442
ALT, u/L, median (IQR)	25 (25)	31 (29)	24 (22)	0.004
AST, u/L, median (IQR)	39 (37)	46 (45)	38 (35)	0.162
Total Bilirubin, mg/dL, median (IQR)	0.5 (0.4)	0.4 (0.4)	0.5 (0.3)	0.301
İndirekt Bilirubin, mg/dL, median (IQR)	0.3 (0.2)	0.3 (0.27)	0.3 (0.2)	0.787
aPTT, sn, mean±SD	34.97±12.64	32.54±14.63	35.66±12.01	0.696
INR, mean±SD	1.25±0.57	1.2±0.31	1.27±0.62	0.256
WBC, 10^9/L, median (IQR)	9.88 (8.24)	8.75 (8.79)	10.1 (8.01)	0.132
Lymphocyte, 10^9/L, median (IQR)	0.67 (0.52)	0.74 (0.55)	0.66 (0.53)	0.748
Neutrophil, 10^9/L, median (IQR)	8.68 (7.98)	7.67 (8.17)	9.06 (7.88)	0.085
Hemoglobin, g/dL, mean±SD	11.87±2.67	12.1±2.49	11.81±2.72	0.702
Platelet, 10^9/L, mean±SD	231±135	228±112	232±141	0.559
Albumin, g/dL, mean±SD	3.42±0.8	3.53±0.65	3.4±0.83	0.644
LDH, u/L, median (IQR)	456 (286)	500 (362)	444 (236)	0.020
Creatinine, mg/dL, median (IQR)	1.28 (1.08)	0.94 (0.79)	1.35 (1.16)	<0.001
eGFR, median (IQR)	43.78 (43)	49.96 (44)	41.05 (43)	0.157
Troponin, ng/mL, median (IQR)	0.068 (0.207)	0.036 (0.145)	0.076 (0.218)	0.055
CK-MB, u/L, median (IQR)	21.1 (15.76)	19.3 (12.8)	21.58 (15.85)	0.126

CONCLUSION

This study described the comorbidities, laboratory parameters, and duration of hospitalization of young and elderly patients who died due to COVID-19. In the light of the study data, there was no significant intergroup difference. Further research is required on these parameters.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Karabük University Non-interventional Clinical Researches Ethics Committee (Date: 18.11.2021, Decision No: 2021/719).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer reviewed.

Conflict of Interest Statement: The author has no conflicts of interest to declare.

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Author Contributions: The author has participated in the design, execution, and analysis of the paper, and approved the final version.

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