Original article

Evaluation of platelet morphology and C-reactive protein in patients of systemic lupus erythematosus attending dermatology outpatient department (OPD) of a rural hospital in south India

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Abstract

Background: Systemic lupus erythematosus (SLE) is an autoimmune connective tissue disorder with periods of remission and relapses. The complexity of clinical presentation of the SLE patients leads to incorrect evaluation of disease activity. Mean platelet volume (MPV) has been studied as a simple inflammatory marker in several diseases. There are very few studies in the literature about platelet count and MPV levels in adult SLE patients. We aimed to evaluate the platelet count, C reactive protein in SLE patients with cutaneous malar rash during and between the active phase.

Methods: The study consisted of 40 SLE patients in active disease and 40 healthy controls who were evaluated for erythrocyte sedimentation rate (ESR), C reactive protein (CRP), platelet count, and mean platelet volume (MPV)

Results: The platelet count and MPV were significantly lower ($p<0.001$) in patient group than in controls. The inflammatory markers ESR and CRP were significantly higher in patient group.

Conclusions: Along with conventional inflammatory markers like elevated CRP and ESR, the platelet count and MPV can be considered as markers of inflammation and disease activation in patients of SLE .

Key words: Systemic lupus erythematosus, C-reactive protein, Mean platelet volume

Introduction

Systemic lupus erythematosus (SLE) is a chronic, multisystem, autoimmune connective tissue disorder, with a heterogeneous presentation. The disorder presents as a broad spectrum of clinical presentations involving almost all organs including skin[1]. Skin being the largest organ of the body gets visibly affected. The clinical course of SLE is characterized by periods of remission and relapses [1]. Since SLE is an complex condition involving cutaneous as well as systemic manifestations, the disease activity in SLE can be assessed using composite disease activity indices, such as the SLE Disease Activity Index (SLEDAI) and British Isles Lupus Assessment Group (BILAG) [2]. However, these indexes are complex for use in routine clinical practice. Therefore, there is great amount of interest in the identification of biomarkers that can quantify disease activity of SLE. Since SLE is an inflammatory condition, the inflammatory cytokines released are said to affect platelet activity. The platelet count and mean platelet volume (MPV) are parameters used during routine haematological investigations and to which clinicians do not usually pay much attention.

Platelet volume is known to be a marker determined from megakaryocytes during platelet production, which is associated with platelet function and activation.[3] Under normal circumstances, there is an inverse relationship between platelet size and number[4]. MPV has been studied as a simple inflammatory marker in several diseases. Some studies have reported that platelet count decreases and MPV increases in smoking, myocardial infarction and stroke where as it is reduced in inflammatory conditions like rheumatoid arthritis, ankylosing spondylitis, ulcerative colitis etc. [5-7]. Since, there are very few studies on platelet morphological indices such as count and mean volume, the present study was undertaken to assess if these parameters along with classical markers of inflammation such as C-reactive protein (CRP) and ESR can be useful in assessment of disease activity of SLE.

Materials and methods

The study comprised of total 80 female subjects aged 20 to 50 years, out of which 40 were patients diagnosed with SLE in the outpatient Department of Dermatology, Kamineni Institute of Medical Sciences, Hospital, Narketpally over a time period of two years. Patients were evaluated clinically by the dermatologist based on history, systemic and cutaneous examination including site of the lesions, severity of erythema. Forty age matched healthy female controls were enrolled for this study, recruited from healthy volunteers and patients attending skin outpatient department for cosmetic problems like acne and pigmentary disturbances. The study was approved by institutional ethics committee. Informed consent were taken from the patients as well as the controls, before collection of blood sample.

Complete blood picture (CBP), Platelet count and MPV

Whole blood (EDTA as anticoagulant) was used for determining WBC count, Hematocrit (Ht%), Hb concentration, platelet count and MPV by an Auto-Hematology Analyser (Lab Life H3D, MINDRAY).

Estimation of C-reactive protein (CRP)

CRP was evaluated manually according to latex agglutination method by Becker et al [8] . This method is based on the principle of agglutination by mixing the specimen containing CRP with latex reagent agglutinates which are coated with anti-human CRP. The agglutination within two minutes was taken as positive titre and the CRP concentration was estimated in mg/dl by taking the highest dilution.

Statistical analysis

The data was expressed as mean ± standard deviation. Comparison of data was done by independent sample t-test and p-values were calculated using the Open EPI6 software (Open Epi Version 2.3.1 from Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, GA 30322, USA). P-value of <0.05 was considered to be significant.

Results

Demographic and clinical features of SLE patients are given in Table I. All study parameters are presented in Table 2. The mean ages of the SLE subjects were 42 ± 16 years, while the mean ages of controls were 41 ± 17 years. There were no significant differences between patient group with SLE and healthy controls in terms of age distribution. Platelet count and MPV was significantly lower in the patient group than in the control group ($p<0.001$); however, there was no difference in Hb and Ht. The CRP and ESR values were significantly higher in the patient group than control group ($p<0.001$).

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Table-1 Hematological data of patients and controls (Data expressed as mean ± SD)

	Controls (n=40)	Patients (n=40)	p-value
Age (years)	42.4±4.3	41.7 ±3.9	0.448
WBC (x109/L)	7.92±4.2	7.18±2.9	0.362
Ht (%)	44.76±1.34	42.83±1.45	<0.001
Hb (gm%)	13.1±1.4	12.9±1.7	<0.001

Hb- Hemoglobin concentration, Ht-Hematocrit, *p<0.05, **p<0,001

Table-2 Comparison of platelet count, MPV and inflammatory markers among patients and controls.(Data expressed as mean ± SD)

	Controls (n=40)	Patients (n=40)	p-value
Plateletcount (x109/L)	267.5±12.5	235.5±15.8	<0.001*
MPV(fl)	8.4±0.19	7.69±1.12	<0.001*
CRP(mg/dl)	6.4±22.3	15.3±6.1	<0.001*
ESR(mm/h)	18.6±26.9	30.6±13.9	<0.001*

MPV-Mean platelet volume, CRP- C reactive protein , ESR-Erythrocyte sedimentation rate, *p<0.05

Discussion

In the present study, it was observed that the platelet count and mean platelet volume were significantly decreased in SLE patients during active phase compared with healthy controls. There are very few studies in the literature about platelet count and MPV in adult SLE patients. Gasparyan et al have reported significantly reduced platelet count and MPV in rheumatoid arthritis as well as in SLE [9]. They have suggested that it may be possibly due to the increased consumption of large platelets at the sites of inflammation in SLE. Kisacik et al. [7] have observed MPV to be significantly low in active inflammatory conditions such as ankylosing spondylitis and rheumatoid arthritis [5]. They have also reported that increase in MPV and subsequent normalization following treatment. The present study is in concurrent with Nagahama et al. who have reported reduced platelet count and MPV in patients with SLE in the active phase, as in our study [10]. Safak et al. have suggested that the decrease in plate count and mean

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platelet volume might be due to possible interaction of inflammatory cytokines such as interferon-α with mechanism of platelet activation [11].

While analysing the inflammatory markers in the present study, we observed significant increase in ESR and CRP levels in the patient group in comparison to controls. The increase in ESR was highly significant, however ESR is often considered as non specific marker of inflammation by the clinician. The increase in CRP in SLE patients was moderately significant. Studies have indicated that many patients with active SLE display only modestly elevated or even normal CRP levels during periods of intense disease activity [12–14], particularly when compared with patients with rheumatoid arthritis [14]. Indeed, this observation has led to similar conclusion suggesting that there is a modest increase in CRP levels in SLE patients during intense phase of disease activity. The findings of the present study are similar to Becker et al. who suggested that if marked CRP elevation is present in patients with SLE, it indicates active infection [13].The moderately high CRP levels in SLE may be possibly due to induction of acute-phase protein synthesis in hepatocytes which is regulated by a combination of inflammation-associated cytokines, cytokine modulators, and other blood-borne molecules in varying combinations, sequences of action, and concentrations [15]. In vitro studies of adult human hepatocytes indicate that IL-6 is the cytokine primarily responsible for CRP induction [16-18]. Studies in a variety of diseases have consistently shown a correlation between serum IL-6 and CRP levels [19,20].Thus the present study states that there is a decrease in platelet count and MPV along with moderate elevation of CRP in SLE. Since MPV and platelet count can be easily measured by automated cell counters in routine haematological laboratories under any storage conditions for blood samples, we suggest along with CRP, these markers can be used for assessing SLE disease activity.

Limitation

The results of this study are subjected to some limitations. The study was conducted on relatively smaller sample size which have been taken from a limited geographical area. Thus studies on larger scale are warranted to further strengthen the present results.

Conclusion

We suggest platelet count and MPV to be evaluated as markers of disease progression by the clinician along with conventional markers of inflammation like CRP for a better assessment of disease activity in SLE.

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