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Research Article

Psychiatric symptoms in covid-19 inpatients and 2-month follow-up: an exploration of the relationship with neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), and D-dimer

Covid-19 sebebiyle yatışı olan hastaların psikiyatrik belirtiler açısından 2 aylık takibi ve psikiyatrik belirtilerin nötrofil-lenfosit oranı (NLR), trombosit-lenfosit oranı (PLR) ve D-dimer ile ilişkisinin incelenmesi

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Abstract

Aim: COVID-19 is linked to mental health challenges. In this study, we assessed anxiety, depression, sleep quality, and their correlation with inflammatory markers in COVID-19 inpatients.

Material and Methods: In this prospective clinical study, COVID-19 inpatients evaluated twice, 2 months apart. During the initial evaluation, participants completed the Sociodemographic Data Form, Hospital Anxiety and Depression Scale (HADS), and Pittsburgh Sleep Quality Index (PSQI). Additionally, relevant clinical information and laboratory results were extracted from the hospital automation system. In the second assessment, HADS and PSQI were again administered.

Results: In the psychiatric diagnosis group (In the group with a past psychiatric diagnosis such as depression, anxiety disorders and sleep disorders) (n=26), platelet (PLT) and platelet-to-lymphocyte ratio (PLR) values were significantly higher than in others (z= -2.090, p=0.037; z=-2.561, p=0.010). Patients' HADS-Anxiety scores positively correlated with PSQI scores ($r = 0.230$, $p = 0.015$). HADS-Anxiety ($p = 0.853$), HADS-Depression ($p = 0.562$), and PSQI ($p = 0.737$) scores showed no significant change from the initial evaluation at the 2nd-month endpoint. Hospitalization duration correlated positively with neutrophil-to-lymphocyte ratio NLR ($p = 0.016$, $r = 0.229$), PLR ($p = 0.008$, $r = 0.251$), Ferritin ($p < 0.001$, $r = 0.368$), D-Dimer ($p = 0.003$, $r = 0.285$), and CRP values ($p < 0.001$, $r = 0.330$), while negatively with lymphocyte count ($p = 0.004$, $r = -0.273$).

Conclusion: This study underscores the importance of monitoring psychiatric symptoms, such as anxiety, depression and sleep problems, during COVID-19 process and its relation with inflammatory parameters. The results addresses the controversy surrounding psychological symptoms linked to inflammation, and may contribute to the literature.

Keywords: pandemic; anxiety, depression, sleep quality, COVID-19

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Öz

Amaç: COVID-19 zihinsel sağlık sorunlarıyla ilişkilidir. Bu çalışmada, COVID-19 sebebiyle yatan hastalarda anksiyete, depresyon, uyku kalitesi ve bunların inflamatuar belirteçlerle ilişkisinin değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntemler: Bu prospektif klinik çalışmada, COVID-19 nedeniyle yatan hastalar 2 ay arayla iki kez değerlendirildi. İlk değerlendirme sırasında katılımcılar Sosyodemografik Veri Formu, Hastane Anksiyete ve Depresyon Ölçeği (HADÖ) ve Pittsburgh Uyku Kalitesi İndeksini (PUKİ) doldurdular. Ayrıca hastane otomasyon sisteminden ilgili klinik bilgiler ve laboratuvar sonuçları saptandı. İkinci değerlendirmede hastalara yeniden HADÖ ve PUKİ uygulandı.

Bulgular: Psikiyatrik tanı grubunda (Depresyon, kaygı bozuklukları ve uyku bozuklukları gibi geçmişte psikiyatrik tanı almış grupta) (n=26) trombosit (PLT) ve trombosit-lenfosit oranı (PLR) değerleri diğerlerine göre anlamlı derecede yüksekti (z= -2,090, p=0,037; z=-2,561, p =0,010). Hastaların HADÖ-Anksiyete puanları PUKİ puanları ile pozitif yönde ilişkiliydi (r = 0,230, p = 0,015). Hastaların HADÖ-Anksiyete (p = 0,853), HADÖ-Depresyon (p = 0,562) ve PUKİ (p = 0,737) puanları, 2. ay sonrasında ilk değerlendirmeye göre anlamlı bir değişiklik göstermedi. Hastanede kalış süresi, nötrofil-lenfosit oranı NLR (p = 0,016, r = 0,229), PLR (p = 0,008, r = 0,251), Ferritin (p < 0,001, r = 0,368), D-Dimer (p = 0,003, r=0,285) ve CRP değerleriyle (p<0,001, r=0,330) pozitif, lenfosit sayısı ile negatif (p=0,004, r=-0,273) korelasyon gösterdi.

Sonuç: Bu çalışma, COVID-19 sürecinde anksiyete, depresyon ve uyku sorunları gibi psikiyatrik belirtilerin takibinin önemini ve bu hastalıkların inflamatuar parametrelerle ilişkisini vurgulamaktadır. Sonuçların, inflamasyonla ilişkili psikolojik semptomları ele alması sebebiyle literatüre katkı sağladığı düşünülmektedir.

Anahtar Kelimeler: pandemi; anksiyete, depresyon, uyku kalitesi, COVID-19

Introduction

The Coronavirus transmission, which affects the whole world and threatens the life, was declared by WHO (World Health Organization), as a pandemic on March 11, 2020. The focus of the outbreak was the city of Wuhan in China, and the accumulation of cases admitted to the hospital with the diagnosis of pneumonia has started to draw attention. According to data from WHO, millions of people have been infected with Coronavirus, and hundreds of thousands have died. Scientists continue to fight the COVID-19 outbreak and examine it with different dimensions of the outbreak. COVID-19 is thought to lead to psychiatric problems such as depression, anxiety, fear and insomnia as well as physical symptoms[1]. In a study conducted on 144 patients who were hospitalized with the diagnosis of COVID-19, 28.47% had depression and 34.72% had anxiety symptoms[2].

Even if the disease is a physical condition; it has been shown in studies that the most common additional psychiatric problems are anxiety and depression, as well as all other related variables such as demographic and personality characteristics such as the symptoms of the disease and duration of hospitalization, age and gender of the individual[3, 4]. It is known that multiple factors play a role in the etiology of depression and anxiety disorders[5]. Along with many psychosocial stressors, the relationship of these diseases with conditions such as systemic inflammatory response, immunreactivation and some changes in the central nervous system has been tried to be understood[6]. Recently, new hematological markers that are easy to access and reproducible have been emphasized in patients with major depression. In conditions such as major depression and stress, there may be some quantitative hematological changes such as an increase in the number of neutrophils and leukocytes in the blood and a decrease in the number of lymphocytes[7]. Since the inflammatory process also includes parameters such as neutrophils and leukocytes, it has been started to be evaluated with new parameters such as Neutrophil / Lymphocyte ratio (NLR), Platelet / Lymphocyte ratio (PLR)[8, 9]. This issue has also been investigated in psychiatric patients, and studies on Alzheimer's and Schizophrenia patients have shown that NLR values are statistically higher than healthy control groups[10]. In another study, a significant relationship was detected between NLR and suicidal behavior[11]. According to a study conducted in Türkiye, it was stated that PLR is more predictive than NLR in terms of showing the prognosis in patients with Major depression[12]. Although it has been shown that Major Depression may be associated with inflammatory markers such as C Reactive Protein (CRP), Tumor Necrosis Factor-alpha (TNF-alpha), Interleukin-6 (IL-6) and Interleukin-1 (IL-1), the role of these markers in etiology not yet clearly illuminated[13, 14].

The relationship between depression and anxiety and inflammatory markers has been previously investigated, but the biological and psychological dimensions of COVID-19 disease and its relationship with inflammatory markers have not been fully clarified. In this study, we aimed to investigate the previous history of psychiatric illness, level of Anxiety and Depression symptoms, and the relationship between sleep quality and inflammatory markers in hospitalized patients due to COVID-19.

Material and Methods

Sample Selection and Study Design

This comprehensive study was conducted with the voluntary participation of inpatients at the COVID-19 clinic in Sakarya University Medical Faculty Training and Research Hospital, spanning from April 6, 2020, to June 30, 2020. The inclusion criteria comprised individuals aged 18-65 who were literate, willingly volunteered for research, and were undergoing inpatient treatment for Covid-19. Individuals with pre-existing psychiatric disorders were included in the study and not excluded. Conversely, exclusion criteria were applied to individuals who did not volunteer, were illiterate, had neurocognitive impairment, mental retardation, head trauma, intracranial infection, infections other than Covid-19, rheumatologic/oncologic/hematologic diseases, or delirium.

In the study, to minimize the risk of COVID-19 transmission, assessments beyond the general clinical examination were conducted using self-report scales. Patients were evaluated at the commencement and at the end of the 2nd month. All participants completed a Sociodemographic Data Form, Hospital Anxiety and Depression Scale (HADS), and Pittsburgh Sleep Quality Index (PSQI). Additionally, the clinical condition records and laboratory test results of the patients were retrieved from the hospital automation system at the initial evaluation. After 2 months, participants in the study underwent reevaluation, and HADS and PSQI were once again administered by the physicians leading the study. In strict adherence to the ethical principles outlined in the 1964 Helsinki Declaration, the study obtained necessary approvals from the Sakarya University Clinical Researches Ethics Committee (ethical approval date/number: 2020/136). Meticulous efforts were made to secure comprehensive written consent from all participating patients, emphasizing the commitment to upholding ethical standards throughout the entire research process.

Materials

Sociodemographic Data Form: In this form; there were questions about age, gender, marital status, education level, household size, working status, monthly income status, presence of child, physical comorbidities, psychiatric history, quarantine-related anxiety and patients' confidence in treatment. Sociodemographic data form was filled out by the patients during their initial assessment.

Hospital Anxiety and Depression Scale (HADS): It was developed by Zigmond and Snaith (1983) and its validity and reliability study was conducted[15]. The scale is Likert type and consists of 14 questions, 7 of which are anxiety and 7 of which are depression. The cut-off value of the scale was found to be 7 for depression and 10 for anxiety disorder. The Turkish validity and reliability study of the scale has been conducted and it has been found to be valid and reliable[16].

Pittsburgh Sleep Quality Index (PSQI): Developed in 1989 by Buysse et al.[17]. The items in the scale were prepared based on the 18-month clinical observation of patients with sleep disorders. A total PSQI score greater than 5 indicates poor sleep quality. Used to measure symptoms over the last month. Turkish validity and reliability study of the scale was conducted by Ağargün et al.[18].

Laboratory Analysis: In this study, the patients' Complete Blood Count (CBC) data were accessed through hospital automation system. White Blood Cells (WBC) and its sub- parameters, hemoglobin and platelet count were evaluated in the CBC examination. Additionally neutrophil to lymphose ratio (NLR), platelet to lymphosit ratio (PLR), C-Reactive Protein (CRP) and Body Mass Index (BMI) values were also recorded.

Statistical analysis

Firstly, the data were imported into the SPSS (Statistical Package for Social Sciences) version 22.0 software, and statistical analysis was conducted using this program. The normality distribution of the data was assessed through the Kolmogorov-Smirnov test. For normally distributed groups in two independent samples, the Student t-test was employed, while the Mann-Whitney U test was utilized for numerical variables that did not display a normal distribution. Pearson analysis was employed to examine the correlation between variables in cases of normally distributed data, whereas Spearman correlation analysis was used for data that did not exhibit a normal distribution. Linear regression analysis was performed for predictor variables. The significance level for the results was set at a 95% confidence interval, and $p < 0.05$ was considered statistically significant.

Results

A total of 110 participants aged 18-65 were enrolled in the study. Among them, 44.5% (n = 49) were female, and 55.5% (n = 61) were male, with a mean age of 47.93 ± 11.36 years. The demographic characteristics of the patients are detailed in Table 1.

Self-Report Evaluations of Patients Related to the COVID-19 Process

In the sociodemographic data form, four questions prepared by our team were asked to the patients, which will enable us to evaluate the possible anxiety that may arise during the pandemic process, their confidence in the treatment they received during this process and their views on the future. Numerical data regarding the questions and answers are shown in Table 2.

Psychiatric diagnosis history and clinical properties

The group with a psychiatric diagnosis (In the group with a past psychiatric diagnosis such as depression, anxiety disorders and sleep disorders) (n = 26) had a significantly higher PLT and PLR value than the patient group without a psychiatric diagnosis (z = -2.090 p = 0.037; z = -2.561 p = 0.010, respectively). There was no significant difference between the two groups in terms of NLR, PSQI, CRP, WBC, neutrophil and lymphocyte values. No significant difference was found between HADS and PSQI scores between those who had a previous psychiatric diagnosis and those who did not (p> 0.05) (Table 3).

The group of patients with a psychiatric illness not receiving treatment (n = 16) had statistically significantly higher WBC and PLT values than the patient group with a psychiatric disease still receiving treatment (n = 10) (respectively z = -2.082 p = 0.037; z = -2.372 p = 0.018)

NLR, PLR, CRP, Ferritin, HADS and PSQI

A positive correlation was observed between the patients' HADS-Anxiety scores and PSQI scores, and as the anxiety level increased, sleep quality deteriorated. (r = 0.230, p = 0.015, Table 5). While there was no significant relationship between PLR, NLR, Ferritin and CRP and psychiatric symptoms; CRP had a significant positive correlation with NLR, PLR and BMI.

Data on the correlation relationship between NLR, PLR, CRP, Ferritin, HADS and PSQI scores of the patients are given in Table 4.

Table 1. Sociodemographic Characteristics of Patient

	n	%		Min	Max	Mean±SD
Sex			Age (year)	18	65	47,93±11,36
Male	61	55,5				
Female	49	45,4				
Marital Status			Number of children	1	10	2,82±1,32
Married	91	82,7				
Single	19	17,3				
Education Level			Age at First Marriage (years)	14	37	22,69±4,98
Primary School	59	53,6				
Secondary School	16	14,5				
High School	17	15,5	Body Mass Index (BMI)	22,50	35,34	28,57±2,80
College/University	13	11,8				
Master's Degree and Above	5	4,5				
Presence of Comorbid Disease (non-psychiatric)			Monthly Income Level (TL) - Before Covid	800	8000	2853±1265
Yes	95	86,4				
No	15	13,6				
Presence of Child			Monthly Income Level (TL) - After Covid	0	8000	2386±1453
Yes	95	86,4				
No	15	13,6				
Job			Duration of Hospitalization (day)	1	37	8,83±5,83
Working	43	39,1				
Not working	37	33,6				
Self-employment	4	3,6	Household Size	1	9	3,71±1,40
Retired	26	23,6				

Table 2. Self-Report Evaluations of Patients Regarding the Covid-19 Process

Questions	(n:110)	%	Min	Max	Mean±SD
Do you trust the treatment you received for Covid?					
I trust completely	93	%84,5			
I partially trust	14	%12,7			
I do not trust	3	%2,7			
Are you worried about the 14-day quarantine period after discharge?					
Yes (Please rate between 1-10)	30	%27,3	4	10	8,16±1,83
No	80	%72,7			
Are you worried that the coronavirus will harm you?			4	10	7,68±2,15
Yes (Please rate between 1-10)	48	%43,6			
No	62	%56,4			
Are you hopeful for the future?					
Yes	94	%85,5			
No	4	%3,6			
Partly	12	%10,9			

Table 3. Comparison of the groups with and without a psychiatric diagnosis

	Patients with Psychiatric Diagnosis			**Patients without Psychiatric Diagnosis**			
	Min	Max	Mean ± SD	Min	Max	Mean ± SD	p*
HADS-Anxiety Score	0	10	4,00±3,55	0	10	2,96±2,89	0,198
HADS-Depression Score	0	10	3,03±3,30	0	10	3,82±3,51	0,551
PSQI	1	15	6,03±4,17	0	14	4,48±3,11	0,129
WBC(µl)	2,03	20,50	6,30±3,56	2,0	66,7	7,43±7,12	0,303
Neutrophil (µl)	1,25	16,60	4,04±2,96	0,90	58,5	4,84±6,36	0,330
Lymphocyte (µl)	0,60	2,90	1,58±0,57	0,56	4,64	1,89±0,89	0,149
Platelet (µl)	71,000	495,000	286,461±103,887	67,3	526,000	242,231±103,133	0,037
NLR(Neutrophil/Lymphocyte)	1,15	9,33	2,70±1,77	0,38	12,61	2,82±2,06	0,947
PLR(Platelet/Lymphocyte)	37,57	392,50	201,084±89,553	31,39	760,12	161,731±114,66	0,010
CRP (mg/L)	1,19	258	37,35±58,96	0,66	445	49,58±78,14	0,828
Ferritin (ng/ml)	5,25	3742	469,91±961,834	2	9690	443,6±1142,6	0,870
D-Dimer (ng/ml)	6,98	10,600	1278,9±2129,8	5,80	8200	710,8±1135,4	0,109
Duration of Hospitalization (day)	3	22	9,00±5,14	1	37	8,78±6,06	0,559

Total (n=110). Mann Whitney U Test*

Table 4. Correlation of NLR, PLR, Ferritin, CRP and BMI with PSQI and HADS Scores

	NLR	PSQI	PLR	CRP	BMI
PSQI	r= -0,051 p=0,598	1,000 -	r= -0,049 p=0,609	r=0,042 p=0,666	r=-0,082 p=0,396
HADS- Anxiety	r= -0,145 p=0,130	r=0,230 p=0,015	r= -0,124 p=0,199	r=-0,092 p=0,341	r= -0,181 p=0,058
HADS-Depression	r=-0,025 p=0,798	r=0,760 p=0,430	r= -0,101 p=0,294	r= 0,001 p= 0,993	r= -0,013 p=0,897
CRP	r=0,445 p < 0,001		r=0,316 p=0,001	1,000 -	r=0,189 p=0,049
NLR	1,000 -		r=0,463 p < 0,001		
Ferritin	r=0,279 p=0,003	r=-0,30 p=0,755	r=0,192 p=0,046	r=0,575 p=0,000	r=0,161 p=0,093

Spearman Correlation Test was applied.

Follow-up results after two months

The patients were reevaluated 2 months after the date they participated in the study. Although 75 patients (68.2%) out of 110 patients were reevaluated, communication could not be established with 35 patients (31.8%). The HADS and PSQI scores of 75 patients are summarized in Table 5. No significant difference was observed in the average scale scores between the initial interview and the two-month follow-up. (Table 5) Comparison graph of Patients' PSQI and HADS Scores at initial and second evaluation is shown in Figure 1.

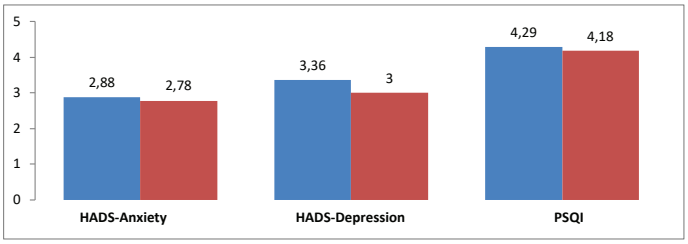

Fig 1. Comparison of Patients' PSQI and HADS Scores at first (blue) and second (red) evaluation

In the assessment of individuals with high HADS scores (n = 20) after two months, 11 individuals were reached, and a significant decrease in their HADS scores was observed (initial HADS scores mean: 9.40 ± 0.75; mean after 2 months: 5.00 ± 4.89, p < 0.001)

Factors associated with the hospitalization duration

The mean hospitalization duration was 8.83 ± 5.83 days, with patients being monitored in the clinic for a minimum of 1 day and a maximum of 37 days. In the assessment of the relationship between hospitalization duration and NLR, PLR, Ferritin, D-Dimer, and CRP values, positive correlations were observed (p = 0.016; r = 0.229 *; p = 0.008; r = 0.251 **; p < 0.001; r = 0.368 **; p = 0.003; r = 0.285 **; p < 0.001; r = 0.330 **). Additionally, a negative correlation was observed with lymphocyte count (p = 0.004; r = - 0.273 **).

The results of multiple regression analysis regarding the impact of NLR, PLR, Ferritin, Lymphocyte count, and D-Dimer parameters on the duration of hospitalization are given in Table 6. A multiple linear regression analysis was conducted to predict the duration of hospitalization using the variables NLR, PLR, CRP, Ferritin, Lymphocyte count, and D-Dimer. The analysis revealed a significant regression model, F(6,101)=3.940, p=0.001, explaining 14% of the variance in the dependent variable (Adjusted R^2=.142). Accordingly: The NLR value predicts positively and significantly, β1=0.20, t(101)=2.11, p=0.037, pr^2=0.04. The D-Dimer value predicts hospitalization duration positively and significantly, β1=0.28, t(101)=3.36, p=0.001, pr^2=0.09. The analysis determined that the other independent variables did not significantly predict the duration of hospitalizaton (p> 0.05). (Table 6).

Table 5. Comparison of PSQI and HADS scores of reevaluated patients after two months

Scales	Groups	N	Mean	Standart Deviation	t	df	p1
HADS-Anxiety2	First Evaluation	75	2,88	2,99	0,186	74	0,853
	Second Evaluation	75	2,78	4,48			
HADS-Depression3	First Evaluation	75	3,36	3,44	0,582	74	0,562
	Second Evaluation	75	3,00	4,72			
PSQI4	First Evaluation	75	4,29	3,01	0,337	74	0,737
	Second Evaluation	75	4,18	3,68			

Paired-Sample T Test1
HADS cut-off value for anixety2: 10
HADS cut-off value for depression3: 7
PSQI cut-off value4: 5

Table 6. Effect of NLR, PLR and D-Dimer Parameters on Duration of Hospitalization

Variable	Unstandardized Coefficients	Standardized Coefficients			
	B	SEβ	β	t	Sig
(Constant)	9,463	2,542		3,722	,001
NLR	,606	,287	,204	2,114	,037
PLR	-,003	,006	-,066	-,553	,582
D-Dimer	,001	,000	,285	3,162	,002
CRP	,001	,007	,008	,085	,932
Ferritin	,000	,000	,025	,279	,781
Lymphocyte	-1,529	,822	-,221	-1,862	,066

Multiple linear regression analysis was applied.

Discussion

This study is a two-month follow-up study examining psychiatric symptoms and related factors in 110 inpatients due to COVID-19. It sheds light on the psychiatric aspects of COVID-19 patients, emphasizing the prevalence of psychiatric diagnoses (23.6%) and childhood trauma (9.1%). Notably, psychiatric diagnoses correlate with higher platelet (PLT) and platelet-to-lymphocyte ratio (PLR) values, suggesting a link between psychiatric conditions and inflammatory markers. Hospitalization duration (mean: 8.83 ± 5.83 days) positively correlates with NLR, PLR, Ferritin, D-Dimer, and CRP values and negatively with lymphocyte count. Multiple regression analysis identifies NLR and D-Dimer as predictors of longer hospitalization. The study underscores ongoing mental health challenges in COVID-19 patients, highlighting persistent symptoms, comorbidities, and the potential role of inflammatory markers in psychiatric conditions and hospitalization duration.

In this study, patients' confidence in treatment was quite high, at 84.5%. In addition, it was observed that concerns about the quarantine process and corona were low (27.3%) and hope for the future (85.5%) was high. It was determined that the risk of depression in patients was high (18.2%) in the screening performed with the HADS. The psychiatric history of the patients were also evaluated, it was determined that two most common psychiatric symptoms were anxiety (42.3%) and depression symptoms (42.3%). In a study conducted on patients diagnosed with COVID-19, it was stated that the most common psychiatric problems were anxiety and depression[2]. The data in this area are insufficient to evaluate in terms of inpatients, because studies investigating the rates of anxiety and depression in hospitalized patients in this period have mostly focused on healthy society and healthcare professionals[19]. However, the distributions of psychiatric diagnoses history observed in this study are similar to those in the literature[20, 21].

Individuals with a psychiatric diagnosis in this study had higher PLR values in this study, and PLR was correlated with long hospitalization. Although there is no direct relationship between the history of psychiatric diagnosis and the duration of hospitalization, it may be thought that the psychiatric history indirectly affects immunity[22]. Previous studies have reported that NLR-PLR values are higher in those with mood disorders than healthy ones[23]. The significant high PLR (Platelet/Lymphocyte) and PLT values in untreated psychiatric patients suggest a relationship between psychiatric diseases and blood parameters.

According to the findings of this study, duration of hospitalization is not related to psychiatric symptoms but is related to PLR, NLR, Ferritin, D-Dimer and CRP. One study states that NLR and PLR rates can be used as independent prognostic markers for the exclusion of severe and non-severe disease in COVID-19 patients[24]. Additionally smilar to our results, it is stated that it would be beneficial to evaluate markers such as C-Reactive Protein (CRP), Ferritin and D-Dimer in terms of prognostic in addition to these markers in Covid-19 patients[25].

The primary limitations of our study include its short-term follow-up, not examining blood parameters of patients in the pre-COIVD period, absence of a control group, a small sample size, the use of self-report scales, and the lack of assessment of other factors influencing depression and anxiety in individuals. One of the notable advantages of our study is its short-term yet prospective design, distinguishing it from cross-sectional studies and making it one of the rare investigations in the relevant field.

Conclusion

The study identified factors influencing anxiety, depression, and sleep quality, along with their correlation to inflammatory markers in COVID-19 inpatients. Surprisingly, the correlation for hospital stay length was observed with NLR, PLR, Ferritin, D-Dimer, and CRP values, rather than psychiatric symptoms. Ongoing symptoms in the two-month follow-up highlight the significance of continuous psychiatric care during and after hospitalization. Our research is important as it underscores the necessity of psychiatric evaluation in hospitalized COVID-19 cases.

Ethical Approval

This study was conducted according to the Declaration of Helsinki and was approved by the Ethical Committee for Clinical Research of Sakarya University. (Date and Decision #2020/136)

Statements

Acknowledgments

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Conflicts of Interest

The authors declare no conflict of interests.

Authors' Contributions

Conception: Ç, T; A, E, K; O, K - Design: Ç, T; A, E, K; E, T, M; N, Y; T, E; Y, S, O; O, K;- Supervision: O, K, - Data Collection and/or Processing: Ç, T; E, T, M; N, Y; T, E;- Analysis and/or Interpretation: Ç, T - Literature: Ç, T; A, E, K - Review: Ç,T; A, E, K - Writing: Ç, T; A, E, K; E, T, M; N, Y; T, E; Y, S, O; O, K - Critical Review: O, K

Consent to participate statement

Informed consent was obtained from all patients for being included in the study.

Ethical Approval

This study was conducted according to the Declaration of Helsinki and was approved by the Ethical Committee for Clinical Research of Sakarya University. (Date and Decision #2020/136)

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