



■ Original Article

Evaluation of laboratory parameters in inflammatory myositis

İnflamatuar miyozitte laboratuvar parametrelerinin değerlendirilmesi

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Abstract

Aim: Polymyositis (PM) and dermatomyositis (DM) are the two most common forms of idiopathic inflammatory myositis (IIM) and they are generally rare diseases. We aimed to investigate the parameter that can help the diagnosis with easy and cheap laboratory tests as C-reactive protein (CRP)/albumin ratio (CAR), neutrophil/lymphocyte ratio (NLR), platelet/lymphocyte ratio (PLR).

Material and Methods: A total of 60 participants; 30 patients (19 females, 11 males) and 30 healthy volunteers (16 females, 14 males) aged >18 years were included in this retrospective study. Demographic data (age, gender) and CRP, erythrocyte sedimentation rate (ESR), albumin values, leukocyte, neutrophil, lymphocyte, and platelet counts were recorded.

Results: 50% of the patients had a diagnosis of DM and 50% of them had a diagnosis of PM, and the median (IQR) duration of disease was 4 (0.5-13) years. The median (IQR) age of the patients was 46 (38-60) years and healthy volunteers was 45 (42-52) years (p=0.506). Gender distributions, creatinine levels, leukocyte and platelet counts were similar in the patient and control groups (p>0.005). The median values of CAR (3.6 (1.0-5.1) vs. 0.3 (0.1-0.6), p<0.001), NLR (3.4 (2.3-4.4) vs. 1.8 (1.6-2.1), p=0.002), and PLR (223 (157-249) vs. 107 (100-125), p=0.040) were found to be significantly high in the patient group.

Conclusion: Given the positive association between the disease and CAR, CAR can be considered as a helpful assessment tool to show inflammation in patients with suspected IIM.

Keywords: Idiopathic inflammatory myopathies; C-reactive protein; inflammation; lymphocytes; neutrophils

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Öz

Amaç: Polimiyozit (PM) ve dermatomiyozit (DM), idiyopatik inflamatuvar miyozitin (İİM) en sık görülen iki formudur ve genellikle nadir görülen hastalıklardır. Bu hastalıklarda C-reaktif protein (CRP)/albümin oranı (CAR), nötrofil/lenfosit oranı (NLR), trombosit/lenfosit oranı (PLR) gibi tanıya yardımcı olabilecek kolay ve ucuz laboratuvar parametrelerini araştırmayı amaçladık.

Gereç ve Yöntemler: 18 yaş üstü 30 hasta (19 kadın, 11 erkek) ve 30 sağlıklı gönüllü (16 kadın, 14 erkek) olmak üzere toplam 60 katılımcı bu retrospektif çalışmaya dahil edildi. Demografik veriler (yaş, cinsiyet) ve CRP, eritrosit sedimentasyon hızı (ESR), albümin değerleri, lökosit, nötrofil, lenfosit ve trombosit sayıları kaydedildi.

Bulgular: Hastaların %50'sinin DM, %50'sinin PM tanısı vardı ve ortanca (IQR) hastalık süresi 4 (0,5-13) yıldır. Hastaların medyan (IQR) yaşı 46 (38-60) yıl ve sağlıklı gönüllülerin 45 (42-52) yılı idi ($p=0,506$). Hasta ve kontrol grubunda cinsiyet dağılımları, kreatinin düzeyleri, lökosit ve trombosit sayıları benzerdi ($p>0,005$). CAR (3,6 (1,0-5,1) vs. 0,3 (0,1-0,6), $p<0,001$), NLR (3,4 (2,3-4,4) vs. 1,8 (1,6-2,1), $p=0,002$) ve PLR (223 (157-249) vs. 107 (100-125), $p=0,040$) ortanca değerleri hasta grubunda anlamlı olarak yüksek bulundu.

Sonuç: Hastalık ve CAR arasındaki pozitif ilişki göz önüne alındığında, CAR, İİM şüphesi olan hastalarda inflamasyonu göstermek için yararlı bir değerlendirme aracı olarak düşünülebilir.

Anahtar Kelimeler: İdiyopatik inflamatuvar miyopatiler; C-reaktif protein; inflamasyon; lenfositler; nötrofiller

Introduction

Polymyositis (PM) and dermatomyositis (DM) are the two most common forms of idiopathic inflammatory myositis (IIM) and they are generally rare diseases [1]. IIM have a reported incidence of 0.1 to 1 per 100000 person-years and prevalence of 0.55 to 6 per 100 000 in the United States [1]. They are characterized by symmetrical proximal muscle weakness, myopathy findings on electromyography (EMG), increased muscle enzyme in serum, necrosis findings with mononuclear cell infiltration in the muscles DM is differentiated from PM with its typical cutaneous findings [2].

In older series, the 5-year survival rate of IIM patients was less than 50%. In recent studies showed that improved survival of IIM patients, ranging from 72% to 85%, 34% to 75%, and 42% to 85% at 2, 5 and 10 years, respectively [3-19]. Despite all kinds of developments, mortality of IIM patients is 2-3 times higher compared to the healthy population [20]. Advanced age, delay in diagnosis or treatment, cancer-related myositis, and extra-muscular organ involvement including the lung have been reported as poor prognosis factors [20-22]. In some studies, it has been reported that serum IL-6 levels and some autoantibodies specific to myositis (for example, anti-nuclear matrix protein-2, anti-transcriptional mediator factor 1- γ , and anti-melanoma differentiation-associated gene-5), may be biomarkers that can be used to predict poor prognosis [23]. These reported myositis-specific antibodies cannot be easily measured in clinical

practice, and a valuable and simple prognostic biomarker has not yet been developed for patients with IIM.

Recent studies have reported that C reactive protein (CRP)/albumin ratio (CAR), neutrophil/lymphocyte ratio (NLR), and platelet/lymphocyte ratio (PLR) are useful and cost-effective prognostic markers in many diseases [24-26]. CAR, NLR, and PLR have been reported as inflammatory markers that can show disease activity and increase in inflammation in rheumatic diseases, including IIM [27-32]. In this study, by comparing the rates of NLR, PLR, CAR at the time of diagnosis in patients diagnosed with IIM and with healthy volunteers, besides the steps of expensive and time-consuming examinations such as autoantibody examinations, magnetic resonance imaging (MRI), muscle biopsy and EMG required for the diagnosis of IIM, it was aimed to investigate the parameter that can help the diagnosis with easy and cheap laboratory tests.

Material and Methods

Thirty patients were included in this retrospective study who applied to the rheumatology clinic between January 2020 and January 2021 and diagnosed with IIM according to the 2017 European League Against Rheumatism/American College of Rheumatology classification criteria for adult and juvenile idiopathic inflammatory myopathies [33]. And 30 healthy volunteers with matching age and gender were included in this study. The patients with malignancy, pregnancy, breastfeeding, and other chronic diseases were excluded.

Demographic data (age, gender), habits (smoking, alcohol), used drugs and previous disease history of the patients with IIM at the time of diagnosis, EMG, MRI and muscle biopsy were recorded. The values of CRP (mg/dL), erythrocyte sedimentation rate (ESR) (mm/hour), albumin (g/dL), creatine phosphokinase (CPK) (U/L) were obtained from biochemical analysis. Leukocyte (K/uL), neutrophil (K/uL), lymphocyte (K/uL), thrombocyte (K/uL) numbers were obtained from hemogram analysis. The CAR value was obtained by dividing the CRP value by the albumin value, the NLR value was obtained by dividing the neutrophil number by the lymphocyte number, and the PLR value was obtained by dividing the platelet number by the lymphocyte value. They were compared with the results of healthy volunteers with matching age and gender.

The study protocol was approved by the local ethics committee (Approval number: 2021/19). Written informed consent was obtained from each patient and the study was conducted in accordance with the Helsinki Declaration principles.

Statistical analysis

SPSS (Statistical Package for Social Sciences) version 22.0 program was used for statistical analysis in the evaluation of the data. Categorical variables were presented as number (percentage). The distribution characteristics of continuous variables were evaluated by using the Kolmogorov-Smirnov test. While data conforming to normal distribution were presented as mean ± standard deviation (SD), data not conforming to normal distribution were presented as median (IQR). Chi-square test was used to compare categorical data. In comparison of continuous variables, Independent-Samples T test or Mann-Whitney U test was preferred according to the distribution feature. A p < 0.05 was considered as statistically significant.

Results

A total of 60 participants; 30 patients (19 females, 11 males) and 30 healthy volunteers (16 females, 14 males) were included in the study and the median (IQR) age of the patients was 46 (38-60) years; the median age of healthy volunteers was 45 (42-52) years, the groups were statistically similar (p > 0.05). 50% of the patients had a diagnosis of DM and 50% of them had a diagnosis of PM, and the median (IQR) duration of disease was 4 (0.5-13) years.

The demographic data and laboratory values of the patients and the control group are summarized in Table-1. Median ages, gender distributions, creatinine levels, WBC and platelet counts

were similar in the patient and control groups. Albumin and lymphocyte counts were significantly lower in the IIM group compared to the control group, while CPK level, neutrophil count, NLR, PLR, CAR, ESR and CRP levels were significantly higher in the IIM group compared to the healthy control group.

Table-1: Demographic and laboratory data of PM/DM patients and the control group

Parameters	IIM (n:30)	Control group (n: 31)	P value
Age, year	46 (38-60)	45 (42-52)	0.506
Female gender, n (%)	19 (63%)	16 (51%)	0.440
Laboratory parameters			
Creatine, mg/dL	0.62 (0.48-0.81)	0.77 (0.7-0.88)	0.008
Albumin, g/dL	4.1 (4.0-4.6)	4.8 (4.7-4.9)	<0.001
Creatine phosphokinase, u/L	361 (102-1253)	59 (44-80)	<0.001
Hemoglobin, g/dL	13.1 (12.3-13.7)	14.8 (13.8-15.7)	<0.001
WBC, 10 ³ / L	7.3 (6.2-9.3)	7.1 (6.3-8.7)	0.829
Neutrophil, 10 ³ / L	4.8 (4.0-6.9)	3.9 (3.5-4.7)	0.005
Lymphocyte, 10 ³ / L	1.8 (0.6-3.7)	2.2 (1.0-3.2)	0.028
Platelet, 10 ³ / L	274 (246-380)	243 (216-284)	0.051
Neutrophil/lymphocyte ratio	3.4 (2.3-4.4)	1.8 (1.6-2.1)	0.002
Platelet/lymphocyte ratio	223 (157-249)	107 (100-125)	0.040
CRP/albumin ratio	3.6 (1.0-5.1)	0.3 (0.1-0.6)	<0.001
ESR, mm/hour	20.5 (8-29.5)	4.0 (3-7)	<0.001
CRP, mg/L	6.5 (2.5-15.6)	1.7 (0.7-2.8)	<0.001

CRP: C-Reactive Protein; ESR: Erythrocyte sedimentation rate; WBC: White blood cell

Discussion

Idiopathic inflammatory myositis, of which PM and DM constitute the majority, are illnesses which are rarely-seen and have generally poor prognosis [2]. The malignancy relationship of DM has been clearly defined [2]. More recent studies have reported 5-year survival rate of patients with IIM is 70-96% [20]. This rate is significantly higher compared to the period 30-40 years ago, when patients had difficulty in early diagnosis, and when immunosuppressive drugs were not as developed as now [4, 20, 33, 34]. Delays in diagnosis and treatment are factors that affect the prognosis negatively [20, 21]. So, it is important to diagnose and start treatment quickly in the IIM disease group. CAR, NLR and PLR are named among the prognostic scores based on inflammation [35]. We compared these values, which are indicators of inflammation, with the control group at the time of diagnosis of patients with IIM, and we aimed to investigate their benefits at the stage of diagnosis. According to our findings, while CAR, NLR and PLR

values were significantly higher in patients diagnosed with IIM compared to the control group. In addition, hemoglobin and albumin were significantly lower, CPK, ESR and CRP levels were significantly higher in the patient group.

Neutrophil/lymphocyte ratio is a value for which the data is obtained from the hemogram measurement, which is easily performed in every clinic. Studies have shown that NLR is associated with the disease activity of systemic autoimmune diseases [27-29, 36]. Recently, through the study conducted by Gao MZ et al. and Yang W et al., it was reported that NLR was associated with disease activity in patients with IIM and interstitial lung disease dependent on DM [31, 32]. In our study, like the significant relationship reported in these studies, significant difference was found between the NLR in newly diagnosed IIM patients.

C-reactive protein/albumin ratio value has been found to be high in many rheumatic diseases, including systemic lupus erythematosus and rheumatoid arthritis, malignant diseases and patients treated in the intensive care unit [24-32]. Yang et al. reported that CAR has a correlation with DAS-28 in RA patients and that CAR can be used as an indicator to evaluate the activity of RA disease [30]. Similarly, in the study conducted by Sunar et al., it was reported that there is a positive but weak correlation between CAR and DAS28-ESR and ESR [35]. In a retrospective study, Akkecceci et al. showed that CAR was found to be significantly associated with CRP, and ESR levels and disease activity in Takayasu arteritis [37]. In a study involving patients with ANCA-associated vasculitis, it was reported that CAR at diagnosis was an independent predictor of all-cause mortality [38]. Similar to studies conducted with other inflammatory diseases, in this study, the CAR values of the patients diagnosed with IIM at the time of diagnosis were found to be significantly higher than the control group.

There is a need for markers that can be used in the diagnosis stage and in determining the prognosis in IIM patients, which are simple, easily accessible and capable of giving fast results. The results of examinations such as muscle enzymes, autoantibody tests, EMG, MRI, and biopsy, which are still used during diagnosis, take time and some of them require invasive procedures. Further studies are required to identify such markers which are easy-to-apply, giving results quickly and inexpensive.

There are some limitations in this study. The first one is that the sample is relatively small and it is a single center study. Second, selection bias may arise because it is a retrospective study.

Finally, we did not evaluate the effects of treatment on CAR.

Conclusion

The CAR values of the patients with IIM at the time of diagnosis were significantly higher than the healthy group. Given the positive association between the disease and CAR, CAR can be considered as a helpful assessment tool to show inflammation in patients with suspected IIM. Further studies are needed to determine the use of CAR in patients with IIM.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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