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Comparing the Clinical, Radiological and Laboratory Characteristics of Confirmed or Suspected COVID-19 Cases

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ABSTRACT

Objective: The present study aims to compare the clinical and laboratory characteristics of patients diagnosed with coronavirus disease (COVID-19) using Real-Time Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) and Computed Tomography (CT).

Materials and Methods: In this study, 240 adult patients were included. The demographic data, symptoms, COVID-19 findings in the initial pulmonary CT during admission and the first laboratory parameters were recorded. The patients were divided into three groups as Group 1 consisting of 100 PCR (+) CT (+) patients, Group 2 consisting of 40 PCR (+) CT (-) patients, Group 3 consisting of 100 PCR (-) CT (+) patients.

Results: The mean symptom duration was 5.78 days in Group 1, 2.67 days in Group 2, and 5.26 days in Group 3 ($p<0.05$). The mean symptom duration was 5.52 days in CT (+) patients and 2.67 days in CT (-) patients ($p<0.05$). The findings showed that one unit increase in pathological lobe count decreased PCR positivity by 1.3 times ($p=0.002$).

Conclusion: There may not be any findings in CT in the first 48-72 hours after the onset of the symptoms in symptomatic patients, and as the number of pathological pulmonary lobes detected in CT increases, PCR positivity decreases.

Keywords: COVID-19, polymerase chain reaction, computerized tomography, neutrophil/lymphocyte ratio, cough

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INTRODUCTION

Several viral pneumonia cases with many unknown causes were detected in December 2019 in Wuhan, China, and associated with a local live animal market (1). The novel Coronavirus (SARS-CoV2) detected in Rhinolophus bats was shown for the etiology of these viral pneumonia cases (2). The virus spread from Wuhan to 33 countries in only two months; the coronavirus disease that was caused by the SARS-CoV2 virus was called "COVID-19," and was declared a pandemic by the World Health Organization on March 11, 2020. The outbreak caused fears of being infected and caused economic recessions (3).

In Turkey, as in the whole world, the definitive diagnosis of the disease is made with Real-Time Reverse Polymerase Chain Reaction (RT-PCR) examination. However, the sensitivity of the examination varies between 30% and 60% depending on the difficulty in collecting, storing and transporting the samples that are taken from patients for RT-PCR examination and on the part of the body samples are taken from (4). However, it is interesting that nearly 75% of the subjects with positive PCR results may remain asymptomatic (5). Computerized Tomography (CT) has gained importance in detecting COVID-19 cases because of the low sensitivity of RT-PCR. COVID-19 causes a typical appearance in pulmonary tomography in almost all patients. The most common causes of tomography findings in the pulmonary CT are ground glass image with peripheral involvement, multifocal patch consolidations, and interstitial changes usually detected in the peripheral areas of the lungs (6). In clinical practice, these tomography findings can be detected in patients who have negative results in RT-PCR. It was also concluded in several small-scale studies that CT prevented that possible COVID-19 cases were overlooked in RT-PCR negative patients due to the low sensitivity of RT-PCR (7, 8).

There are some laboratory parameters that are often used as prognostic values, although not in the diagnosis of COVID-19. Among these, there are Neutrophil/Lymphocyte Ratio (NLR), fibrinogen, d-dimer, cardiac troponin and C-Reactive Protein (CRP), which can be seen as increased in COVID-19 infection, and Procalcitonin (PCT) is low or normal (9–15).

In this retrospectively planned study of ours, the purpose was to compare COVID-19 patients diagnosed with RT-PCR and CT concerning demographic and clinical characteristics and laboratory findings, and also to determine at what stage the RT-PCR and CT identify COVID-19 cases clinically, radiologically and with laboratory data. Because the RT-PCR test may not be a gold standard for the diagnosis of COVID-19, we wanted to search for a better or help-

er diagnostic tool instead or in addition to RT-PCR. The purpose of comparing is to assess the accuracy between RT-PCR and CT.

MATERIALS and METHODS

This retrospective study was conducted in Sivas Numune Hospital after the approval of the Cumhuriyet University Ethics Committee with the decision number 2020-05/22. This study included patients who were admitted to our hospital between the dates 02/04/2020 and 02/06/2020, who were between the ages of 18 and 96, diagnosed with COVID-19 with RT-PCR test and pulmonary CT and who were treated due to COVID-19. In this study, 240 patients were included. The patients provided a written consent. Our study consisted of the patients that received the same medical treatment for COVID-19. In the COVID-19 treatment of the patients with mild progression, 2x400 mg loading dose and 2x200 mg maintenance dose (5 days) of hydroxychloroquine were administered; and severe pneumonia cases or those whose clinical symptoms deteriorated during the hydroxychloroquine treatment were administered favipiravir 2x1600 mg loading dose and 2x600 mg maintenance dose (5 days). Patients with severe pneumonia and patients that were clinically worsening during the COVID-19 medication were tested for other respiratory infections. Patients whose samplings were made from only oropharynx and nasopharynx for PCR testing were included in this study. The patients receiving oseltamivir or another antiviral therapy other than COVID-19, patients with PCR samplings other than oropharynx and nasopharynx were excluded from this study.

The cases were defined as "suspected" or "confirmed" according to the WHO's interim guidance for COVID-19 (16).

The demographic data, clinical characteristics, laboratory and radiological findings of patients who were included in this study were obtained from the Patient Information System of the hospital or by a telephone conversation with the patients. The age, gender, comorbidity, symptoms in anamnesis received during the admission and how many days the symptoms continued, whether there was cough complaints, the day of admission to hospital, whether there was need for intensive care, discharge or death status when treatment was completed, presence of COVID-19 findings in the initial pulmonary CT in admission, and if any, the lobes of COVID-19 findings in the pulmonary CT of all patients were recorded. Also, the Neutrophil/Lymphocyte Ratio, d-dimer, troponin, C-Reactive Protein and procalcitonin values were detected in the initial blood samples of these patients during the first admission to the hospital were recorded. Then, the patients were divided into three groups, and the data were analyzed. There were patients with RT-PCR (+) and COVID-19 findings (+) in CT in Group 1; patients with RT-PCR (+) and COVID-19 findings (-) in CT were in Group 2, and patients with RT-PCR (-) and COVID-19 (+) in CT in Group 3. Group 3 was evaluated as patients suspected of COVID-19, and Group 1 and Group 2 were evaluated as the cases with a confirmed diagnosis of COVID-19. The COVID-19 findings at CT were decided according to the radiology expert report of the hospital. Group 1 (PCR +, CT +) consisted of 100 patients, Group 2 (PCR +, CT -) 40 patients, and Group 3 (PCR -, CT+) 100 patients. Group 3 was the case group with suspected COVID-19. Group 1 and Group 2 were the control groups with confirmed COVID-19 diagnosis.

Statistical Method

The statistical analyses were conducted with the help of the Statistical Package for the Social Sciences (SPSS) version 25.0 Program. The suitability of the variables to normal distribution was tested with the histogram charts and Kolmogorov-Smirnov Test. If the p-value <0.05 as a result of the Kolmogorov-Smirnov test, it means the data distribution is not normal. The mean, standard deviation, and median values were used when performing descriptive analyses. Categorical variables were compared with the Pearson Chi-Square Test. The Mann-Whitney U-Test was used when evaluating the variables that did not show normal distribution (nonparametric) between two groups, and the Kruskal-Wallis Test was used in comparisons among more than two groups. Spearman Correlation Test was made use of in the analysis of measurement data with each other. The cut-off values were determined for NLR in diagnosis with ROC analysis. Situations in which the P-value was below 0.05 were evaluated to be statistically significant.

RESULTS

P-value was under 0.05 as a result of the Kolmogorov-Smirnov test. Hence, the data distribution was not normal because the number of patients for each group was not equal. In this study, 139 patients were male (57.92%), and 101 were female (42.08%). The mean age of the participants of this study was 52.48±19.41 years (min: 18, max: 96). The mean age was 54.40±15.99 years in Group 1, 39.60±15.40 years in Group 2, and 55.72±21.90 years in Group 3 ($p<0.05$). A total of 42 patients needed intensive care and 15 patients died. When evaluated according to the groups, 19 patients needed intensive care in Group 1 and 23 patients in Group 3. Eight of the 15 cases who died were in Group 1, and Group 3 had seven dead cases.

A total of 72 patients (30%) had hypertension, and 52 (21.67%) had diabetes mellitus. The most common symptom during the admission was cough and fatigue, 140 patients had a cough, and 105 patients had fatigue. The distribution of the data regarding other comorbidities and symptoms according to groups is shown in Table 1.

The mean symptom duration was 5.78 days in Group 1, 2.67 days in Group 2, and 5.26 days in Group 3 ($p<0.05$). The mean cough duration was 5.54 days in Group 1, 2.81 days in Group 2, and 5.58 days in Group 3 ($p<0.05$). The mean hospitalization duration was 11.44 days in Group 1, 7.15 days in Group 2, and 7.67 days in Group 3 ($p<0.05$). The mean number of pathological lobes compatible with COVID-19 in the pulmonary CT was 3.38 in Group 1, and 3.11 in Group 3 ($p<0.05$). The mean NLR value was 3.67 in Group 1, 2.47 in Group 2, and 7.39 in Group 3 ($p<0.05$). The mean CRP value was 5.44 mg/dL in Group 1, 1.08 mg/dL in Group 2, and 6.66 mg/dL in Group 3 ($p<0.05$) (Table 2).

The Spearman Correlation Analysis was used in intra-group correlation analysis of laboratory parameters. In this respect, a significant correlation was detected between CRP, d-dimer, troponin and PCT; between CRP and d-dimer; between troponin and PCT; and between d-dimer, troponin and PCT in Group 1 ($p<0.05$). There was a significant correlation between CRP, d-dimer and troponin, between CRP, d-dimer and troponin, and

Table 1. Gender, intensive care need, comorbidities and symptoms

	PCR (+) CT (+)		PCR (+) CT (-)		PCR (-) CT (+)		Total		p
	N	%	n	%	n	%	n	%	
Male	51	(51.00)	24	(60.00)	64	(64.00)	139	(57.92)	0.169
Female	49	(49.00)	16	(40.00)	36	(36.00)	101	(42.08)	
Diabetes mellitus	25	(25.00)	4	(10.00)	23	(23.00)	52	(21.67)	0.138
Hypertension	30	(30.00)	6	(15.00)	36	(36.00)	72	(30.00)	**0.050***
Coronary artery disease	2	(2.00)	0	(0.00)	8	(8.00)	10	(4.17)	**0.037***
Chronic obstructive pulmonary disease	4	(4.00)	0	(0.00)	11	(11.00)	15	(6.25)	**0.025***
Asthma	4	(4.00)	0	(0.00)	5	(5.00)	9	(3.75)	0.366
Hypothyroidism	5	(5.00)	0	(0.00)	2	(2.00)	7	(2.92)	0.220
Alzheimer	0	(0.00)	0	(0.00)	3	(3.00)	3	(1.25)	0.119
Epilepsy	1	(1.00)	0	(0.00)	1	(1.00)	2	(0.83)	0.817
Dementia	1	(1.00)	0	(0.00)	0	(0.00)	1	(0.42)	0.495
Familial Mediterranean fever	1	(1.00)	0	(0.00)	0	(0.00)	1	(0.42)	0.495
Asymptomatic	9	(9.00)	13	(32.50)	10	(10.00)	32	(13.33)	**<0.001***
Headache	10	(10.00)	1	(2.50)	8	(8.00)	19	(7.92)	0.332
Fatigue	50	(50.00)	17	(42.50)	38	(38.00)	105	(43.75)	0.228
Fever	34	(34.00)	7	(17.50)	32	(32.00)	73	(30.42)	0.144
Gastrointestinal symptoms	10	(10.00)	1	(2.50)	4	(4.00)	15	(6.25)	0.121
Sore throat	14	(14.00)	9	(22.50)	4	(4.00)	27	(11.25)	**0.004***
Dyspnea	32	(32.00)	2	(5.00)	40	(40.00)	74	(30.83)	**<0.001***
Cough	69	(69.00)	16	(40.00)	55	(55.00)	140	(58.33)	**0.005***
Intensive care need	19	(19.00)	0	(0.00)	23	(23.00)	42	(17.50)	**0.005***
Living	92	(92.00)	40	(100.00)	93	(93.00)	225	(93.75)	0.193
Exitus	8	(8.00)	0	(0.00)	7	(7.00)	15	(6.25)	

Chi-Square Test was used. PCR: Polymerase chain reaction; CT: Computed tomography; n: number; %: Ratio; *: p<0.05: significant

between d-dimer and PCT in Group 2 (p<0.05). A significant correlation was detected between CRP, d-dimer, troponin and PCT; between CRP, d-dimer and PCT; and between PCT, d-dimer and troponin in Group 3 (p<0.05).

As a result of the ROC analysis that was carried out to find the NLR value for definitive diagnosis, the cut-off value was 3.75 (Fig. 1). When the cut-off value for NLR was taken as 3.75, 77.14% sensitivity, 64% specificity, 75% positive predictive value (PPV) and 66.67% negative predictive value (NPV) were obtained. In this respect, 28 patients in Group 1 (28%), four patients in Group 2 (10%), and 64 patients in Group 3 (64%) had NLR values above 3.75 (p<0.05) (Table 3).

A total of 85 PCR positive patients (60.71 %) and 55 PCR negative patients (55%) had cough complaints (p>0.05). The mean symptom duration was 5.52 days in patients with CT findings and 2.67 days in patients without CT findings (p<0.05). The mean symptom duration was 5.78 days in Group 1, 2.67 days in Group 2, and 5.26 days in Group 3 (p<0.05). COVID-19 CT findings were found in 19 asymptomatic patients (59.38%), there were no CT findings in 13 asymptomatic patients (40.63%) (p<0.001); there were CT findings in 181 (87.02%) symptomatic patients, and no CT findings in 27 symptomatic patients (12.98%) (p<0.001).

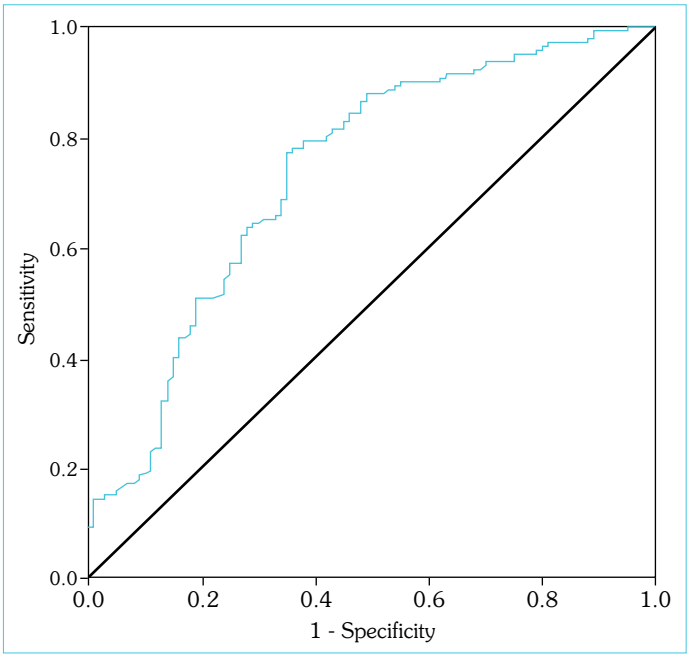

Figure 1. ROC analysis for neutrophil/lymphocyte ratio (NLR)

Table 2. Laboratory parameters, number of infiltrative lung lobes, duration of symptoms and duration of hospitalization

	Mean	SD	Median	Minimum	Maximum	p
Symptom duration (day)						
PCR (+) CT (+)	5.78	±3.05	5.00	1.00	20.00	
PCR (+) CT (-)	2.67	±2.83	2.00	1.00	13.00	**<0.001***
PCR (-) CT (+)	5.26	±4.08	4.00	1.00	20.00	
Total	5.15	±3.63	4.00	1.00	20.00	
Cough duration (day)						
PCR (+) CT (+)	5.54	±3.29	5.00	2.00	20.00	
PCR (+) CT (-)	2.81	±3.08	2.00	1.00	13.00	**<0.001***
PCR (-) CT (+)	5.58	±4.26	5.00	1.00	20.00	
Total	5.24	±3.76	4.00	1.00	20.00	
Hospitalization duration in living patients (day)						
PCR (+) CT (+)	11.44	±10.18	9.00	2.00	61.00	
PCR (+) CT (-)	7.15	±3.56	6.00	2.00	20.00	**<0.001***
PCR (-) CT (+)	7.67	±3.84	7.00	1.00	24.00	
Total	9.15	±7.41	8.00	1.00	61.00	
Number of pathological lobes in lungs						
PCR (+) CT (+)	3.38	±1.32	3.50	1.00	5.00	
PCR (+) CT (-)	0.00	±0.00	0.00	0.00	0.00	**<0.001***
PCR (-) CT (+)	3.11	±1.17	3.00	1.00	5.00	
Total	2.70	±1.66	3.00	0.00	5.00	
Neutrophil/lymphocyte ratio						
PCR (+) CT (+)	3.67	±3.43	2.66	0.39	22.50	
PCR (+) CT (-)	2.47	±1.45	2.17	0.69	8.24	**<0.001***
PCR (-) CT (+)	7.39	±7.11	5.07	1.09	39.66	
Total	5.02	±5.51	3.01	0.39	39.66	
C-reactive protein (mg/dL)						
PCR (+) CT (+)	5.44	±7.99	2.00	0.03	50.40	
PCR (+) CT (-)	1.08	±3.45	0.21	0.02	17.07	**<0.001***
PCR (-) CT (+)	6.66	±6.94	4.02	0.04	33.70	
Total	5.22	±7.22	1.81	0.02	50.40	
D-dimer (ng/ml)						
PCR (+) CT (+)	690.19	±1430.83	293.00	10.00	9959.00	
PCR (+) CT (-)	226.65	±348.69	131.00	8.00	2032.00	**<0.001***
PCR (-) CT (+)	991.57	±1679.05	354.00	47.00	9295.00	
Total	738.51	±1451.65	275.00	8.00	9959.00	
Troponin I (µg/L)						
PCR (+) CT (+)	0.43	±1.85	<0.10	<0.10	13.56	
PCR (+) CT (-)	0.11	±0.02	<0.10	<0.10	0.23	**0.004***
PCR (-) CT (+)	0.42	±1.51	<0.10	<0.10	12.75	
Total	0.37	±1.54	<0.10	<0.10	13.56	
PCT (ng/ml)						
PCR (+) CT (+)	0.30	±1.27	0.08	0.02	12.13	
PCR (+) CT (-)	0.07	±0.11	0.04	0.02	0.59	**<0.001***
PCR (-) CT (+)	0.69	±1.97	0.13	0.02	10.50	
Total	0.42	±1.53	0.08	0.02	12.13	

Kruskal-Wallis Test was used. SD: Standard deviation; PCR: Polymerase chain reaction; CT: Computed tomography; *: p<0.05: significant

Table 3. Neutrophil/Lymphocyte Ratio (NLR) levels according to the groups

	PCR (+) CT (+)		PCR (+) CT (-)		PCR (-) CT (+)		p
	Number	Ratio (%)	Number	Ratio (%)	Number	Ratio (%)	
NLR							
<3.75	72	(72.00)	36	(90.00)	36	(36.00)	**0.018**
>3.75	28	(28.00)	4	(10.00)	64	(64.00)	

Chi-Square Test was used. PCR: Polymerase chain reaction; CT: Computed tomography

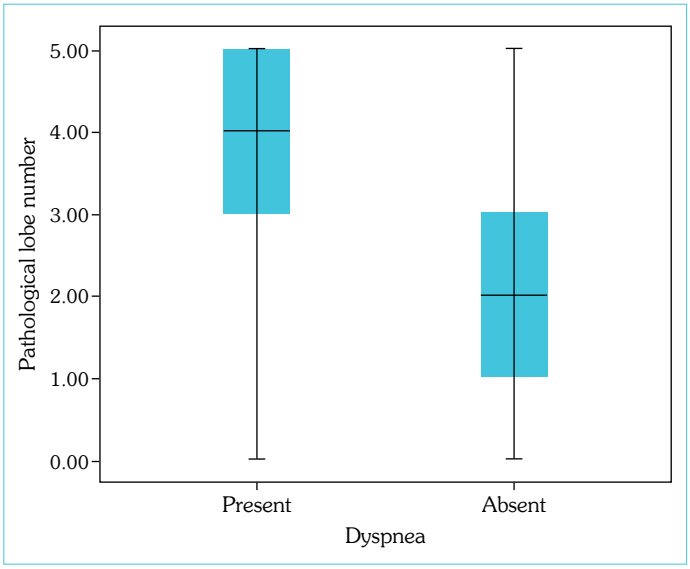

Figure 2. The relation between pathological lobe number and dyspnea

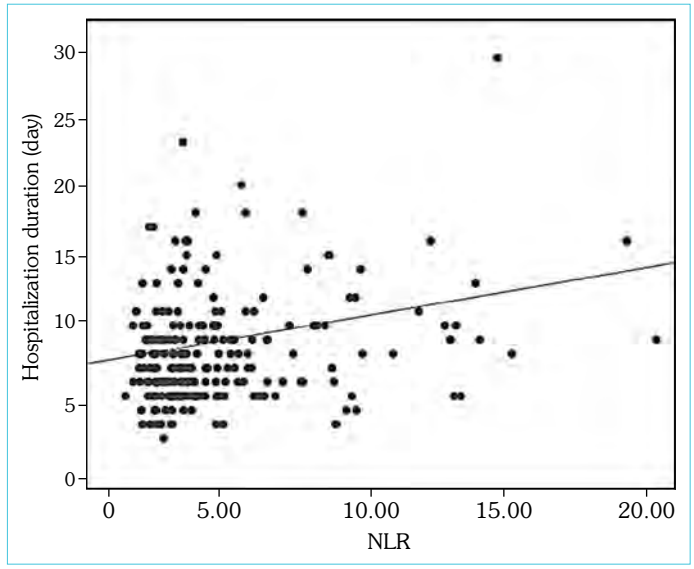

Figure 3. The correlation between hospitalization duration and neutrophil/lymphocyte ratio (NLR)

A significant relation was detected between hospitalization duration in surviving patients and the number of pathological pulmonary lobes detected in CT according to the Spearman Correlation Test (rho=0.595, n=225, p<0.001). Another significant correlation was detected between the onset of the symptoms, the number of pathological pulmonary lobes in Thoracic CT, which was carried out in the first admission of patients, and the time between the admission to the hospital (rho=0.173, p=0.013, n=208). The mean number of pathological lobes in patients whose treatment resulted positively was 2.56 and 4.80 in patients who died (p<0.001). The mean number of pathological pulmonary lobes in patients with shortness of breath among the complaints at admission was 3.76, and the number of pathological pulmonary lobes in those who did not have shortness of breath complaints was 2.26 (p<0.001) (Fig. 2). A positive and significant correlation was detected between NLR and pathological lobe counts (rho=0.423, p<0.001, n=240).

A significant correlation was detected between the hospitalization time and d-dimer in surviving patients (rho=0.289, p.001, n=225). Another significant correlation was detected between hospitalization time and NLR in surviving patients (rho=0.241, p<0.001, n=225) (Fig. 3).

The mean number of pathological pulmonary lobes in PCR positive patients was 2.41; however, this was 3.11 in PCR negative patients (p=0.01). According to the regression analysis made to examine how the number of pathological lobes affected PCR positivity, it was determined that one unit increase in pathological lobe count decreased PCR positivity by 1.3 times (p=0.002).

When the 42 patients who had intensive care need were evaluated separately, the most common reason for hospital admission was shortness of breath in 36 patients. Other most common complaints were fatigue (29 patients) and cough (26 patients) (Table 4). The most common comorbidity in intensive care patients was hypertension (26 patients) and diabetes mellitus (18 patients). None of the PCR (+) CT (-) Group 2 patients needed intensive care.

The mean age of Group 1 patients who needed intensive care was 64.95 years, and the mean age of Group 3 patients was 75.52 years (p=0.002). Again, according to the analysis in intensive care patients, the mean time between the onset of symptoms and hospitalization was 6.17 days in Group 1 patients, and 3.87 days in Group 3 patients (p=0.004). The mean length of hospitalization of the surviving patients in intensive care was 22.37 days in Group 1, and 10.91 days in Group 3 (p=0.033) (Table 5).

DISCUSSION

Omitting the diagnosis of even one single patient with a pandemic and highly infective disease will cause that this viral disease is infected to dozens of people. PCR and CT play important roles in

Table 4. Gender, intensive care need, comorbidities and symptoms in intensive care patients

Intensive care patients	PCR (+) CT (+)		PCR (-) CT (+)		Total		p
	n	Ratio (%)	n	Ratio (%)	n	Ratio (%)	
Male	13	(68.42)	13	(56.52)	26	(61.90)	0.429
Female	6	(31.58)	10	(43.48)	16	(38.10)	
Diabetes mellitus	10	(52.63)	8	(34.78)	18	(42.86)	0.245
Hypertension	10	(52.63)	16	(69.57)	26	(61.90)	0.261
Coronary artery disease	2	(10.53)	8	(34.78)	10	(23.81)	0.066
Chronic obstructive pulmonary disease	3	(15.79)	5	(21.74)	8	(19.05)	0.625
Asthma	1	(5.26)	3	(13.04)	4	(9.52)	0.393
Alzheimer	0	(.00)	3	(13.04)	3	(7.14)	0.102
Epilepsy	1	(5.26)	0	(0.00)	1	(2.38)	0.265
Dementia	1	(5.26)	0	(0.00)	1	(2.38)	0.265
Asymptomatic	1	(5.26)	0	(0.00)	1	(2.38)	0.265
Headache	0	(0.00)	2	(8.70)	2	(4.76)	0.188
Fatigue	16	(84.21)	13	(56.52)	29	(69.05)	0.053
Fever	12	(63.16)	5	(21.74)	17	(40.48)	**0.006***
Gastrointestinal symptoms	2	(10.53)	0	(0.00)	2	(4.76)	0.111
Sore throat	1	(5.26)	0	(0.00)	1	(2.38)	0.265
Dyspnea	14	(73.68)	22	(95.65)	36	(85.71)	**0.043***
Cough	14	(73.68)	12	(52.17)	26	(61.90)	0.153
Living	11	(57.89)	16	(69.57)	27	(64.29)	0.432
Exitus	8	(42.11)	7	(30.43)	15	(35.71)	

Chi-Square Test was used. None of the patients with PCR (+) CT (-) needed intensive care. PCR: Polymerase chain reaction; CT: Computed tomography; p<0.05: significant; n: number

the diagnosis of COVID-19, a new disease for the whole world. In a population that has not acquired immunity to pandemic disease, perhaps the diagnosis of the disease has a more important place than the treatment. For these reasons, we examined the laboratory parameters and clinical characteristics of COVID-19 patients who were diagnosed with PCR and CT in our study.

In our study, the swab samples for PCR test were taken from the oropharynx and nasopharynx of all patients. The present study aimed to investigate whether PCR sensitivity was associated with cough or not. Since the novel coronavirus settles in the upper respiratory tract and then moves into the lower respiratory tract, this translocation is expected to be mostly confined to the upper respiratory tract in coughing patients. According to the results of the present study, no statistically significant differences were detected in PCR sensitivity in patients with cough complaints and patients who did not have such complaints. However, we found that the positivity of the PCR test decreased at a rate of 1.3 units for every one unit increase in the number of pathological pulmonary lobes detected in the initial admission of the patients. These results show us that the translocation of the virus to the lower respiratory tract from the upper respiratory tract reduces the sensitivity of PCR. The fact that the mean cough time was similar in Group 1 and 3 (5.54 days and 5.58 days, respectively), but that this time was 2.81 days in Group 2 indicates that the sensitivity of PCR is greater in the first stages of cough than of CT (p<0.001). When the duration of all symptoms was evaluated, a similarly significant result was obtained again. In other words, according to our study, the sooner the PCR testing is made in symptomatic patients, the higher the sensitivity of the test.

Many studies have been conducted on the sensitivity of PCR and CT (8, 9, 17, 18). In these studies, test series were applied to patients to determine the sensitivity level of PCR and CT, and serial tomographies were carried out. Among these, Ai et al.'s (9) study included 1014 patients, applied PCR and CT with 4-day intervals, and as a result, found that the sensitivity of CT was 97%. In our study, we evaluated only the patients who underwent PCR tests and CT examination during the initial admission to the hospital. According to the results of our study, we concluded that the time passing from the onset of the symptoms in symptomatic patients affects the sensitivity of PCR and CT.

If we evaluate the results on the basis of asymptomatic patients, that 19 of the 42 asymptomatic patients had CT findings shows that CT is a compulsory examination in the diagnosis of COVID-19 even in asymptomatic patients. However, this rate shows that CT has lesser sensitivity in asymptomatic patients compared to symptomatic patients. In this respect, our study ended differently compared to the study of An et al. (17). An et al. conducted a study on 25 asymptomatic COVID-19 patients and detected COVID-19 findings in 24 of patients' initial CTs. In our study; however, com-

Table 5. Laboratory parameters, number of infiltrative lung lobes, duration of symptoms and duration of hospitalization in intensive care patients

Intensive care patients	Mean	SD	Median	Minimum	Maximum	p
Age (year)						
PCR (+) CT (+)	64.95	±9.56	64.00	47.00	81.00	
PCR (-) CT (+)	75.52	±13.39	81.00	44.00	89.00	**0.002***
Total	70.74	±12.83	72.50	44.00	89.00	
Symptom duration (day)						
PCR (+) CT (+)	6.17	±3.26	6.50	2.00	15.00	
PCR (-) CT (+)	3.87	±3.95	2.00	1.00	14.00	**0.004***
Total	4.88	±3.80	4.00	1.00	15.00	
Cough duration (day)						
PCR (+) CT (+)	5.57	±3.55	4.00	2.00	15.00	
PCR (-) CT (+)	3.92	±3.70	2.50	1.00	14.00	0.095
Total	4.81	±3.64	4.00	1.00	15.00	
Hospitalization duration (day)						
PCR (+) CT (+)	22.37	±19.07	16.00	2.00	61.00	
PCR (-) CT (+)	10.91	±5.71	10.00	1.00	24.00	**0.033***
Total	16.10	±14.51	13.00	1.00	61.00	
Number of pathological lobes in lungs						
PCR (+) CT (+)	4.74	±0.56	5.00	3.00	5.00	
PCR (-) CT (+)	4.39	±0.72	5.00	3.00	5.00	0.078
Total	4.55	±0.67	5.00	3.00	5.00	
Neutrophil/lymphocyte ratio						
PCR (+) CT (+)	7.22	±4.30	7.06	1.28	14.39	
PCR (-) CT (+)	14.45	±9.65	11.44	3.03	39.66	**0.009***
Total	11.17	±8.45	9.03	1.28	39.66	
C- reactive protein (mg/dL)						
PCR (+) CT (+)	15.42	±11.41	13.48	0.75	50.40	
PCR (-) CT (+)	10.05	±8.23	8.52	0.20	26.80	0.086
Total	12.48	±10.04	11.31	0.20	50.40	
D-dimer (ng/ml)						
PCR (+) CT (+)	2171.05	±2808.57	887.00	238.00	9959.00	
PCR (-) CT (+)	2254.65	±2663.87	1162.00	137.00	9295.00	0.640
Total	2216.83	±2696.76	1162.00	137.00	9959.00	
Troponin (µg/L)						
PCR (+) CT (+)	1.68	±4.05	0.13	0.10	13.56	
PCR (-) CT (+)	1.40	±3.00	0.14	0.10	12.75	0.825
Total	1.53	±3.47	0.14	0.10	13.56	
Procalcitonin (ng/ml)						
PCR (+) CT (+)	1.08	±2.82	0.19	0.03	12.13	
PCR (-) CT (+)	2.00	±3.22	0.46	0.05	10.50	0.086
Total	1.58	±3.04	0.23	0.03	12.13	

Mann-Whitney U Test was used. *: p<0.05: significant; SD: Standard deviation, none of the patients with PCR (+) CT (-) needed intensive care; PCR: Polymerase chain reaction; CT: Computed tomography

pared to An et al.'s (17) study, this rate remained low as 19 in 42 patients. The low number of asymptomatic patients in both studies is an obstacle to achieve definitive results on the sensitivity of CT. It is natural that asymptomatic patient numbers are low because an asymptomatic patient does not come to hospital. Asymptomatic patients in our study consisted of close contacts of positive cases. They were called with phone and were brought to the hospital for PCR testing and CT scanning.

COVID-19 findings were detected in the initial CTs in 87.02% of the symptomatic patients. In our study, since we only evaluated the status of patients at the time of initial admission, and since we did not mention serial CT scans and serial PCR tests, we cannot achieve definitive conclusions about the superiority of these tests. However, the present study has a significant conclusion regarding these tests, which is that, if symptomatic patients was admitted to the hospital on the 2nd and 3rd days as of the onset of their symptoms, COVID-19 findings may not be seen in the first CT, but the first PCR test may be positive.

NLR, which is evaluated together with other diagnostic tests by clinicians in COVID-19, is not a specific parameter for COVID-19 diagnosis. NLR has been shown to increase in many inflammatory processes in recent years (12, 19–22). It has been related to plasma glucose level type-2 diabetic patients (20). In hashimoto's thyroiditis NLR, again, has been a useful inflammatory marker (21).

NLR is a parameter evaluated during patients' admission and is more significant when evaluated with the number of lymphocytes because it leads to an abnormal inflammatory process in COVID-19. In the study of Yang et al. (12) conducted on 93 confirmed COVID-19 patients, they found the cut-off value for NLR as 3.3 with 63% specificity and 88% sensitivity in prognostic prediction. In our study, to find an NLR value in definitive diagnosis, 77.14% sensitivity, 64% specificity, 75% PPV and 66.67% NPV were obtained when the cut-off value was taken 3.75. In our study, in 32 (22.85%) of the 140 patients with PCR positive, the NLR value was above 3.75; and the NLR value was above cut-off in 64 patients among the 100 patients in Group 3 patients with PCR negative and with CT findings. According to this analysis made with NLR, which has a 77% sensitivity in COVID-19, once again, we concluded that initial CT was necessary for the diagnosis in patients with initially negative PCR results. In our study, the outcome based on which we can comment on the prognostic value of NLR was the relationship between the NLR and hospitalization duration. According to the results of our study, as the NLR value increases, the hospitalization is elongated. This significant correlation gives us an idea of the prognostic, predictive value of NLR. Also, the mean NLR value was 11.17 in patients with intensive care needs. The mean value was 5.02 in all patients demonstrates the prognostic, predictive strength of NLR.

To our knowledge, there is not any research in the literature comparing the number of pulmonary lobes with pathological involvement in the initial CT of patients suspected of COVID-19. Our study is important in this respect. According to the results of our study, as the number of pathological lobes with radiological involvement increases, PCR positivity decreases, and hospitalization duration, mortality and NLR increase. These results were statistically significant.

Many studies showed that D-Dimer has a place in predicting the prognosis in COVID-19 patients (14, 23), although the mean d-dimer value in intensive care patients was 2216.83 ng/ml in our study and 738.51 ng/ml in all patients. Parallel to the literature, the d-dimer value was also found as an important marker in predicting the clinical course of COVID-19 patients in our study.

One of the limitations of this study is that this study has a single-centered design. Regarding the retrospective nature of our study, selection bias may be present. Also, the number of patients for each group was not equal. We have reached fewer numbers of patients for Group 2 because of the patient's profile that was admitted to the hospital on the dates that our research was designed on.

CONCLUSION

Based on the results of our study, there might not be any findings in CT in the initial 48-72 hours after the onset of the symptoms in symptomatic patients. As the number of pathological pulmonary lobes seen in CT increases, the PCR positivity decreases. PCR positivity has no relation with cough. NLR, which is a valuable inflammatory marker, also has an important role in predicting the prognosis in COVID-19. According to these results, PCR, CT and NLR must be evaluated together in the diagnosis of COVID-19.

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