

Detecting the presence of inflammation in fibromyalgia syndrome with neutrophil/lymphocyte ratio, platelet/lymphocyte ratio, and mean platelet volume

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Abstract

Aim: Our purpose was to determine the presence of inflammation in Fibromyalgia Syndrome (FMS), whether the parameters of neutrophil lymphocyte ratio (NLR) and platelet lymphocyte ratio (PLR) and mean platelet volume (MPV) can be used as inflammation markers.

Materials and Methods: FMS patients who applied to Hatay State Hospital Physical Medicine and Rehabilitation Clinic in the last two years were analyzed retrospectively from the patient records. 92 participants were enrolled in the study, 43 of them were FMS patients, and 49 were healthy control group. Hemogram, glucose levels, hepatic panel and renal function tests, thyroid and parathyroid function testing, vitamin B12 and 25-hydroxyvitamin D, serum iron panel, folate, lipid panel, erythrocyte sedimentation rate (ESR), C-reactive protein, RF, Bucella agglutination test results were evaluated. Thus, patients with diseases that could affect NLR, PLR, and MPV were not enrolled in the study.

Results: No significant difference between the groups in terms of gender distribution was found ($p = 0.999$). No significant difference between the groups in terms of age was found ($p=0.327$). When the groups were compared in terms of MPV, the values were found to be lower in the FMS group. Statistically significant difference was not found in both groups in terms of NLR, PLR, White blood count (WBC) and Platelet (PLT) levels ($p=0.106$; $p=0.710$; $p=0.271$; $p=0.141$, respectively).

Conclusion: A significant difference was not found in both groups in terms of NLR and PLR, which were thought to be inflammation markers. The statistically significant higher values of mean ESR values in the FMS group indicate that inflammation may be present in the pathogenesis of FMS, but NLR and PLR cannot be used as indicators of inflammation, so correlating these rates with the severity of symptoms would be meaningless.

Keywords: Fibromyalgia syndrome; inflammation; mean platelet volume; neutrophil lymphocyte ratio; platelet lymphocyte ratio

INTRODUCTION

Fibromyalgia Syndrome (FMS) is a musculoskeletal disease, the cause of which is not fully understood, and is characterized by general fatigue with pain in muscles and bones, painful-tender points, and sleep disorder. Many symptoms such as sleep problems, functional bowel and mood disorders, fatigue, paresthesia, headache, dysmenorrhea, Reynaud-like findings, and concentration problems can be seen in patients (1). The prevalence of FMS in epidemiological studies is 2-4%. It is most common in the 20-50 age range and this syndrome is approximately 9 times more common in women. Many factors, mainly environmental and genetic factors, are involved in the etiopathogenesis of FMS. Especially traumatic causes, immunological, hormonal factors,

and viral infections play a role (2,3). It is also considered that hypothalamic-pituitary-adrenal axis disorders may have a role in pathophysiology. For these reasons, FMS has recently been included in the central sensitization syndrome family, considering that it is associated with the autonomic central system (4).

Objective findings cannot be detected in clinical examinations and tests in FMS. For this reason, the diagnosis of FMS is made by ruling out chronic musculoskeletal diseases that cause pain (5).

A complete blood count is an easily accessible and inexpensive laboratory test that is important in the follow-up of many diseases. NLR and PLR are indicators associated with the prognosis of systemic inflammatory

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diseases, acute viral and bacterial infections. Its usability has become important in inflammatory arthritis, diabetes mellitus, coronary heart diseases, ulcerative colitis, and some cancers (ovarian, colorectal cancer) (6-8). MPV is thought to be involved in the etiopathogenesis of immunological and inflammatory events (9).

Studies show that immunological and inflammatory events may have a place in the etiopathogenesis of fibromyalgia (1,3,10). Our aim was to show up the relationship between inflammation in fibromyalgia and hematological parameters such as MPV, NLR, and PLR, which play a role in inflammatory events.

MATERIALS and METHODS

Forty-three patients who applied to Hatay State Hospital Physical Medicine and Rehabilitation Clinic in the last two years and were diagnosed with FMS according to the American College of Rheumatology 2013 criteria were included (13). 49 participants who were considered to be healthy according to their blood values and had no complaints made up the control group. A total of 92 participants, aged 18-65, were included in this retrospective study. Other possible causes of chronic pain were excluded through clinical and laboratory tests, while the causes of inflammation and infection were ruled out. Patients with hypothyroidism, hyperthyroidism, inflammatory rheumatic disease and autoimmune disease were not included in the study. Patients with a history of major depression, cerebrovascular events and malignancy were excluded from the study. Patients were also excluded if they had cardiovascular disease, hypertension, peripheral artery disease, active chronic obstructive lung disease, heart failure, chronic kidney disease, diabetes mellitus, pulmonary or neurological disease, peripheral neuropathy, hepatic disease, alcohol abuse problems or BMIs indicating morbid obesity ($BMI \geq 40 \text{ kg/m}^2$). Hemogram, glucose levels, hepatic panel and renal function tests, thyroid and parathyroid function testing, vitamin B12 and 25-hydroxyvitamin D, serum iron panel, folate, lipid panel, ESR, C-reactive protein, RF, Bucella agglutination test results were evaluated. 5-7 cc of peripheral venous blood was collected from all patients and control subjects into sterile EDTA (Ethylenediaminetetraacetic acid) tubes. Hematological parameters were analyzed using a hematology analyzer (Abbott CELL DYN 3700, Boston, USA) within 30-45 minutes after the blood was collected. Leucocyte ($10^3/\mu\text{L}$), neutrophil ($10^3/\mu\text{L}$), lymphocyte ($10^3/\mu\text{L}$) and platelet ($10^3/\mu\text{L}$) counts were recorded. The results were expressed in $10^3/\mu\text{L}$. NLR, PLR and MPV were calculated using the results of these parameters. NLR and PLR were obtained by dividing the neutrophil and platelet counts of the participants by their lymphocyte counts.

Statistical Analysis

The statistical analyses were performed using SPSS version 21 software package. The descriptive statistics for the constant variables were expressed as mean, standard deviation, minimum and maximum values while the categorical variables were expressed as numbers and percentages. Fisher's exact test was used to compare

categorical data between groups. For comparison of independent variables and analysis of independent samples, Student T test was used if the data showed normal distribution and Mann Whitney-U test was used if the data showed abnormal distribution. $P < 0.05$ value was considered to be statistically significant.

RESULTS

Forty-three FMS patients and 49 healthy participants were enrolled in this study. No significant difference between the groups in terms of gender distribution was found ($p=0.999$). While the mean age was 47.23 ± 8.75 in the FMS group, it was 45.50 ± 8.41 in the control group, and no significant difference between the groups in terms of age was found ($p=0.327$) (Table 1).

Table 1. Demographic data

		Group		P
		FMS	Control	
Gender	Female	40 (93.0%)	45 (91.8%)	0.999*
	Male	3 (7.0%)	4 (8.2%)	
Age		47.23 ± 8.75	45.50 ± 8.41	0.327**

*: Fisher's Exact Test, **: Student's t Test

When control and FMS groups are compared in terms of laboratory data; mean ESR values were found to be statistically significantly higher in the FMS group ($p=0.018$). When the groups were compared in terms of MPV, the values were found to be lower in the FMS group and a statistically significant difference was not found in both groups in terms of NLR, PLR, WBC, and PLT levels ($p=0.106$; $p=0.710$; $p=0.271$; $p=0.141$, respectively) (Table 2).

Table 2. Biochemical data

	Group		p
	FMS	Control	
NLR	1.92 ± 0.80	1.66 ± 0.54	0.106*
PLR	152.92 ± 47.53	116.54 ± 29.90	0.710*
MPV	10.10 ± 1.02	10.84 ± 0.73	<0.001**
Sedimentation	14.33 ± 10.10	10.16 ± 5.12	0.018**
WBC	7.31 ± 1.65	6.91 ± 1.39	0.271*
PLT	277.51 ± 53.45	259.10 ± 49.02	0.141*

*: Fisher's Exact Test. **: Student's t Test

DISCUSSION

FMS is a syndrome whose etiopathogenesis has not been fully explained, but some immune mechanisms are thought to play a role. NLR, PLR, and MPV are accepted as indicators of systemic inflammatory response (7). Neutrophils, lymphocytes are the primary cells of the immune system and they can initiate and increase the release of cytokines that cause inflammation (8).

Studies evaluating the presence of inflammation in the etiopathogenesis of FMS have yielded conflicting results. With this study, we wanted to eliminate conflicting results.

Blood parameters are generally evaluated routinely in FMS patients. Its inexpensive and low cost is an advantage. Based on blood parameters, NLR, PLR and MPV can be calculated easily.

In our study, when we compared the NLR and PLR of the two groups, no significant difference was found between them. Karabas, Ç., in his study, the NLR and PLR in patients with FMS were evaluated, and similar to our study, they did not find a significant difference (11). Again, Boyraz, I., in his study, NLR and PLR in patients with FMS were evaluated, and similar to our study, they did not find a significant difference (12). Ilgun et al. (8), PLR values were found higher than the healthy control group in his study. On the other hand, no statistically significant difference was found in NLR values between the groups, similar to our study. Kilic et al. (13), in their study, NLR and PLR, which are thought as indicators of inflammatory response in patients with Rheumatoid Arthritis (RA), were examined and values were found statistically higher than the control group. Atar et al. (14), in his study, NLR and PLR in patients with osteoarthritis was evaluated, and similar to our study, a statistically significant difference was not found.

MPV is thought to play a role in immunological and inflammatory events (9). Studies are reporting that the MPV value has a negative and positive correlation with the inflammatory process. Kılıç et al. (13), in their study, MPV was found lower in patients with rheumatoid arthritis than the control group. Kapsorittekis et al. (15), in another study, detected that MPV was lower in inflammatory bowel patients than the control group. While both studies found a negative correlation between MPV and inflammation, Yazıcı et al. (16), in their study, a positive correlation was found in the relationship between The Disease Activity Score-28 for Rheumatoid Arthritis (DAS28 score) and MPV. Atar et al.(14), in their study, no statistically significant difference was found between MPV and knee osteoarthritis. Karabas, C.(11), in his study, no statistically significant difference was found between the FMS group and the healthy control group in terms of MPV values. In our study, MPV values were found lower than the control group, similar to the results of Kapsorittekis'.

In this study, mean ESR values were found to be statistically significantly higher in the FMS group. Although the high ESR values indicate the presence of inflammation in FMS, using parameters such as NLR, PLR and MPV as an inflammation marker seems meaningless. New markers are needed to show the presence of inflammation with future studies. The relationship between these new markers to be detected and the patient's clinical condition should also be investigated.

LIMITATIONS

Limitations of our study include the insufficient number of patients and the inability to evaluate the clinical parameters

of the disease. Since our study was retrospective, it was not possible to evaluate the relationship between the number of painful points, VAS values and clinical features of the patients and the inflammatory markers we investigated. We believe that further studies are needed in which the number of patients is higher and more clinical data can be investigated.

CONCLUSION

In our study, we examined the NLR and PLR, which are thought to have a role in inflammatory events, and we didn't detect any significant difference between the groups. In this study, we found that the MPV level of the FMS group was lower than the control group. Studies are reporting that the MPV value has a negative and positive correlation with the inflammatory process. Consequently, the statistically significant higher values of mean ESR values in the FMS group may indicate that inflammation may be present in the pathogenesis of FMS, but the lack of statistically significant results in terms of NLR and PLR, and conflicting results in studies where MPV values were evaluated in terms of inflammation marker, show that correlation with these parameters in terms of inflammation is meaningless.

Competing interests: The authors declare that they have no competing interest.

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Ethical approval: This study was approved by Mustafa Kemal University, Tayfur Ata Sokmen Faculty of Medicine, Clinical Study Ethics Committee (Approval no: 27, dated 27.07.2020).

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