TURKISH JOURNAL of ONCOLOGY

Turk J Oncol 2023;38(1):82–91
doi: 10.5505/tjo.2022.3784

ORIGINAL ARTICLE

Poor Risk Factors Affecting Cancer Patients Infected with Covid-19: A Retrospective Comparative Study from a Pandemic Hospital

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OBJECTIVE

It is known that cancer patients are more prone to infections than the general population. We aimed to describe the risk factors affecting the survival of cancer patients infected with COVID-19 and clinical findings compared with a large COVID-19 patient population without cancer diagnosis.

METHODS

The clinical data of 61 cancer and 558 non-patients with COVID-19 infection who applied to the emergency room were compared retrospectively. Risk factors affecting overall survival in cancer patients were analyzed.

RESULTS

Gender and mean age were comparable in both groups. In the entire cohort, cancer diagnosis was found to be an independent poor prognostic factor (hazard ratio [HR] = 3.09, p<0.001) among other comorbidities. In univariate analysis; lung cancer, activated partial thromboplastin time >32 seconds, INR >1.1, N-terminal-pro-B-type natriuretic peptide (NT-proBNP) >400 pg/ml, C-reactive protein >100 mg/L, and procalcitonin >0.23 ng/mL were determined as prognostic risk factors. Lung cancer (HR=5.277, p=0.012) and NT-proBNP >400 pg/ml (HR=0.139, p=0.021) were determined as independent prognostic risk factors in multivariate analysis.

CONCLUSION

Cancer patients with COVID-19 infection have poor survival outcomes. Lung cancer diagnosis and elevated NT-proBNP levels were identified as the most crucial prognostic risk factors in cancer patients infected with COVID-19.

Keywords: Cancer; COVID-19; SARS-CoV-2.

INTRODUCTION

According to the data of the World Health Organization, the new coronavirus, also known as SARS-CoV-2 or COVID-19, since the beginning of the pandemic process that started at the end of 2019, has infected 236 million people as of October 2021 and resulted in approximately 4.82 million deaths. The most effective pre-

Received: September 06, 2022
Accepted: November 20, 2022
Online: December 01, 2022

Accessible online at:
www.onkder.org

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vention method is social isolation measures along with vaccination, and the treatments applied in cases of infection are generally experimental and empirical based on observational data.[1,2] The most common causes of death are multiorgan failure and acute respiratory distress syndrome.[3] The most commonly affected people are men and the elderly, as well as those with hypertension, cardiovascular disease, diabetes mellitus, chronic obstructive lung disease, and malignancy.[4,5] The most common symptoms in the general population are fever and dry cough.[6,7] In actively treated cancer patients and cancer survivors infected with COVID-19, severe events such as admission to an intensive care unit (ICU), necessity for mechanical ventilation, and death have been shown to be considerably higher compared to patients without a cancer diagnosis.[8]

Several factors known to cause cancer patients to be at higher risk of mortality include the burden of malignant disease, advanced stage, comorbid conditions, and side effects caused by systemic chemotherapy.[9–11] Literature review studies on how cancer patients are affected by COVID-19 have been carried out with limited patient groups in Asia, especially in China.[8,10,11] However, the course of COVID-19 in cancer patients, a unique and fragile group, may differ during the COVID-19 infection due to regional, genetic, and viral mutations. Therefore, more data are needed on how COVID-19 affects cancer patients whose treatment and follow-up should continue uninterrupted. For this purpose, we found it appropriate to share the clinical processes of our patients diagnosed with COVID-19 infected solid cancer and non-cancer diagnosis in our center.

MATERIALS AND METHODS

From March to June 2020, cancer and non-cancer patient infected with COVID-19 who applied to the emergency service of Istanbul University, Istanbul Faculty of Medicine - a tertiary care center that serves as a pandemic hospital - were evaluated. Hematological malignancy was not included in this study because it was considered to be a separate entity. COVID-19 infection was confirmed using reverse transcription polymerase reaction methods as previously suggested.[12,13] Demographic information, including the age and gender of the patients, was recorded. Smoking history, travel history, and contact history were collected. Fever, cough, sputum, dyspnea, nausea, vomiting, diarrhea, fatigue or myalgia, and anosmia symptoms were recorded. The recorded comorbidities of the patients included hypertension, diabetes mellitus, coronary artery disease, and chronic obstructive pulmonary disease (COPD). Thoracic computed tomography findings ranging from mild to diffuse involvement at the time of admission were categorized by a radiology specialist. In addition, complete blood count and biochemical findings at admission were recorded. The date of pathological diagnosis was taken into account as the onset of cancer. From the medical records of the patients, information about their diagnosis of cancer was obtained. The time since the patient's first symptom, length of hospital and ICU stay, and duration of treatments for COVID-19 were recorded retrospectively. This study was approved by the Ethics Committee of Istanbul University, Istanbul Faculty of Medicine (File no: 2020/643).

Statistical Analysis

IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. was used for statistical analysis. For descriptive statistics, numbers and percentages are given for categorical variables. Mean, standard deviation, and minimum and maximum values are given for numerical variables. Proportions in independent groups were analyzed using the Chi-square test. Comparisons of numerical variables in two separate groups were made by the Mann-Whitney U test since the condition of normal distribution was not met. International standardized values were used for international normalized ratio (INR; upper limit of normal: 1.1). For N-terminal-pro-B-type natriuretic peptide (NT-proBNP), 400 pg/ml value, which is frequently used in clinical studies, was considered as a cutoff point.[14] The median values were accepted as cutoff points for the other laboratory parameters. Overall survival (OS) was primarily targeted in the survival analysis. It was considered to be the time interval from the date of admission to the emergency room to the date of death. Survival rates were calculated using the Kaplan-Meier analysis. Univariate and multivariate Cox regression analysis was performed to determine the risk factors affecting OS. The statistical significance level of alpha was accepted as $p<0.05$.

RESULTS

Demographic Features and Symptoms

A total of 619 patients diagnosed with COVID-19 were included in the study. Of these, 61 were cancer patients, and 558 were non-cancer patients. Gender, mean age, travel and smoking histories, rates of hypertension, diabetes mellitus, coronary artery disease, COPD, and asthma were almost evenly distributed be-

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Table 1 Comparison of cancer and non-cancer patients' demographic and clinical features related to COVID-19

	Cancer patients n=61		Non cancer patients n=558		p
	n	%	n	%	
Gender					
Male	34	55.7	332	59.5	0.572
Female	27	44.3	226	40.5	
Age*	58±12	23–84	57±16	18–98	0.413**
Travel history	0	0	6	1.1	0.420
Smoking	8	13.6	65	11.6	0.666
Hypertension	19	31.7	229	41.0	0.159
Diabetes mellitus	11	18.3	127	22.8	0.435
COPD or asthma	6	10.0	80	14.3	0.356
Coronary artery disease	6	10.0	65	11.6	0.704
COVID-19 symptoms					
Fever reported	30	50.8	391	70.1	**0.003**
Coughing	35	57.3	455	81.5	**<0.001**
Sputum	5	8.5	13	2.3	**0.008**
Fatigue or myalgia	40	67.8	481	86.2	**<0.001**
Dyspnea	30	50.8	242	43.4	0.271
Nausea	12	21.1	88	16.5	0.389
Diarrhea	4	7.0	68	12.8	0.207
Anosmia	2	3.9	0	0	1

*: Mean±standard deviation is given instead of "n"; minimum and maximum are given instead of "%"; **: Analyzed by student's t-test. Bold font represents p<0.05. COPD: Chronic obstructive pulmonary disease

tween the two groups, and no significant differences were determined (p>0.05). Among the symptoms associated with COVID-19, sputum (p=0.008) was found to be significantly higher in cancer patients; fatigue-myalgia (p<0.001), dry cough (p<0.001), and high fever (p=0.003) were found to be significantly higher in the non-cancer patients. Details of the patients' demographic and clinical features related to COVID-19 are shown in Table 1.

Laboratory and Radiologic Findings

In cancer patients, neutrophil (p=0.031), eosinophil (p=0.005), blood urea nitrogen (p=0.026), aspartic transaminase (p<0.001), gamma-glutamyl transferase (p<0.001), alkaline phosphatase (p<0.001), C-reactive protein (CRP; p<0.001), procalcitonin (PCT; p<0.001), ferritin (p=0.009), NT-proBNP (p=0.008), fibrinogen (p=0.003), INR (p<0.001), and activated partial thromboplastin time (aPTT; p<0.001) values were significantly higher than non-cancer patients. On the contrary, in non-cancer patients, hemoglobin (p<0.001) and lymphocytes (p=0.002), sodium (p=0.001), LDH (p=0.046), total protein (p=0.012), and albumin (p<0.001) values were found significantly increased. Pulmonary involvement associated with COVID-19 was compared in three categories as "mild, moderate and diffuse." There was no significant difference between two groups (p=0.579). Details of the patients' laboratory and radiologic findings are shown in Table 2.

COVID-19 Treatment

The proportion of hydroxychloroquine, tocilizumab, favipiravir, and anakinra use in the treatment of COVID-19 were similar in both groups (p>0.05). Mean hospitalization days (±SD) were 24.8 (±14) and 5.3 (±19.9) in the cancer and non-cancer group, respectively. Mean days in ICU (±SD) were 24.8 (±14) in the cancer group and 25.3 (±19.9) days in the non-cancer group. There was no significant difference between the two groups regarding hospitalization and ICU duration (p>0.05). Details of the patients' treatments related to COVID-19 are shown in Table 3.

Oncologic Features

The three most common diagnoses among cancer patients were colon cancer (13; 21.3%), lung cancer (10;

Table 2 Laboratory values of the patients at admission

	Cancer patients		Non cancer patients		p
	Median±SD	Min-max	Median±SD	Min-max	
Arterial blood gas					
PH	7.4±0.08	7.1–7.5	7.41±0.07	7–7.6	0.790
pO_2 (mm/Hg)	68±16	41–91	61±16	36–132	0.460
PCO_2 (mm/Hg)	39±8.8	23–66	40±8.5	21–67	0.395
HCO_3 (mEq/L)	24±3.4	15–30	25±3.4	10–33	0.125
Lactate (mmol/L)	1.6±0.8	0.7–4	1.5±1.5	0.5–17	0.478
Complete blood count					
Hemoglobin (g/dl)	10.8±2.3	6.3–16.6	13.2±2	4.2–17.7	**<0.001**
Platelets (10^9/L)	253000±130991	42500–518000	210500±91853	20900–638000	0.101
Leukocyte (10^9/L)	8490±5116	280–23690	6220±5125	800–97110	0.051
Neutrophil (10^9/L)	6245±4607	20–19620	4435±3293	70–27490	**0.031**
Lymphocyte (10^9/L)	860±571	0–2600	1120±3439	170–81150	**0.002**
Monocytes (10^9/L)	600±1775	40–12770	500±364	0–6520	0.084
Eosinophils (10^9/L)	10±216	0–1180	0±69	0–500	**0.005**
Biochemistry					
BUN (mg/dl)	18±19.51	6–86	14±13.68	3–185	**0.026**
Kreatinin (mg/dl)	0.8±0.6	0.4–3	0.9±1.1	0.3–18	0.259
Na (MeQ/L)	135±4	127–147	138±5	109–172	**0.001**
Cl (MeQ/L)	98±4	89–107	98±5	75–131	0.376
K (MeQ/L)	4.2±0.7	2.9–6.4	4.3±0.5	2.5–8.6	0.278
Glucose (mg/dl)	114.5±40	85–258	115±58.2	63–633	0.988
AST (IU/L)	37.3±7.7	7–62	27±31.9	9–421	**<0.001**
ALT (IU/L)	22±17	3–94	23±43.9	5–610	0.98
GGT (IU/L)	39±272	5–1825	28±49	5–606	**<0.001**
ALP (IU/L)	101±248	34–1653	68±52	19–764	**<0.001**
LDH (U/L)	221±113	105–682	255±131	130–1664	**0.046**
Total protein (g/dl)	7±0.8	5–8.3	7.2±0.7	3.6–8.7	**0.012**
Albumin (g/dl)	3.6±0.7	2–4.8	4±0.5	1.2–5.1	**<0.001**
CRP (mg/L)	100±105.7	1–363	46±70.9	1–460	**<0.001**
Procalcitonin (ug/L)	0.23±1.5	0.02–7.8	0.08±3.68	0.02–57	**<0.001**
Ferritin (µg)	616±1112	15–5193	315±894	6–8516	**0.009**
D-dimer (ng/ml)	2055±1352	990–4000	780±2303	210–20000	0.13
NT-proBNP (pg/mL)	278±2180.5	5–11393	101.5±3765.5	5–35000	**0.008**
Fibrinojen (mg/dL)	608±176	278–1090	529±140	34–1085	**0.003**
INR	1.1±0.2	0.8–2.1	1±0.2	0.8–3.8	**<0.001**
APTT (sec)	32±7	25–62	29±5	13–65	**<0.001**

Bold font represents p<0.05. PH: Power of hydrogen; pO_2: Partial pressure of oxygen; PCO_2: Partial carbon dioxide pressure; HCO_3: Bicarbonate; BUN: Blood urea nitrogen; Na: Sodium; Cl: Confidence interval; K: Potassium; AST: Aspartic transaminase; ALT: Alanine aminotransferase; GGT: Gamma-glutamyl transferase; ALP: Alkaline phosphatase; LDH: Lactate dehydrogenase; CRP: C-reactive protein; NT-proBNP: N-terminal-pro-B-type natriuretic peptide; INR: International normalized ratio; APTT: Activated partial thromboplastin time; SD: Standard deviation; Min: Minimum; Max: Maximum

16.3%), and breast cancer (5; 8.1%). The cancer diagnoses of all patients are listed in Table 4.

Risk Factors and Survival

To determine independent predictors of mortality associated with COVID-19 infection in the entire cohort, multivariate analysis was performed on comorbid diseases, including cancer diagnosis, diabetes mellitus, COPD, coronary artery disease, and hypertension. Cancer diagnosis was found to be an independent poor prognostic comorbid condition (hazard ratio [HR]=3.09, 95% confidence interval [CI] 1.70–5.62, p<0.001). The mean OS of cancer and non-cancer patients was 31.7 weeks and 34.9 weeks, respectively (p<0.001). One-month survival rates for cancer and non-cancer patients were 80.3% and 93.2%, respectively (Fig. 1).

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Table 3 Radiologic findings and COVID-19 treatment

	Cancer patients n=61		Non cancer patients n=558		p
	n	%	n	%	
The type of pulmonary parenchyma consolidation					
Mild	29	55.8	281	51	0.579
Moderate	17	32.7	176	31.9	
Diffuse	6	11.5	94	17.1	
COVID-19 treatments					
Hydroxychloroquine	61	100.0	558	100.0	1
Tocilizumab	6	10.7	89	15.9	0.302
Favipiravir	21	37.5	202	36.2	0.847
Anakinra	3	5.5	46	8.2	0.467
ICU	9	15.3	76	13.6	0.729
Days spending ICU*	24.8±14.0	3–48	25.3±19.9	1–70	0.724
Days hospitalized*	10.80±8.3	2–47	10.65±8.1	1–60	0.832

*: Mean±standard deviation is given instead of “n”, minimum and maximum are given instead of “%”. Bold font represents p<0.05. ICU: Intensive care unit

In the univariate analysis of cancer patients, males had a higher mortality risk compared to female patients. Fever, cough, sputum, and fatigue-myalgia symptoms did not affect survival. Patients with low aPTT levels had a better prognosis than those with higher ones (HR=0.19, 95% CI 0.05–0.73, p=0.001). It was determined that a low INR value was related to lower mortality risk (HR=0.349, 95% CI 0.117–1.042, p=0.059). In addition that low NT-proBNP value was associated with a better OS (HR=0.153, 95% CI 0.034–0.690, p=0.015). Patients with higher CRP values had a higher risk of death (HR=4.265, 95% CI 1I172–15.522, p=0.028). Lower PCT levels were significantly correlated with better OS (HR=0.273, 95% CI 0.074–1.011, p=0.052).

In multivariate analysis, lung cancer (HR=5.277, 95% CI 1.45–19.18, p=0.012) was determined as an independent prognostic risk factor associated with poor survival (Fig. 2). Nonetheless, a low NT-proBNP value (HR=0.139, 95% CI 0.02–0.74, p=0.021) was found to be an independent prognostic factor associated with favorable survival (Fig. 3). Details of univariate and multivariate analyses are shown in Table 5.

DISCUSSION

In our center, which also serves as a pandemic hospital, detailed information was collected on the epidemiological and clinical characteristics of 61 cancer and 558 non-cancer patients who were confirmed to be infected with COVID-19 between March 2020 and July 2020.

Table 4 The diagnoses of all cancer patients

Cancer diagnosis	n	%
Colon cancer	13	21.3
Lung cancer	10	16.3
Breast cancer	5	8.1
Larynx cancer	3	4.9
Renal cell carcinoma	3	4.9
Ovary cancer	3	4.9
Esophageal cancer	3	4.9
Pancreas cancer	3	4.9
Bladder cancer	2	3.2
Testicular cancer	2	3.2
Endometrium cancer	2	3.2
Gastrointestinal stromal tumors	1	1.6
Gestational trophoblastic tumor	1	1.6
Insulinoma	1	1.6
Cholangiocarcinoma	1	1.6
Malign melanoma	1	1.6
Stomach cancer	1	1.6
Nasopharyngeal cancer	1	1.6
Pleural mesothelioma	1	1.6
Cancer primary unknown origin	1	1.6
Sarcoma	1	1.6
Cervical cancer	1	1.6
Thyroid cancer	1	1.6
Total	61	100

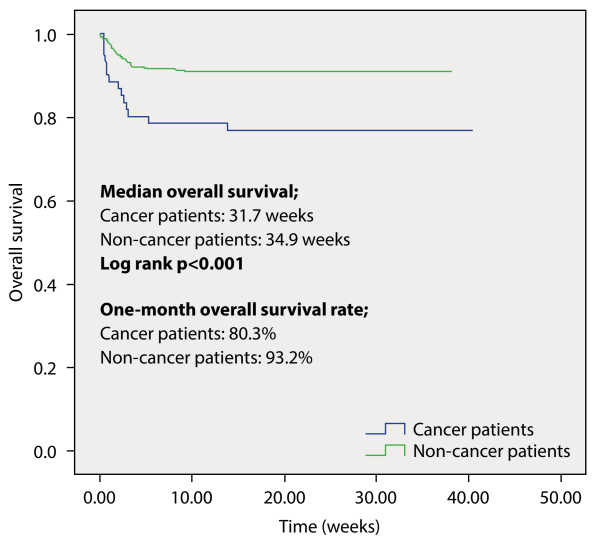

Fig. 1. Survival analysis in cancer and non-cancer patients.

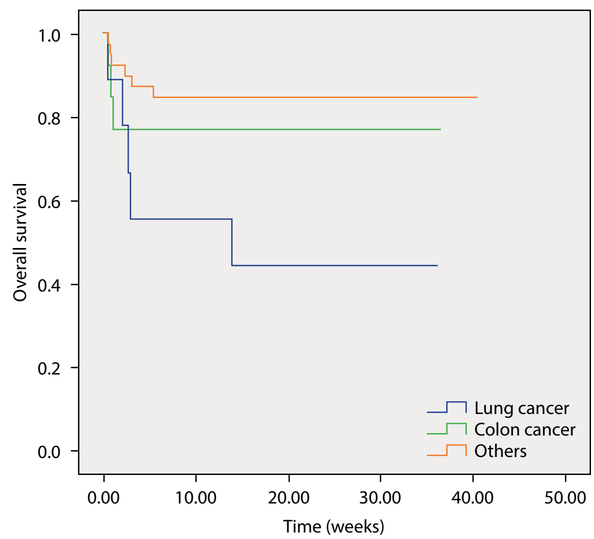

Fig. 2. Survival of patients with lung cancer decreases rapidly from the time of admission to the emergency room compared to colon cancer and other cancers.

The rate for male gender in cancer and non-cancer patients in our cohort was 55.7% and 59.5%, respectively. At that time interval (From March to June 2020), 52% of patients were male, and 48% were female infected with COVİD-19 in Türkiye.[15] In our study, the survival of males was found to be significantly lower compared to females in cancer patients. (Mean OS: 25.8 weeks vs. 35.5s weeks, respectively; p<0.001).[16] Although gender distribution seems to have similar proportions, it has been shown in large-scale case series that both the incidence of the disease and the disease-related mortality are higher in men.[17–19] In conclusion, the male gender appears to be a risk factor for mortality in cancer patients infected with COVID-19, similar to the general population.

Distinct clinical findings between the two groups were sputum, fatigue or myalgia, dry cough, and high fever. Sputum production was higher in cancer patients (8.5%) compared to non-cancer patients (2.3%) (p=0.008). It may be related to the susceptibility of patients with primary lung cancer to chronic upper and lower respiratory tract infections. In a meta-analysis study by Li et al.,[20] the most common symptoms of admission to the hospital in 1995 patients with COVID-19 infection were fever (88.5%), cough (68.6%), and myalgia (35.8%), respectively. In our study, fever and dry cough were observed approximately 50% more frequently in the control group. In a study by Van Lancker et al.,[21] the symptoms were compared between older cancer and non-cancer patients. Cough was found to be lower in the cancer group. In another study comparing cancer and non-cancer patients

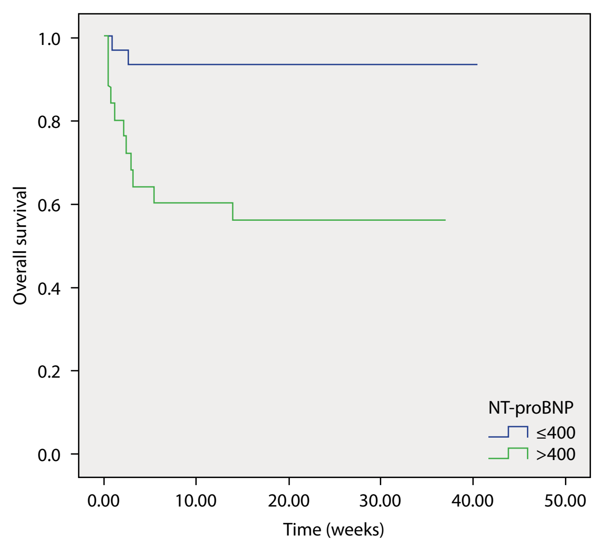

Fig. 3. Survival curve significantly decreases in the group with high NT-proBNP levels in the 1st weeks.
NT-proBNP: N-terminal-pro-B-type natriuretic peptide.

with COVID-19 infection, the percentage of fever was found to be higher in non-cancer patients.[22] Thus, the reason for a lower rate of fever and dry cough in cancer patients, considering the data in the literature, may be related to an inadequate systemic response to the infection. In a meta-analysis evaluating several clinical studies, fatigue or myalgia was found to be the third most common symptom (51.1%) in COVID-19 patients.[23] However, in this study, we found that the

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Table 5 Risks features in determining death, univariate, and multivariate cox regression analysis

	p	OR	95.0% CI
Univariate cox regression analysis			
Lung cancer	**0.004**	5.86	1.78–19.2
APTT	**0.016**	0.19	0.05–0.73
INR	**0.059**	0.34	0.11–1.04
NT-proBNP	**0.015**	0.15	0.03–0.69
CRP	**0.028**	4.26	1.17–15.52
Procalcitonin	**0.052**	0.27	0.07–1.01
Multivariate cox regression analysis			
Cancer diagnosis (Ref: Others)	**0.038**		
Lung cancer	**0.012**	5.27	1.45–19.18
NT-pro BNP	**0.021**	0.13	0.02–0.74

Bold font represents p<0.05. OR: Odds ratio; CI: Confidence interval; APTT: Activated partial thromboplastin time; INR: International normalized ratio; NT-proBNP: N-terminal-pro-B-type natriuretic peptide; CRP: C-reactive protein

most common symptoms of cancer and non-cancer patients with COVID-19 infection were fatigue or myalgia (67.8% and 86.2%, respectively). It should be kept in mind that an increase in fatigue or myalgia for patients diagnosed with cancer in terms of pre-diagnosis of COVID-19.

The most common types of cancer in our cohort were lung and colon cancer (37.6% for both). In a study conducted by Zhang et al.,[10] in which 27 cancer patients were evaluated in three different centers, it was observed that the median age was 65, and the most common type of cancer was lung cancer at 25%. In another multicenter study in China, in which 105 cancer patients with COVID-19 infections were evaluated, the most common cancers were found to be lung and gastrointestinal (20.9% and 12.4%, respectively). In the same study, the risk of death was significantly increased in patients with primary lung cancer.[11] It has been shown that COVID-19 is colonized in serum, urine, and stool samples outside the respiratory tract.[24] However, since the primarily affected organs are the lungs,[3] mortality can be expected to be high in lung cancer patients. Nevertheless, lung cancer was found to be an independent prognostic risk factor in the multivariate analysis. The worse survival rate of lung cancer patients compared to non-cancer patients was demonstrated in the Kaplan-Maier survival analysis (Fig. 2). Therefore, it should be remembered that lung cancer patients are more vulnerable among cancer patients, and strict isolation measures should be encouraged to prevent COVID-19. Different cancer diagnoses and the variety of treatment rates may be other factors that cause variation within the study results.[10,11] A comparison of three studies, including the present study, is given in Appendix 1.

Among the laboratory data that differed between the two groups, high CRP and PCT levels were associated with poor survival. On the other hand, low levels of INR, aPTT, and NT-proBNP were found to be positive prognostic indicators.

In our study, PCT and CRP levels were found to be significantly higher in the cancer patients compared to the control group. In addition, in univariate analysis, we found that high PCT and CRP levels were associated with poor survival in cancer patients. In a study comparing 92 solid cancer and 327 non-cancer patients; CRP (mg/L-median [IQR]: 37.6 vs. 10.8; p<0.001) and PCT (mg/L-median [IQR]: 0.09 vs. 0.05; p<0.001) levels were found to be significantly higher in the cancer patients group, which is correlated with our results.[16]

INR is the most rapidly affected laboratory marker among synthetic liver function tests. Jin et al.[25] investigated a possible correlation between the effect of blood coagulation levels and the severity of COVID-19 infection in 147 infected patients. It was shown that high INR and aPTT levels were correlated with both disease severity and increased mortality. In another study carried out in Wuhan, demographic features, comorbidities, and laboratory findings of 2665 patients infected with COVID-19 were evaluated to analyze the risk factors affecting survival. It was found that cancer diagnosis was an independent risk factor and associated with poor survival outcomes. And in addition, aPTT and INR levels were higher in cancer patients than in the non-cancer control group.[16]

In multivariate analysis, we found that a higher NT-proBNP level detected in cancer patients is an independent risk factor for mortality. Similarly, in a study conducted by Gao et al.,[26] in which 54 patients with confirmed COVID-19 infection were included, the relationship between NT-proBNP level and mortality was analyzed. Patients with higher NT-proBNP levels were found to be had a higher risk of mortality. In another study including 1244 COVID-19 patients, 104 cancer patients whose demographic characteristics (mean age 57 and 53% male) were similar to ours were evaluated. Compared to non-cancer patients, it was shown that cancer patients had higher NT-proBNP levels (64 pg/mL vs. 645 pg/mL; p<0.001) and had a higher risk of death (HR=1.00; p=0.022).[27]

CONCLUSION

This study evaluated the factors affecting the OS of cancer patients diagnosed with COVID-19 in our pandemic hospital. Our findings demonstrated that lung cancer diagnosis and high NT-proBNP levels are independent prognostic factors among a number of risk factors for cancer patients. Since there were many cancer diagnoses and treatment differences in our study, and a small patient group, it is difficult to generalize the results we obtained.[28] COVID-19 infection continues to spread rapidly. To reach more specific results, multicenter studies with larger numbers of patients are needed. We hope that our findings will encourage new research and help guide clinicians.

Peer-review: Externally peer-reviewed.

Conflict of Interest: All authors declared no conflict of interest.

Ethics Committee Approval: The study was approved by the Istanbul University, Istanbul Faculty of Medicine Ethics Committee (no: 2020/643, date: 22/05/2020).

Financial Support: None declared.

Authorship contributions: Concept – F.F., N.P., N.A.; Design – F.F., N.P., N.A., A.M., E.A., S.V.; Supervision – N.Ş., T.K., E.A., S.V.; Funding – F.F., N.P., T.K., N.Ş.; Materials – F.F., N.A., E.A., T.K.; Data collection and/or processing – F.F., A.M., N.Ş., E.A., S.V. Data analysis and/or interpretation – A.M., T.K., E.A., S.V.; Literature search – F.F., N.P., E.A.; Writing – F.F., N.P., N.A., A.M., N.Ş., T.K., E.A., S.V.; Critical review – T.K., F.F., S.V.

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Appendix 1 Comparison of the studies (discussion)

	Ferhatoglu et al. (n=61)		Zhang et al. (n=28)[10]		Dai et al. (n=105)[11]	
	n	%	n	%	n	%
Gender						
Male	34	55.7	17	60.7	57	54.72
Female	27	44.3	11	39.3	48	45.28
Age (mean)	58		65		64	
Smoking	8	13.6	N/A	N/A	36	34.28
Comorbidities						
Hypertension	19	31.7	4	14.3	30	28.5
Diabetes mellitus	11	18.3	4	14.3	7	6.67
COPD or asthma	6	10	1	3.6	N/A	N/A
Coronary artery disease	6	10	3	10.7	12	11.4
COVID-19 symptoms						
Fatigue or myalgia	40	67.8	N/A	N/A	30+6	34.2
Fever	30	50.8	23	82.1	68	64.76 (p=0.04)
Cough	35	57.3	22	78.6	57	52.29
Sputum	5	8.5	N/A	N/A	16	15.24
Dyspnea	30	50.8	14	50	15	14.29
Nausea	12	21.1	N/A	N/A	6	5.71
Diarrhea	4	7	3	10.7	N/A	N/A
Oncological features						
Lung cancer	10	16.3	7	25	22	20.95
Metastatic disease	27	44.2	10	35.7	N/A	N/A
Anti-cancer therapy	11	18 (≤ 7 days)	5	83.3 (≤14 days)	17	16.19 (≤40 days)*
COVID-19 treatments						
Antibiotic	20	32.7	23	82.1	81	77.1
Antiviral	17	27.8	20	71.4	75	71.4
Hospitalization time (mean)	10.8		19.0		N/A	

*: Only chemotherapy regiments are given for this group. COPD: Chronic obstructive pulmonary disease; N/A: Not applicable