Original Investigation
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Effect of psoriasis severity on inflammation parameters: Controlled study

Psoriazis şiddetinin inflamasyon parametreleri üzerine etkisi: Kontrollü çalışma

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Abstract

Background and Design: Psoriasis is a complex and chronic disease that may be associated with systemic diseases. In this study, our aim was to show the relationship of C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) values with disease severity. Additionally, the relationship between body mass index (BMI) values and inflammation markers was investigated.
Materials and Methods: Sixty-two patients with chronic plaque psoriasis and 62 non-psoriasis patients were included in the study. Psoriasis severity was calculated using the psoriasis area severity index (PASI). The relationship of psoriasis severity with BMI, serum CRP and ESR values were investigated. In addition, psoriasis patient data were compared with control group data.
Results: Of the 62 psoriasis patients included in the study, 31 (50%) were female and 31 (50%) were male. The ages of the patients ranged from 18 to 69 years and the mean age was 41.74±13.96 years. The mean PASI score was determined to be 15.86±8.95. CRP, ESR and BMI values were higher in psoriasis patients than in controls ($p<0.05$). In addition, CRP and BMI values were significantly increased as psoriasis severity increased ($p<0.05$). However, there was no relationship between ESR and psoriasis severity ($p=0.82$).
Conclusion: CRP value can be used as an objective parameter for evaluating chronic inflammation in psoriasis patients.
Keywords: Psoriasis, acute phase reactants, C-reactive protein, erythrocyte sedimentation rate, body mass index

Öz

Amaç: Psoriazis, sistemik hastalıklarla birliktelik gösterebilen kompleks kronik bir hastalıktır. Bu çalışmada enflamasyon belirteçleri olan C-reaktif protein (CRP) ve eritrosit sedimantasyon hızı (ESH) değerlerinin hastalık şiddeti ile ilişkisini göstermek amaçlandı. Ayrıca vücut kitle indeksi (VKİ) değerlerinin enflamasyon belirteçleri ile olan ilişkisi araştırıldı.
Gereç ve Yöntem: Çalışmaya kronik plak psoriazisi olan 62 hasta ve psoriazis dışı neden ile başvuran 62 kontrol hastası dahil edildi. Psoriazis şiddeti psoriazis alan şiddet indeksi (PAŞİ) kullanılarak hesaplandı. Psoriazis şiddetinin VKİ, serum CRP ve ESH değerleri ile ilişkisi değerlendirildi. Ayrıca psoriazis hasta verileri kontrol grubu verileri ile karşılaştırıldı.
Bulgular: Çalışmaya dahil edilen 62 hastanın 31'i (%50) kadın iken, 31'i (%50) erkekti. Hastaların yaşları 18-69 arasında olup, yaş ortalaması 41,74±13,96 olarak belirlendi. Ortalama PAŞİ skoru ise 15,86±8,95 olarak belirlendi. Psoriazis hastalarında, kontrol grubuna göre CRP, ESH ve VKİ değerleri istatistiksel olarak daha yüksek saptandı ($p<0,05$). Ayrıca CRP ve VKİ değerlerinin psoriazis şiddeti arttıkça anlamlı oranda arttığı gözlendi ($p<0,05$). Ancak ESH ile psoriazis şiddeti arasında bir ilişki saptanmadı ($p=0,82$).
Sonuç: Psoriazis hastalarında CRP değeri kronik enflamasyonun değerlendirilmesinde objektif bir parametre olarak kullanılabilir.
Anahtar Kelimeler: Psoriazis, akut faz reaktanları, C-reaktif protein, eritrosit sedimantasyon hızı, vücut kitle indeksi

Introduction

Psoriasis is a chronic hyperproliferative skin disease that may be associated with systemic manifestations. The increased incidence of psoriasis associated with metabolic syndrome or metabolic syndrome components (obesity, insulin resistance, hypertension and atherogenic dyslipidemia) in recent years has led to the consideration of psoriasis in the systemic

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disease category[1-3]. Besides, the severity of psoriasis and the rate of association with systemic diseases have been suggested to increase in proportion with the severity of inflammation[4,5]. The most common parameters currently used in determining the disease severity are the psoriasis area severity index (PASI) and/or the percentage of involved body surface area. However, since these parameters are subjective, the search for more objective parameters continues.

Acute phase reactants (APRs) are proteins secreted as a result of several acute and/or chronic inflammatory events. APRs are especially secreted from the liver under the effect of interleukin (IL)-6 and include C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), fibrinogen, haptoglobin, complements, ferritin, ceruloplasmin, and serum amyloid A. These values increase in several acute and chronic disorders seen with various infectious and especially bacterial diseases, malignant disorders, trauma and inflammation[3,6,7]. However, CRP and ESR are the most commonly used APRs in practice. CRP is an APR that is only synthesized by the liver and is important in the follow-up of systemic inflammatory diseases[8-11]. It is a non-specific but sensitive marker of inflammation and reaches its peak value within 24-48 hours of inflammation[8,12]. CRP has a half-life of 6-8 hours, making it useful in the follow-up of the disease[1].

ESR is another APR used in the diagnosis of acute and chronic inflammatory diseases and evaluation of the response to treatment. However, at least 24 hours is required for ESR to increase following inflammation and its half-life varies between 96 and 144 hours. Although its long half-life leads to some doubt regarding its reliability in follow-up of inflammation, it is currently in use for the diagnosis and follow-up of many inflammatory diseases[3,6,7].

APRs have been suggested as follow-up markers for several diseases with a chronic inflammatory component, such as rheumatoid arthritis, tuberculosis, various cancers, cardiovascular diseases, and psoriasis[10,11]. In this study, we aimed to evaluate the effect of psoriasis severity on CRP and ESR which are the most commonly used APRs in clinical practice. We also investigated the correlation between body mass index (BMI) and APRs in psoriasis patients.

Materials and Methods

A total of 91 psoriasis patients who presented to the dermatology outpatient clinics between March 2015 and March 2017 were retrospectively evaluated. Our study was designed in accordance with the Helsinki Declaration 2013 principles and could not approved by the ethics committee and patient for being retrospective. The group consisted of 62 chronic plaque psoriasis patients who had not been receiving any treatment for at least one month and 62 control patients who presented with a problem other than psoriasis. Those with infection or malignancy and/or subjects who had undergone major surgery in the past 6 months were not included in the study. Demographic characteristics of all patients including gender, age, and duration of disease were recorded. Disease severity was calculated by using the PASI. BMI values were determined in all the patients and the controls. The effect of psoriasis severity on serum CRP and ESR values was evaluated and compared with the control group data. The association of BMI with psoriasis severity and APRs was also reviewed.

Statistical Analysis

The SPSS (Statistical Programs for Social Sciences) v. 22 software program was used for statistical analysis. Normally distributed variables are presented as mean ± standard deviation. Chi-square or Fisher's exact test was used for the comparison of the groups. The significance level was accepted as $p<0.05$.

Results

The 62 patients included in the study consisted of 31 (50%) females and 31 (50%) males. The age range was 18 to 69 years and the mean age was 41.74±13.96 years. No statistically significant difference was found between the psoriasis patient group and the control group in terms of gender and age. The mean disease duration was 12.46±10.46 years. The mean PASI score was 15.86±8.95. The PASI score was ≤15 in 28 (45.16%) patients and >15 in 34 (54.84%) patients. The mean BMI value was 27.31±5.32 in the PASI >15 group, 25.28±3.67 in the PASI ≤15 group and 23.70±3.92 in the control group. Accordingly, the mean BMI value in the psoriasis patients was statistically significantly higher than in the control group ($p<0.05$). Similarly, the BMI level was found to be significantly higher in those with a high PASI score than in those with a low PASI score ($p<0.05$). The mean CRP level was 6.82±4.12 mg/L in the PASI >15 group, 5.08±3.43 mg/L in the PASI ≤15 group and 3.71±3.78 mg/L in the control group. According to these results, the CRP level was found to be higher in the psoriasis patients ($p<0.05$) than in controls, and significantly higher in the PASI >15 group than in the PASI ≤15 group ($p<0.05$). The mean ESR value was 12.96±5.64 mm/h in the PASI >15 group, 12.05±3.83 mm/h in the PASI ≤15 group and 8.80±6.04 mm/h in the control group. The mean ESR value was significantly higher in the psoriasis patients than in the controls ($p<0.05$,) but no statistically significant difference was found between the PASI >15 and PASI ≤15 groups (Table 1).

Discussion

Psoriasis is a skin disease with a prevalence of up to 3% in the population and where the main pathology is chronic inflammation. However, its association with many systemic diseases has been noticed in recent years, leading to the notion that skin inflammation is associated with systemic inflammation[1,13-15]. The prevalence of obesity, diabetes, hypertension, dyslipidemia, metabolic syndrome, nonalcoholic fatty liver disease, inflammatory bowel disease, and cancer has been found to be higher in psoriasis patients than in the general population[16-18]. Although the etiopathogenesis is not fully understood, chronic inflammation is thought to result in lipid-containing macrophage cell development, endothelial dysfunction and increased T helper-1 cytokine release[19,20]. Thus, the possibility of using inflammatory markers in the follow-up of diseases associated with chronic inflammatory disorders, such as psoriasis has been considered. It has even been reported that chronically elevated CRP values, even if mild, are a more important risk factor than low-density lipoprotein (LDL) elevation in coronary artery disease. Besides, the life expectancy has been estimated to be shortened in subjects with a chronically high CRP value[20]. ESR and CRP values therefore reflect the inflammatory response indirectly and directly, respectively, and their use has been suggested in diseases with chronic inflammation such as coronary artery disease[7,19,20]. However,

Table 1. Comparison of demographic and acute phase reactants values of psoriasis and control group

	Patient (n=62)	Control (n=62)	p value
Age (mean ± SD), year	41.74±13.96	40.82±14.02	0.87
Gender Female Male	 31 (50%) 31 (50%)	 31 (%50) 31 (%50)	1
Duration of disease (mean ± SD), year	12.46±10.46	-	-
PASI score	15.86±8.95	-	-
BMI (mean ± SD), kg/m^2	26.28±4.53	23.70±3.92	<0.05
	PASI >15; 27.31±5.32		
	PASI ≤15; 25.28±3.67		
CRP (mean ± SD), mg/L	5.62±3.43	3.71±3.78	<0.05
	PASI >15; 6.82±4.12		
	PASI ≤15; 5.08±3.43		
ESR (mean ± SD), mm/h	12.70±7.63	8.80±6.04	<0.05
	PASI >15; 12.96±5.64		
	PASI ≤15; 12.05±3.83		

SD: Standard deviation, PASI: Psoriasis area severity index, BMI: Body mass index, CRP: C-reactive protein, ESR: Erythrocyte sedimentation rate

it has also been argued that a single measurement of inflammatory markers may be inadequate and/or misleading in evaluating the chronic inflammatory load and the cumulative mean of the measured values should therefore be determined at certain intervals[19]. It is believed that comorbid diseases can be detected in the early period with simple and inexpensive tests that can be applied everywhere in patients with chronic inflammatory diseases such as psoriasis in this manner. This could, in turn, enable early treatment of accompanying diseases[5,17,19]. Indeed, increased levels of CRP have been reported to be a potential follow-up marker for the development of cardiovascular disease[3,11].

There are several studies in the literature that evaluate the relationship between disease severity and acute inflammatory markers. Yazici et al.[13] have reported that CRP value in psoriasis patients was increased due to the chronic inflammation caused by the disease. Besides, some studies suggest a positive correlation between the severity of the disease and APRs[12,21]. In their study, Asahina et al.[22] reported higher CRP levels in psoriasis patients with a PASI ≥12. In a study by Strober et al.[23], CRP levels were found to be higher in cases with moderate and severe psoriasis but no arthritis, and the difference was even more significant in psoriatic cases with arthritis. However, Yazici et al.[13] and Ferretti et al.[24] reported that although CRP levels were increased in their psoriasis patients, this increase was not correlated with psoriasis severity. CRP and high-sensitivity CRP levels were compared between severe and mild/moderate psoriasis cases and no significant difference was found in another study conducted by Emre et al.[11].

ESR is another APR we evaluated in our study. It is thought to be less sensitive than CRP in evaluating the severity of inflammation as it is affected by the shape of erythrocytes and its value takes longer to return to normal following an increase[6]. The number of studies evaluating the relationship between psoriasis severity and ESR is therefore smaller. A significant increase in ESR similar to that in CRP was found in psoriasis patients in the study conducted by Yazici et al.[13] ESR values in psoriasis patients were reported to be higher than in controls by Solak et al.[25] Besides, female patients were shown to have higher ESR and CRP values than female controls[25]. However, false negativity or false positivity has also been reported to be more common when ESR is used to determine inflammation[6]. ESR may be false negative especially in the early stages of inflammation while kidney diseases, female gender and old age may cause false positive results[6,7].

The mean CRP value was found to be higher in the psoriasis patient group than in the control group in our study. We observed a significant increase in CRP values with increasing psoriasis severity. The positive correlation between the psoriasis severity and BMI values in our study indicates a relationship between CRP and BMI values. This could explain the CRP increase that is especially seen in obese psoriasis patients by both psoriasis and obesity causing chronic inflammation. Obesity causes a chronic severe inflammation especially by increasing the tumor necrosis factor alpha, IL-6, plasminogen activator inhibitor type 1 and CRP levels[26]. However, the relationship between obesity and psoriasis is also thought to be especially associated with adipokines, inflammatory mediators of visceral fat tissue[22,27,28]. Thus, it is possible that the pro-inflammatory cytokines involved in the pathogenesis of obesity may be associated with increased CRP in psoriasis patients. However, the fact that CRP elevation occurs in non-obese psoriasis and non-psoriatic obese patients as well suggests that the cause is a more complex inflammatory process and that both obesity and psoriasis may have an effect that is additive to that of chronic inflammation.

ESR values in psoriasis patients were also found to be higher than in the control group in our study. However, the same increase was not seen with the mean ESR level as the psoriasis severity increased. The lack of a correlation between ESR and psoriasis severity may be explained by the less sensitive nature of ESR than CRP in inflammation follow-up. However, we only measured ESR levels once and this may have been insufficient to demonstrate the relationship with disease severity.

Study Limitations

The limitations of our study include its retrospective nature and the fact that inflammatory markers were measured only once in the psoriasis patients. However, we believe it is useful in showing that simple laboratory tests can be used for the follow-up of inflammation

in psoriasis.

Conclusion

There is no currently accepted laboratory marker for monitoring psoriasis severity and progression. Studies suggesting that skin inflammation may be accompanied by systemic inflammation with increasing psoriasis severity indicate that it may be possible to use APRs for this follow-up. Our results have shown that the CRP levels increase significantly as the psoriasis severity increases. ESR values were also found to be higher in psoriasis patients than in the controls, but we were unable to find a significant relationship between ESR and psoriasis severity. CRP seems promising in determining disease severity and systemic inflammation in psoriasis patients as it is inexpensive and easy to use as a parameter.

Ethics

Ethics Committee Approval: Our study was designed in accordance with the Helsinki Declaration 2013 principles.

Patient Approval: Our study was conducted by retrospectively reviewing the archive files.

Peer-Review: Externally peer-reviewed.

Conflict of Interest: The author did not state any conflict of interest regarding this article.

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