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Assessment of Some Biochemistry Parameters in Hospitalized Patients Evaluated with CT and RT-PCR for The Diagnosis of Covid-19

Covid-19 Tanısı için BT ve RT-PCR ile Değerlendirilen Hastanede Yatan Hastalarda Bazı Biyokimya Parametrelerinin Değerlendirilmesi

Ayşegül SÜMER[1], Lütfiye Nur UZUN[2]

ABSTRACT

It was reported that a new type of coronavirus (2019-nCoV) was the cause of repeated pneumonia cases in Wuhan, Hubei Province, China in December 2019. The aim of this study was to evaluate the laboratory results of the patients diagnosed with COVID-19 as confirmed by RT-PCR test or presence of ground-glass opacities on CT imaging. 51 people with various exclusion criteria were included in the single-center study planned retrospectively. Comparison was made by measuring the laboratory findings of the patients who underwent RT-PCR test, who underwent computed lung tomography and who were divided into four groups according to their results. All data were accessed via electronic health records. Fisher Exact Test, One Way ANOVA, Kruskall Wallis Test were used as statistical analysis method in addition to percentages and frequencies and adjusted Bonferonni test were used for post-hoc analysis. In laboratory findings, significant data were obtained in favor of COVID-19 at WBC, NEU, EOS, Prothrombin time, INR and Troponin levels. It was concluded that laboratory findings can be used as a preliminary diagnosis in the admission of the patient to the clinic, and also help to determine the clinical severity of the disease and predict the prognosis.

Keywords: COVID-19, Clinical characteristics, Laboratory findings

ÖZ

Aralık 2019'da Wuhan, Hubei Çin'de arda arda görülen pnömoni vakalarının sebebinin yeni bir tip koronovirus (2019-nCoV) olduğu bildirilmiştir. Bu çalışmada COVID-19 tanısı RT-PCR testi ile doğrulanmış veya BT görüntülemesinde buzlu cam alanları tespit edilmiş hastaların laboratuar bulgularının değerlendirilmesi amaçlanmıştır. Tek merkezli retrospektif olarak planlanan çalışmaya çeşitli dışlama kriterleri ile 51 kişi dahil edilmiştir. Karşılaştırma, RT-PCR testi yapılan, bilgisayarlı akciğer tomografisi yapılan ve sonuçlarına göre dört gruba ayrılan hastaların laboratuvar bulguları ölçülerek yapıldı. Tüm verilere elektronik sağlık kayıtları aracılığıyla erişildi. İstatistiksel analiz yöntemi olarak yüzde ve frekanslara ek olarak Fisher Exact Test, Tek Yönlü ANOVA, Kruskall Wallis Testi, post-hoc düzeltilmiş Bonferonni testi kullanıldı. Laboratuvar bulgularında WBC, NEU, EOS, Protrombin zamanı, INR ve Troponin seviyelerinde COVID-19 lehine önemli veriler elde edildi. Hastanın kliniğe kabulünde laboratuvar bulgularının ön tanı olarak kullanılabileceği, ayrıca hastalığın klinik şiddetini belirlemeye ve prognozu öngörmeye yardımcı olabileceği sonucuna varıldı.

Anahtar Kelimeler: COVID-19, Klinik özellikler, Laboratuvar bulguları

Permission was obtained from Bolu Abant İzzet Baysal University Clinical Research Ethics Committee. (08.07.2020 Decision no: 2020/122)

[1]Dr. Öğr. Üyesi, Ayşegül SÜMER, Tıbbi Biyokimya, Recep Tayyip Erdoğan Üniversitesi Sağlık Bilimleri Fakültesi, aysegul.sumer@erdogan.edu.tr, ORCID: 0000-0003-4918-4368

[2]Uzman Hemşire, Lütfiye Nur UZUN, Hemşirelik Esasları, Bolu İzzet Baysal Devlet Hastanesi, nuruzun53@gmail.com, ORCID: 0000-0002-8724-3843

İletişim / Corresponding Author: Ayşegül SÜMER
e-posta/e-mail: aysegul.sumer@erdogan.edu.tr

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INTRODUCTION

Coronaviruses are a family that can be transmitted from person to person easily and has several subtypes that have caused pandemics such as SARS (severe acute respiratory failure syndrome) and MERS (middle east respiratory syndrome) over the past two decades.[1] Coronaviruses are RNA enveloped viruses that can cause respiratory, gastrointestinal, hepatic and neurological diseases in humans, mammals or birds. It is likely that new coronaviruses may develop in humans and animals due to the high spreading rate, genetic diversity and frequent recombination of coronaviruses.[2]

The Ministry of Health, Health Protection Center of China, reported that a number of unknown pneumonia cases occurred in Wuhan, Hubei Province, China on December 31, 2019. It was noted that the clinical presentations of the reported cases were largely similar to viral pneumonia.[3] The new coronavirus, which was identified as a result of deep sequencing analysis from the lower respiratory tract samples was named 2019 novel coronavirus (2019-nCoV) by WHO.[2] International Virus Taxonomy Committee Coronavirus Working Group named this new type of coronavirus as SARS-CoV-2.[4] The number of cases in this outbreak, which was declared as a pandemic by the World Health Organization, is increasing day by day.

First of all, the infection was thought not transmitting from human to human or the transmission was limited, but later it was observed that those who had close contact with the sick people soon became infected. The diagnosis of the first cases was made by clinical signs, radiological examinations, unresponsive antibiotic therapy and exclusion of seasonal respiratory infections.[5] In studies conducted, it was reported that clinical symptoms, real-time reverse transcription polymerase chain reaction test (RT-PCR), computed tomography (CT) and serological examinations were used as diagnostic criteria.[6]

Typical clinical symptoms of cases were fever, dry cough, respiratory distress, headache and pneumonia.[1,4,7] RT-PCR test is a descriptive test that is currently accepted, but it is recommended to repeat the test to confirm its positivity and negativity. It is recommended to support the test with clinical findings and radiological examinations.[8] While radiological examinations did not render specific findings by chest radiography, the ground-glass opacities on CT imaging provided important findings.[9] CT imaging was reported to have high sensitivity for the diagnosis of COVID-19. [8] It has been reported that serological examinations are mandatory applications to evaluate the level of immunity against the virus and to better understand the epidemiology, but reliable results have not been achieved to date. [6]

Laboratory tests of coronavirus cases revealed decreased white blood cell and lymphocyte count, increased thrombocytopenia and thromboplastin activation time, increased C-reactive protein, fibrinogen, troponin, lactate dehydrogenase, alanine transaminase, aspartate transaminase, creatine kinase, and increased BUN Blood Urea Nitrogen) (and creatinine in few patients as well as cardiac damage depending on the clinical course of the disease.[2,5,10] Many studies have been conducted to present epidemiological, clinical, laboratory features and potential biomarkers in patients infected with the SARS-CoV-2 virus.[2,5,11]

In this increasingly heavy presentation, rapid decision-making and appropriate test methods are becoming more and more important. In this study, it is thought that early diagnosis and treatment protocols can be created by examining the laboratory findings and a preliminary protocol can be established to make quick decisions in the clinic.

This study was carried out to compare the laboratory results of the patients diagnosed with COVID-19 as confirmed by RT-PCR test or presence of ground-glass opacities on CT imaging.

MATERIAL AND METHOD

Sampling

This study was conducted in the COVID-19 inpatient clinic of a public hospital between 01.04.2020-30.04.2020 with COVID-19 positive and suspicious patients. In this research, the sample size was calculated at 95% confidence level with "G. Power-3.1.9.2" program. As a result of the analysis, the level and effect size were found to be 0.569 based on previous studies [12] and the minimum sample volume was calculated as 51 with 0.95 theoretical power. In the clinic where this study was performed, respiratory samples including throat and nasal lavage fluid are collected from all patients hospitalized as a routine procedure and RT-PCR test is used to confirm COVID-19 infection. All patients are kept in isolation in the inpatient clinic until the test result is confirmed. Computerized lung tomography of all patients admitted to the clinic is taken and interpreted. In addition, all the patients undergo measurement of C-reactive protein (CRP), Blood urea nitrogen (BUN), Creatinine, Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), Lactate dehydrogenase (LDH), Triglyceride, Creatine kinase (CK), Sodium (Na), Potassium (K), International normalized ratio (INR), Prothrombin time (PT), D-dimer, Troponin, Fibrinogen, Activated partial thromboplastin time (aPTT), and complete blood count are measured. No sample selection was made in this study, but the inclusion criteria were determined as all patients who were treated in the inpatient clinic at the relevant dates, did not need intensive care, had no chronic disease, whose laboratory findings were examined during admission to the hospital, and who underwent computerized tomography imaging. The patients were examined in four groups. The first group included the patients with RT-PCR test positive and ground-glass opacities on CT imaging, the second group included the patients with normal CT imaging and RT-PCR test positive, the third group included the patients with ground-glass opacities on CT imaging and RT-PCR test negative twice and the fourth group included the patients with normal CT imaging and RT-PCR test negative twice.

The Ethical Aspects of The Research

For this study, Clinical Research Ethics Committee granted ethical approval numbered 2020/122 and research permition was obtained from the institution where the study was conducted. In order to carry out the study, permission was obtained from the scientific research platform of the Ministry of Health of the Republic of Turkey. In addition, necessary permissions were obtained from the hospital where the study was carried out and whose electronic records were accessed. Identity information of the participants was kept confidential.

Material

Age, gender, RT-PCR test results, CT reports taken when they were first admitted to the clinic and laboratory findings of all participants when they were first admitted to the clinic were retrospectively analyzed through electronic health records.

Statistical Analysis

Shapiro-Wilk Test were used in this study for normality distribution analysis. In addition to descriptive statistics as statistical analysis method, Fisher's Exact Test was used to examine the relationship between groups, the data of patients showing normal distribution in laboratory test results were interpreted with One-Way ANOVA and those that did not show normal distribution were interpreted with Kruskal Wallis Test. Adjusted Bonferroni tests for Kruskal Wallis Test were performed in post hoc analysis to determine the observed level of significance being in favor of or against each group. Level of significance was accepted as 0.05. Statistical analyzes were performed with Statistical Package for the Social Sciences (SPSS) version 25 program.

Limitations

Since the study started when the cases are newly seen, the number of our patients seems to be low, together with the exclusion and inclusion criteria. However, this situation was tried to be remedied by using g power analysis.

RESULTS AND DISCUSSION

Fifty-one patients who were treated at the COVID-19 clinic of the relevant hospital and fulfilled the inclusion criteria were included in the study. Table 1 shows the distribution of participants' age, gender, grouped CT/RT-PCR test results and the relationship between them. As a result of the Fisher's Exact Test performed according to Table 1, there was no significant relationship between gender and CT/RT-PCR test results ($p>0.05$), while the number of patients with RT-PCR test positivity in the advanced age group was higher($p<0.05$).

Table 1. Age, Gender, CT/RT-PCR Test Results Distributions Of Patients Hospitalized In The COVID-19 Clinic.

	CT and RT PCR Result										
	1		2		3		4		Total		Statistics
Feature	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	Fisher'a Exact Test
Gender											
Male	6	24,0	2	8,0	5	20,0	12	48,0	25	49,0	4,978
Female	6	23,1	7	26,9	7	26,9	6	23,1	26	51,0	p>0.05
Total	12	23,5	9	17,6	12	23,5	18	35,3	51	100,0	
Age											
21-34	0	0,00	5	41,7	3	25,0	4	33,3	12	23,5	
35-48	5	26,3	1	5,3	3	15,8	10	52,6	19	37,3	16,417
49-62	4	30,8	1	7,7	4	30,8	4	30,8	13	25,5	**p=0,034***
63-76	3	42,9	2	28,6	2	28,6	0	0,00	7	13,7	
T**otal**	12	23,5	9	17,6	12	23,5	18	35,3	51	100,0	

1; Patients with ground-glass areas on computed tomography and positive RT-PCR test results.
2; Patients with normal computed tomography and positive RT-PCR test results.
3; Patients with ground-glass areas on computed tomography and negative RT-PCR test results.
4; Patients with normal computed tomography and negative RT-PCR test results.
**p<0.05*

According to the grouped CT and PCR results of the patients, Trigliserid, K, Fibrinojen, aPTT and PLT laboratory data were interpreted with ANOVA. The results of ANOVA analysis are given in Table 2**.** But results did not show statistically significant results according to the ANOVA result (p> 0,05).

Kruskal Wallis test was applied to determine the effect of grouped CT and RT-PCR results of the patients on CRP, BUN, Creatinine, ALT, AST, LDH, CK, Na, INR, PT, D-dimer, Ttroponin, White Blood cell (WBC), Lymphocyte (LYM), Monocyte (MONO), Neutrophil (NEU), Basophil (BASO) and Eosinophil (EOS). The results are given in Table 3. According to the Kruskal Wallis Test result, the effect of patients' CT and RT-PCR test results on INR, PT, Troponin , WBC, NEU, and EOS there is a statistically significant difference between the median values.

. Adjusted Bonferroni was used to find the groups that made a difference. Accordingly, the median values of INR, PT, WBC and NEU of patients with ground glass areas on CT imaging and positive RT-PCR test were statistically significantly lower than the median values of those with negative RT-PCR test ($p<0.05$). The median troponin value of patients with ground glass areas on CT imaging and positive RT-PCR test was statistically significantly higher than the median value of patients with normal CT imaging and positive RT-PCR test ($p<0.05$). The median WBC value of patients with normal CT imaging and positive RT-PCR test was statistically significantly lower than

the median values of patients with normal CT imaging and negative RT-PCR test ($p<0.05$). The median NEU and EOS values of patients with ground glass areas on CT imaging and positive RT-PCR test were statistically significantly lower than the median values of patients with ground glass areas on CT imaging and negative RT-PCR tests ($p<0.05$). The median NEU value of patients with normal CT imaging and positive RT-PCR test was statistically significantly lower than the median value of patients with ground glass areas on CT imaging and negative RT-PCR test ($p<0.05$). Although the median BASO value between the groups was significant according to the Kruskal Wallis Test, the results obtained in the corrected Bonferonni test were not significant for or against any group ($p>0.05$).

There was no statistically significant difference between the patients' median values of CRP, BUN, Creatinine, ALT, AST, LDH, CK, Na, D-dimer, LYM and MONO ($p>0.05$)

Table 2. Evaluation Of Laboratory Tests With Normal Distribution

Laboratory parameter	Group	n	$\bar{x}$	sd	p[a]
Triglyceride mg/dL	1	12	120,83	39,57	0,329
	2	9	101,33	54,54	
	3	12	123,91	44,63	
	4	18	139,88	59,58	
K^+ (mmol/L)	1	12	4,17	0,45	0,268
	2	9	4,02	0,30	
	3	12	4,32	0,38	
	4	18	4,35	0,50	
Fibrinogen (g/L)	1	12	4,80	1,36	
	2	9	3,62	1,03	0,088
	3	12	4,44	1,15	
	4	18	3,96	1,00	
aPTT (25-36 s)	1	12	29,91	3,05	0,777
	2	9	30,92	2,50	
	3	12	30,16	3,57	
	4	18	29,70	2,51	
PLT (K/uL)	1	12	219,66	66,34	0,704
	2	9	240,88	40,98	
	3	12	250,16	64,65	
	4	18	226,88	84,63	

1; Patients with ground-glass areas on computed tomography and positive RT-PCR test results.
2; Patients with normal computed tomography and positive RT-PCR test results.
3; Patients with ground-glass areas on computed tomography and negative RT-PCR test results.
4; Patients with normal computed tomography and negative RT-PCR test results.
n: sample number, $\bar{x}$: arithmetic mean, sd:Standart Deviation.
a; One-Way ANOVA

COVID-19 has spread rapidly all over the world since it was first described in China. It was reported that the diagnosis of the first cases was made by clinical signs, radiological examinations, unresponsive antibiotic therapy and exclusion of seasonal respiratory infections.[5] Currently, RT-PCR test is accepted as a descriptive test, which is recommended to be repeated to confirm the positivity and negativity, and it is recommended to be support the result with clinical results and radiological examinations for complete diagnosis.[8]

Li et al. also concluded that there was fluctuation in RT-PCR test results in their study.[13] CT imaging in radiological examinations is known to have high sensitivity for the diagnosis of COVID-19, and ground-glass opacities are among the most common results.[8] The information available in the literature suggest that anomalies such as RT-PCR test and ground-glass opacities in CT imaging may lead to the diagnosis of COVID-19, but additional data are needed in both the differential diagnosis and clinical management of the disease in order to make a quick and accurate decision

in diagnosis and treatment methods. In the present study, the patients were divided into four groups according to RT-PCR test and CT imaging results, and changes in laboratory results were analyzed.

Majority of the COVID-19 patients worldwide are mild cases.[14] It is known that both the clinical presentation and laboratory findings change in favor of the disease as the clinical course of the patients diagnosed with COVID-19 changes and in the presence of accompanying chronic disease.[3,15]

For this reason, the relationship between laboratory findings was investigated by including patients with COVID-19 whose clinical presentation was not severe and had no existing chronic disease.

When the WBC values of the patients were analyzed, it was seen that leukopenia was experienced in patients COVID-19 diagnosis confirmed by CT and RT-PCR test. Similar results were found in studies with COVID-19 patients.[9,16] This can be interpreted as coronavirus consuming immune cells like other virus infections. Bo et al. emphasized that coronavirus suppressed cellular immune functions of the body in their study. [17] For this study, it was seen that NEU and EOS values moved in favor of COVID-19 among the five components of WBC (NEU, LYM, MONO, EOS and BASO), and had lower values in these patients. Although LYM value does not represent a significant result, some studies have obtained important data on low lymphocyte level. [9,18] Another study showed that values in WBC and its five components decreased with the worsening of the clinical presentation.[19] COVID-19 can lead to changes in immune cells, and this worsening presentation can be used to control the patient's clinical course. It may be difficult to distinguish pandemic viral pneumonias from common bacterial, viral or fungal infections due to similar clinical and radiological features.[20] However, the fact that the WBC and NEU medians of the patients with negative RT-PCR test and both normal CT findings and negative RT-PCR test were higher than the other groups suggest that there is a different source of infection in the patients. Therefore, it is suggested that immune cells can be used to differentiate the clinical picture.

Clinically, CRP is used as a biomarker for various inflammatory conditions.[21] However, no significant relationship was identified among patients' CRP levels in the present study. In a single-center study in China, patients with severe cohort had significantly higher CRP levels than mild ones.[22] Similarly, Jin et al. reported that high CRP levels were found in critical patients.[23] In the present study, patients diagnosed with COVID-19 were mild and it is thought that no significant data were obtained.

However, monitoring CRP level can still be used to follow the clinical course of the disease and to establish a treatment protocol.

Recent studies reported that, the novel coronavirus may affect different systems such as lung, heart, liver, kidneys and digestive system. [23] In the literature, there are studies with different results in the biochemistry tests examined in patients with COVID-19. Mardani et al. found that LDH, AST, ALT and BUN values were higher in positive patients. [24] Cheng et al. declared that patients with high initial creatinine levels were more likely to be admitted to the intensive care unit, and Xiang et al. reported that BUN and creatinine values could be used as potential indicators for early diagnosis of severe COVID-19 and differentiation from mild COVID-19. [25,26] In this study, no significant results were obtained in LDH, CK, ALT, AST, BUN, Creatinine, Na and K levels. This could be despite the patients whose clinics were not severe. The conducted studies also support this view and that the tissue damage increases in worsening cases and interpretations suggest that patients' biochemical test results change accordingly.[2,25] Although biochemical studies help determine disease prognosis and outcomes, significant differences among patient groups are thought to affect the results of studies.

Table 3. Evaluation of Laboratory Tests with Nonparametric Distribution

Laboratory parameter	Group	N	Median	IQR (25.-75.)	p[a]	Bonferonni
CRP (mg/L)	1	12	14,90	6,47-70,64	0,087	
	2	9	2,45	1,95-7,05		
	3	12	11,84	2,22-44,72		
	4	18	18,28	2,34-63,01		
BUN (mg/dL)	1	12	26,00	24,00-36,00	0,552	
	2	9	26,00	21,50-41,00		
	3	12	28,00	26,00-34,25		
	4	18	25,00	23,50-28,25		
Creatinine (mg/dL)	1	12	0,90	0,75-1,03	0,677	
	2	9	0,81	0,68-0,99		
	3	12	0,86	0,76-1,00		
	4	18	0,92	0,78-1,02		
ALT (U/L)	1	12	20,00	15,25-30,25	0,372	
	2	9	18,00	13,50-21,00		
	3	12	16,50	14,00-21,75		
	4	18	20,50	14,75-39,50		
AST (U/L)	1	12	257,50	19,25-40,25	0,300	
	2	9	224,00	20,50-30,50		
	3	12	276,50	17,00-25,50		
	4	18	244,00	18,50-45,00		
LDH (U/L)	1	12	257,50	240,50-356,25	0,300	
	2	9	224,00	198,00-295,50		
	3	12	276,50	217,50-304,50		
	4	18	244,00	208,75-286,25		
CK (U/L)	1	12	68,50	51,50-110,75	0,628	
	2	9	75,00	57,50-92,50		
	3	12	73,50	50,25-104,75		
	4	18	96,00	64,75-112,00		
Na^+ (mmol/L)	1	12	139,00	136,25-141,00	0,430	
	2	9	139,00	137,00-140,50		
	3	12	139,00	138,00-140,00		
	4	18	138,00	136,00-139,25		
INR	1	12	0,98	0,96-1,03	**0,007***	**1<4**
	2	9	1,00	0,96-1,07		
	3	12	1,05	1,00-1,10		
	4	18	1,07	1,04-1,14		
PT (s)	1	12	13,35	13,05-14,20	**0,013***	**1<4**
	2	9	13,50	13,15-14,50		
	3	12	14,25	13,60-14,85		
	4	18	14,55	14,17-15,42		
D-dimer (mg/L)	1	12	0,39	0,27-0,56	0,066	
	2	9	0,24	0,13-0,43		
	3	12	0,42	0,30-0,77		
	4	18	0,36	0,28-0,89		
Troponin (ng/L)	1	12	5,65	3,07-11,07	**0,015***	**1>2**
	2	9	2,30	1,70-4,05		
	3	12	3,40	3,12-5,55		
	4	18	2,75	2,00-4,80		
WBC (K/uL)	1	12	5,75	3,82-7,07	**0,002***	**1<4**
	2	9	5,50	4,35-7,15		**2<4**
	3	12	9,30	6,90-12,40		
	4	18	9,65	6,42-13,36		
LYM (K/uL)	1	12	1,35	1,07-2,07	0,773	
	2	9	1,50	1,15-1,65		
	3	12	1,60	1,32-2,10		
	4	18	1,55	1,15-2,20		

Table 3. (Continued)

MONO (K/uL)	1	12	0,45	0,40-0,70	0,270	
	2	9	0,60	0,40-0,70		
	3	12	0,60	0,52-0,95		
	4	18	0,70	0,57-1,02		
NEU (K/ uL)	1	12	3,85	1,92-4,55	**0,001***	**1<4**
	2	9	3,50	2,40-4,75		**1<3**
	3	12	6,35	4,77-8,02		**2<3**
	4	18	6,40	3,95-11,10		
BASO (K/uL)	1	12	0,00	0,00-0,00	**0,027***	**
	2	9	0,00	0,00-0,00		
	3	12	0,10	0,00-0,10		
	4	18	0,00	0,00-0,10		
EOS (K/uL)	1	12	0,00	0,00-0,00	**0,013***	**1<3**
	2	9	0,00	0,00-0,10		
	3	12	0,20	0,00-0,37		
	4	18	0,10	0,00-0,12		

1; Patients with ground-glass areas on computed tomography and positive RT-PCR test results.
2; Patients with normal computed tomography and positive RT-PCR test results.
3; Patients with ground-glass areas on computed tomography and negative RT-PCR test results.
4; Patients with normal computed tomography and negative RT-PCR test results.
* **p<0.05, **p>0.05, IQR(25.-75.); interquartile range percentile (25.-75.)*
a; Kruskal Wallis test

When the coagulation tests of the patients were examined, it was observed that the patients with ground-glass opacities on the CT image and positive RT-PCR results had lower INR and PT values. No significant difference was observed in PLT, aPTT, fibrinogen and D-dimer levels, which are other coagulation analyzes. Studies with severe COVID-19 patients have reported to find thrombocytopenia 2. There are also studies reporting that the D-dimer levels of critical patients can be used as a prognostic marker, and the results of patients in intensive care units have higher D-dimer levels.[3,21] The coagulation cascade in COVID-19 patients is thought to be multifactorial and associated with an increased risk of disease severity and mortality. Monitoring coagulation tests from the moment of hospitalization can serve as a prognostic indicator of the disease.

When studies on COVID-19 disease are examined, troponin levels also attracts attention as a cardiac marker. Velavan and Meyer underlined that clinicians should consider cardiac troponin levels.[27] In the present study, it was observed the patients with ground-glass opacities on CT imaging had increased troponin levels compared to normal patients with CT imaging among the patients with positive RT-PCR test results. Although the results of the patients with low clinical severity were examined in this study, the results emphasize that the signs of cardiac damage must be carefully monitored in management of COVID-19. Shi et al. suggested that the mechanism of cardiac damage remains uncertain in patients with COVID-19, and activation of inflammatory markers such as CRP and leukocytes may lead to necrosis of myocardial cells.[28]

It is considered that cardiac complications must be taken into consideration in the management of COVID-19**.**

CONCLUSION AND RECOMMENDATIONS

In conclusion, complete blood count, CRP, biochemical examinations, coagulation analyzes and cardiac markers should be examined in COVID-19 patients. Utilizing laboratory biomarkers, as well as RT-PCR testing and CT imaging, which support the patient's clinical history, both support the diagnosis of COVID-19 and can be used as

an indicator of increased severity of the disease by offering important clues about the patient's clinical course. When using all such data, important differences among the patients should be considered.

This study has some limitations; this study was carried out with a retrospective method that can limit the strength and reliability of the results. The low sample size was also considered as a limitation due to the fact that only the mild cases and patients without chronic disease were included in the study in order to ensure comparability among the groups.

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