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Original Article

The Relationship Between SII, PLR, LCR, MPV/PLT Values and COVID-19 Prognosis

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ABSTRACT

Objective: The magnitude of the coronavirus 2019 (COVID-19) pandemic has produced a great need to determine laboratory parameters of prognostic significance. This information will help identify patients at risk of severe disease and assist in the optimal allocation of limited medical resources. The aim of this study was to determine the usefulness of systemic-immune-inflammation index (SII), lymphocyte-to-CRP ratio (LCR), platelet-to-lymphocyte ratio (PLR) and mean thrombocyte volume-to-platelet count ratio (MPV/PLT) values compared with the commonly used laboratory parameters of absolute lymphocyte count, neutrophil-to-lymphocyte ratio (NLR), and C-reactive protein (CRP), as prognostic biomarkers of COVID-19.

Methods: The medical records of patients hospitalized with COVID-19 pneumonia between March 2020 and May 2020 were retrospectively evaluated. The NLR, PLR, LCR, SII, and MPV/PLT values were calculated based on laboratory parameters. The need for oxygen support, non-invasive mechanical ventilation (NIMV), and intensive care treatment were documented, as well as mortal outcomes. The patients were divided into a non-severe group and a severe disease group, which was defined by a respiratory rate of >30/minute or an oxygen saturation <90%.

Results: A total of 84 patients were enrolled, including 62 (73.8%) males. The mean age of the study group was 54.07±15.70 years. Thirty-seven had at least 1 comorbidity. Twenty-eight patients (33.3%) had severe disease, with 13 (15.5%) requiring NIMV and 13 (15.5%) needing intensive care. Eleven patients died during the study period. Elevated CRP and NLR and decreased absolute lymphocyte counts were statistically significant in predicting disease severity, need for intensive case treatment, and mortality. The SII and PLR findings also reached statistical significance in the prediction of disease severity and the need for intensive care, and the LCR value was a significant predictor of all 3 outcomes. The MPV/PLT ratio was significant only in forecasting mortality.

Conclusion: Our results indicate that inflammatory indexes can be used as prognostic predictors in COVID-19 pneumonia. These index measurements are cost-effective and readily available, and therefore can aid in the early identification and timely medical management of severe cases.

INTRODUCTION

The current coronavirus disease 2019 (COVID-19) pandemic began with cases of a pneumonia of unknown etiology that emerged in Wuhan, China in December 2019.[1] With the help of genome sequencing, it was confirmed that the pathogen is a virus related to severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV).[2] Infection with the newly identified SARS-CoV-2 spread rapidly, and has had a tremendous impact all over the world.

COVID-19 pneumonia is a severe form of the disease, often seen in patients with immune dysfunction or comorbidities.[3] Several studies have shown that increased quantities of proinflammatory cytokines in the serum were associated with extensive lung damage in cases of COVID-19, as previously seen with SARS-CoV and MERS-CoV infection.[4]

The rapid spread and potential lethality of the virus generated an urgent need to identify indicators that could be used predict the severity and risk associated with infection. These predictors can help to identify patients at high risk of developing severe disease, and thus better allocate

limited human and technical resources during the ongoing pandemic and prevent unnecessary hospitalization, as well as mitigate other impacts.

COVID-19 has been associated with an extreme inflammatory response, a cytokine storm, which includes increased levels of interleukin-6 (IL-6) and can lead to acute lung injury, acute respiratory distress syndrome, and multiple organ failure.[5] It has been reported in a meta-analysis that IL-6 and ferritin levels might be used to distinguish between severe and non-severe cases, and to potentially predict survivors and non-survivors of COVID-19.[6] Increased levels of these markers, as well as the C-reactive protein (CRP) value, have been associated with systemic inflammatory response syndrome (SIRS). However, ferritin and IL-6 analysis is unavailable in many hospitals; therefore, work continues in an effort to identify more widely used laboratory parameters that could predict inflammation, immune disorder, and disease severity.

Various biochemical and hematological markers that are already widely used as predictors of disease severity, the need for intensive care, and mortality can be used in the treatment of COVID-19 patients.[7–9] Several studies have noted that the neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), and the lymphocyte-to-CRP ratio (LCR) reflect the systemic inflammatory response and may serve as potential predictors to be used in COVID-19.[7,10] These markers are also used in the clinical follow-up of other diseases.[11,12]

This study is an examination of the applicability of the systemic-immune-inflammation index (SII), LCR, PLR, and mean platelet volume-to-platelet count (MPV/PLT) ratio values as prognostic predictors in COVID-19 pneumonia and provides a comparison with some other common biomarkers.

MATERIALS AND METHODS

A total of 84 patients diagnosed with COVID-19 who were admitted to a tertiary referral hospital during the period of March through May 2020 were enrolled. The diagnosis of COVID-19 was made according to guidance from the Turkish Ministry of Health. All of the study patients were at least 18 years of age. Patients with hematological disease, severe liver disease, or a history of radiotherapy or chemotherapy were excluded. The composite end point of the study was May 28, 2020.

The records of consecutive patients hospitalized with COVID-19 pneumonia were analyzed retrospectively. The information analyzed comprised details of demographic data, medical history, and laboratory findings. The peripheral blood samples were collected upon admission, complete blood count, blood chemical analysis, CRP, and D-dimer values were recorded, and the NLR, PLR, LCR, SII, and MPV/PLT were subsequently calculated. The SII was defined as platelet count × neutrophil count/lymphocyte count, the NLR was computed as the absolute number of neutrophils divided by the absolute number of lymphocytes, the PLR as the absolute number of platelets divided by the absolute number of lymphocytes, and the LCR as the absolute number of lymphocytes divided by the CRP.

In addition, oxygen therapy provided during hospitalization, noninvasive mechanical ventilation (NIMV), and intensive care unit (ICU) needs were evaluated and noted. Patients admitted with COVID-19 pneumonia were divided into 2 groups: severe and non-severe, according to the regularly updated guidelines of the Turkish Ministry of Health.[13] Severe disease was defined as either a respiratory rate >30 breaths/minute or a mean oxygen saturation <90%.

This study was approved by the Hamidiye Institute of Health Sciences ethics committee on April 24, 2020 (no: 2020/3/63).

Statistical analysis

IBM SPSS Statistics for Windows, Version 25.0 software (IBM Corp., Armonk, NY, USA) was used to analyze the data. Qualitative variables were presented as percentage and frequency. A chi-squared test was used to compare categorical variables. Receiver operating characteristic (ROC) analysis was used to demonstrate the diagnostic ability of the blood test findings in terms of prognosis, intensive care need, and mortality. The ROC analysis results were presented with sensitivity and specificity values. The p value was set at 0.05.

RESULTS

A total of 84 patients were included in the study, 62 of whom were male (73.8%), and the mean age of the group was 54.07±15.70 years. Thirty-seven patients had at least 1 comorbid disease. The mean length of hospital stay was 9.23±5.06 days. The demographic characteristics of the study patients are presented in Table 1.

Table 1. Demographic characteristics of the study patients

Demographic characteristics	
Sex, n (%)	
Male	62 (73.8)
Female	22 (26.2)
Age (years±SD)	54.07±15.70
Age (years)	
<65	64 (76.2)
>65	20 (23.8)
Smoking history, n (%)	
No	41 (65.1)
Yes	22 (34.9)
Comorbidity, n (%)	
No	47 (56)
Yes	37 (44)
Symptom duration before hospitalization, days (mean±SD)	9.13±6.51
BMI, mg/m^2 (mean±SD)	27.59±4.45

BMI: Body Mass Index; SD: Standard deviation.

Table 2. Disease severity, need for intensive care, and demographic factors affecting mortality

	Gender		p	Age (years±SD)	p	Comorbidity		p
	Male	Female				Yes	No	
	n (%)	n (%)				n (%)	n (%)	
Severity of disease								
Severe	23 (82.1)	5 (17.9)	0.219	58.75±9.00	0.009	22 (78.6)	6 (21.4)	0.102
Mild	39 (69.6)	17 (30.4)		51.75±14.25		34 (60.7)	22 (39.2)	
Intensive care need								
Yes	11 (84.6)	2 (15.4)	0.335	59.91±10.13	0.033	13 (100)	28 (39.4)	0.006
No	51 (71.8)	20 (28.2)		53.45±14.60		0 (0)	43 (60.6)	
Mortality								
Yes	8 (72.7)	3 (27.3)	0.930	64.0±4.55	0.001	11 (100)	0 (0)	0.012
No	54 (74)	19 (26)		52.24±14.2		45 (61.6)	28 (38.4)	

SD: Standard deviation.

Twenty-eight patients (33.3%) had severe disease. Thirteen patients (15.5%) needed NIMV and 13 patients (15.5%) needed IMV support in the ICU. In all, 11 patients died while hospitalized. The mean age of the study patients was statistically correlated with disease severity, need for intensive care, and mortality, while gender did not represent a significant difference. The demographic characteristics and their relationship to disease severity, need for intensive care, and mortality are shown in Table 2.

The CRP and NLR were statistically significant predictors of disease severity, intensive care need, and mortality; however, the absolute lymphocyte count did not demonstrate predictive validity. The SII and PLR values reached the level of statistical significance to forecast disease severity and the need for ICU hospitalization, and the LCR was a significant marker for all 3 outcomes. The MPV/PLT ratio was significant only in predicting mortality. The relevant data are presented in Tables 3a, 4a and 5a.

Comparison of ROC curves of the parameters as predictors of the severity of COVID-19 revealed a significant difference between the absolute lymphocyte count and the

Table 3a. ROC analysis for disease severity

	AUC (95% CI)	Cutoff	p	Sensitivity	Specificity
C-reactive protein	0.749 (0.643–0.837)	>177.2	0.002*	54.55	91.78
Lymphocyte	0.779 (0.675–0.862)	≤1.17	0.001*	90.91	60.27
Neutrophil-lymphocyte ratio	0.755 (0.649–0.843)	>2.56	0.001*	100.0	43.84
Systemic-immune-inflammation index	0.781 (0.677–0.864)	>883.08	<0.001*	75	75
Platelet-to-lymphocyte ratio	0.750 (0.644–0.838)	>206.48	<0.001*	57.14	83.93
Lymphocyte-C-reactive protein ratio	0.766 (0.661–0.852)	≤0.17	<0.001*	89.29	53.57
Mean platelet volume to platelet count	0.509 (0.397–0.619)	≤0.07	0.900	82.14	5.36
D-dimer	0.643 (0.531–0.744)	>0.96	0.113	54.55	73.97

*p<0.05. AUC: Area under the curve; CI: Confidence interval; ROC: Receiver operating characteristic.

Table 3b. The comparison of ROC curves of parameters predicting the severity of the disease

	CRP	Lymphocyte	NLR	SII	PLR	LCR
C-reactive protein	–	–	–	–	–	–
Lymphocyte	0.778	–	–	–	–	–
NLR	0.933	0.739	–	–	–	–
SII	0.224	0.204	0.006*	–	–	–
PLR	0.218	0.019*	0.011*	0.712	–	–
LCR	0.406	0.345	0.307	0.477	0.328	–

*p<0.05. NLR: Neutrophil-lymphocyte ratio; SII: Systemic-immune-inflammation index; PLT: Platelet-to-lymphocyte ratio; LCR: Lymphocyte C-reactive protein ratio; ; ROC: Receiver operating characteristic.

PLR: the absolute lymphocyte count had a higher area under the curve (AUC) value. A similar significant difference was observed between the NLR and the SII and between the NLR and the PLR. The SII had a higher AUC value than

Table 4a. ROC analysis for intensive care unit needs

	AUC (95% CI)	Cutoff	p	Sensitivity	Specificity
C-reactive protein	0.841 (0.745–0.912)	>108.5	<0.001*	76.92	78.87
Lymphocyte	0.793 (0.691–0.874)	≤1.02	<0.001*	76.92	74.65
Neutrophil-lymphocyte ratio	0.808 (0.707–0.886)	>5.99	<0.001*	61.54	85.92
Systemic-immune-inflammation index	0.745 (0.639–0.834)	>1320.12	0.001*	69.23	78.87
Platelet-to-lymphocyte ratio	0.716 (0.607–0.809)	>214.95	0.006*	61.54	80.28
Lymphocyte-C-reactive protein ratio	0.746 (0.640–0.835)	≤0.14	<0.001*	92.31	49.30
Mean platelet volume to platelet count	0.582 (0.469–0.689)	>0.07	0.377	30.77	94.37
D-dimer	0.699 (0.589–0.794)	>0.76	0.008*	69.23	66.20

*p<0.05. AUC: Area Under the Curve; CI: Confidence interval; ROC: Receiver operating characteristic.

Table 4b. Intensive care need-comparison of ROC curves

	CRP	Lymphocyte	NLR	SII	PLR	LCR	D-dimer
C-reactive protein	–	–	–	–	–	–	–
Lymphocyte	0.596	–	–	–	–	–	–
NLR	0.572	0.802	–	–	–	–	–
SII	0.127	0.575	0.068	–	–	–	–
PLR	0.107	0.159	0.028*	0.540	–	–	–
LCR	0.050	0.518	0.241	0.985	0.613	–	–
D-dimer	0.085	0.406	0.233	0.631	0.879	0.598	–

NLR: Neutrophil-lymphocyte ratio; SII: Systemic-immune-inflammation index; PLT: Platelet-to-lymphocyte ratio; LCR: Lymphocyte C-reactive protein ratio; ; ROC: Receiver operating characteristic.

Table 5a. ROC analysis for mortality

	AUC (95% CI)	Cutoff	p	Sensitivity	Specificity
C-reactive protein	0.749 (0.643–0.837)	>177.2	0.002*	54.55	91.78
Lymphocyte	0.779 (0.675–0.862)	≤1.17	0.001*	90.91	60.27
Neutrophil-lymphocyte ratio	0.755 (0.649–0.843)	>2.56	<0.001*	100.00	43.84
Systemic-immune-inflammation index	0.653 (0.541–0.753)	>1847.56	0.120	45.45	84.93
Platelet-to-lymphocyte ratio	0.633 (0.520–0.735)	>368.25	0.189	36.36	94.52
Lymphocyte-C-reactive protein ratio	0.696 (0.585–0.791)	≤0.02	0.029*	45.45	90.41
Mean platelet volume to platelet count	0.750 (0.643–0.838)	>0.07	0.002*	45.45	95.89
D-dimer	0.643 (0.531–0.744)	>0.96	0.113	54.55	73.97

*p<0.05. AUC: Area Under the Curve; CI: Confidence interval; ; ROC: Receiver operating characteristic.

Table 5b. Mortality-comparison of ROC curves

	CRP	Lymphocyte	NLR	LCR	MPV/PLT
CRP	–	–	–	–	–
Lymphocyte	0.778	–	–	–	–
NLR	0.933	0.739	–	–	–
LCR	0.406	0.345	0.307	–	–
MPV/PLT	0.996	0.821	0.968	0.716	–

CRP-C-reactive protein; NLR: Neutrophil-lymphocyte ratio; MPV: Mean platelet volume; PLT: Platelet-to-lymphocyte ratio; LCR: Lymphocyte C-reactive protein ratio; ; ROC: Receiver operating characteristic.

the NLR, and the NLR had a higher AUC value than the PLR (Table 3b).

Analysis of the ROC curves of the parameters as predictors of intensive care indicated that the NLR had a higher AUC value than the PLR (Table 4b). When comparing the ROC curves of parameters as markers of mortality, the LCR and the MPV/PLT values were found to be as significant as the CRP, absolute lymphocyte, and NLR values (Table 5b).

DISCUSSION

According to World Health Organization data, as of December 10, 2020, approximately 68 million people had been infected and 1.5 million people had died due to COVID-19. The scope and intensity of the pandemic created a considerable workload for healthcare employees and a shortage of hospital beds in many countries. It is of great importance to determine practical prognostic criteria for potential or definitively diagnosed COVID-19 patients, particularly because at present there is still no specific treatment and widespread vaccination has not commenced. Additional criteria that will help to identify patients who can be followed up at home, those requiring hospitalization, and those at greater risk of a critical/fatal course necessitating close follow-up will be of great value. It has been reported that the development of a cytokine storm leads to ICU admission and increased mortality in patients with COVID-19 disease. Various inflammatory factors produced during the cytokine storm are known to have the potential to cause systemic immune damage and multi-organ failure.

Several hematological and biochemical tests have been studied for their ability to predict the clinical course of COVID-19 and to detect a cytokine storm.[14] In addition, some publications have reported that various inflammatory indices, which are increasingly used in the clinical treatment and follow-up of many diseases, might be used as predictors of the course of COVID-19.[15] The present study was designed to examine the potential of SII, LCR, PLR, or MPV/PLT values to forecast the clinical course of COVID-19. When compared with routinely used biochemical parameters (CRP, NLR, absolute lymphocyte count) for value in predicting disease severity, need for intensive care, and mortality, it was observed that the LCR and 1 of the inflammatory indices were at least equally useful. The SII and PLR calculated from other test results appear to be at least as helpful as the CRP, NLR, and absolute lymphocyte count findings in predicting disease severity and the need for intensive care, and the MPV/PLT was a predictor of mortality.

An inflammatory response stimulates neutrophil production and accelerates apoptosis in lymphocytes. An irregular immune response and subsequent immunological abnormalities are believed to play an important role in the severity of virus-induced diseases. An unregulated immune response in COVID-19 may result in severe inflammation and even death.[16] Increased neutrophil production and a rapid decrease in lymphocyte apoptosis are associated with an increase in the NLR. An elevated NLR is considered a risk factor for mortality, not just in infectious diseases, but also cases of malignancy, acute coronary syndrome, intracerebral hemorrhage, polymyositis, and dermatomyositis. Recent studies have noted that the NLR may serve as a marker for poor prognosis and an independent risk factor for mortality in COVID-19 patients.[7,16] Other studies have found that advanced age, a decreased lymphocyte count, and high NLR, CRP, and procalcitonin levels may be risk factors for severe COVID-19 pneumonia.[17] The results of our study also indicated that advanced age, the presence of lymphopenia, and elevated inflammation markers (CRP, NLR) were indicators of disease severity. A meta-analysis found that a low LCR could be an indicator of poor prognosis, and our findings also suggested that low LCR values were associated with the severity of disease, the need for intensive care, and mortality.[7]

The SII index uses measures of platelets, inflammatory activators (neutrophils/monocytes), and regulators (lymphocytes), which are accepted as objective markers of the balance between systemic inflammation and immune response and play important roles in different pathways of the immune/inflammatory response. The SII index was first described by Hu et al.[18] for use as a simple, convenient, inexpensive, and non-invasive marker for hepatocellular carcinoma. High SII values are associated with a poor prognosis in various diseases, particularly in the field of oncology. A study of patients with colorectal cancer demonstrated that a high SII was correlated with poor overall survival and recurrence. SII was considered a superior prognostic factor of survival than the NLR and PLR.[19] It has been stated that a high SII may be a reliable prognostic factor for a poorer overall survey in various cancers.[12,20] We also found that a high SII was associated with the severity of the disease and the need for intensive care, as seen in other studies. However, no relationship was found between mortality and the SII value.

Activated platelets increase lymphocyte adhesion to the endothelium, promoting lymphocyte accumulation in the vascular endothelium and migration to inflammatory sites. Therefore, the PLR is another parameter indicative of systemic inflammation. The PLR may be a better indicator of inflammation than individual platelet and lymphocyte counts, as it reflects both aggregation and inflammation pathways.[10] The PLR has been used in various studies of tumors, diabetes mellitus, coronary artery disease, and connective tissue disease, and it has been demonstrated that it was a significant predictor of tumor size, lymph node infiltration, metastasis, and prognosis in cases of malignancy.[10] It was noted in a meta-analysis that an elevated PLR was an independent marker for distinguishing severe and mild disease in cases of COVID-19.[21] In another study that examined the NLR and PLR, a high NLR was found to be associated with mortality, while the PLR was not.[22] Our results similarly indicated that a high PLR was found to be significantly related to disease severity, but not with mortality.

The MPV is a measure of the average size of platelets. It is increasingly recognized as an important marker of platelet activity. Large platelets contain more prothrombotic cytokines, such as P-selectin, serotonin, adenosine 5'-diphosphate, thromboxane A2 and beta-thromboglobulin in the form of alpha-granules.[23] The MPV and platelet count are typically inversely related.[24] Therefore, an increased MPV/PLT ratio reflects a high MPV and a low platelet count. A reduced number of platelets may indicate the activation of the coagulation system. Several studies have shown that a low platelet count was associated with increased glycoprotein VI and inflammatory markers. A retrospective study of children with sepsis revealed that a high MPV/PLT ratio was a significant indicator of mortality.[25] In our study also, the MPV/PLT ratio demonstrated predictive value for mortality, but not disease severity or the need for intensive care. To the best of our knowledge, ours is the first study to analyze the relationship between MPV/PLT and mortality in COVID-19 patients.

This is a single-center and retrospective study with a relatively small number of patients, which limits the interpretation of our results.

In conclusion, our results indicated that inflammatory index values calculated from the findings of routine blood tests may also serve as prognostic markers in COVID-19 pneumonia. Inflammatory index data are cost-effective and easily accessible resources that can assist with the early recognition of severe COVID-19 cases and ensure timely initiation of the most appropriate treatment. While these inflammatory markers appear to be associated with a severe disease course, the need for intensive care, and mortality, additional, more comprehensive studies with larger patient groups are needed to further assess our results.

Ethics Committee Approval

This study was approved by the Hamidiye Institute of Health Sciences ethics committee on April 24, 2020 (no: 2020/3/63).

Peer-review

Internally peer-reviewed.

Authorship Contributions

Concept: D.T., M.Ç., E.Ç.; Design: H.Ç., E.G.U.C., B.Z.Y., D.T., C.B.S.; Supervision: E.Ç., H.Ç., E.T.; Materials: E.T., M.Ç., E.G.U.C., B.Z.Y.; Data: M.A.A., D.T., E.T., E.G.U.C., B.Z.Y.; Analysis: C.B.S., H.Ç.; Literature search: M.A.A., C.B.S., E.Ç.; Writing: M.Ç., E.T., D.T.; Critical revision: E.Ç., H.Ç.

Conflict of Interest

None declared.

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COVID-19'da SII, PLR, LCR, MPV/PLT İndekslerinin Prognoz ile İlişkisi

Amaç: Tüm dünyayı etkisi altına alan COVID-19 salgını şiddetlendikçe, hastalığın seyrini tahmin etmede laboratuvar öngörücülerinin tanımlanmasına daha fazla ihtiyaç duyulmaktadır. Bu öngörücüler ciddi hastalık geliştirme riski yüksek olan hastaları belirlemeyi ve böylece devam eden pandemide sınırlı olan insan ve teknik kaynakların tahsisini optimize edecektir. Çalışmamızda sık kullanılan mutlak lenfosit, nötrofil lenfosit oranı (NLR) ve C-reaktif protein (CRP) parametrelerinin dışında systemic-immune-inflammation index (SII), lenfosit CRP oranı (LCR), trombosit lenfosit oranı (PLR), ortalama trombosit volümünün trombosit miktarına oranı (MPV/PLT)'nin, COVID-19 pnömonisinde prediktör olarak kullanılabilirliğini saptamayı amaçladık.

Gereç ve Yöntem: Mart 2020–Mayıs 2020 arasında COVID-19 nedeniyle hastaneye yatırılan hastaların verileri geriye dönük değerlendirilerek demografik verileri, tıbbi geçmişi, laboratuvar bulguları kaydedildi. Laboratuvar parametrelerinden NLR, PLR, LCR, SII, MPV/PLT oranları hesaplandı. Oksijen inhalasyon tedavisi, noninvaziv mekanik ventilasyon ihtiyacı (NIMV), yoğun bakım ihtiyacı ve mortalite durumları kaydedildi. Ağır ve ağır olmayan hastalık olarak iki gruba ayrılan hastalardan solunum hızı >30 kez/dak veya oksijen satürasyonu <%90 olanlar ağır olarak tanımlandı.

Bulgular: Çalışmaya 62'si erkek (%73.8) 84 hasta dahil edildi, 37'sinin en az bir komorbiditesi mevcuttu. Yaş ortalaması 54.07±15.70 yıldı. Yirmi sekiz hastada (%33.3) hastalık ağır seyretmiş, 13'ünde (%15.5) NIMV ihtiyacı, 13'ünde (%15.5) yoğun bakım ihtiyacı gerekmişti. On bir hasta hayatını kaybetti. Hastalık ağırlığı, yoğun bakım ihtiyacı ve mortaliteyi öngörmede CRP ve NLR istatistiksel olarak anlamlı yüksek iken, mutlak lenfosit sayısı ise düşüktü. SII ve PLR hastalık ağırlığını, yoğun bakım ihtiyacını öngörmede anlamlı farklılık gösterirken, LCR her üç durumda da anlamlı farklılık gösterdi. MPV/PLT oranı sadece mortaliteyi öngörmede anlamlı bulunmuştur.

Sonuç: Enflamutuvar indeksler COVID-19 pnömonisinde prognostik belirteçler olarak kullanılabilir. Kostefektif ve kolay erişilebilir olan bu indeksler ağır olguların erken tanınmasını öngörerek tedavi yönetiminin zamanında başlatılmasını sağlayabilirler.

Anahtar Sözcükler: COVID-19; prognoz; sistemik immün enflamatuvar indeks.