ORIGINAL ARTICLE

Neutrophils-to-lymphocyte and platelet-to-lymphocyte ratio and Systemic Lupus erythematosus activity: a cross-sectional study in Brazilian patients

Relação neutrófilos-linfócitos e plaquetas-linfócitos e atividade do lúpus eritematoso sistêmico: um estudo transversal em pacientes brasileiros

Jady Elen Pontes[1], Thiago Alberto Fernando Gomes dos Santos[1], Renato Nisihara[2], Thelma Larocca Skare[1,2]

ABSTRACT

Background: To identify disease activity in Systemic Lupus Erythematosus (SLE) is important to choose the correct treatment. Neutrophil/Lymphocyte (N/L) and Platelet/Lymphocyte (P/L) ratio have been considered to reflect inflammatory status in several situations. In this study, we aimed to evaluate the association of N/L and P/L with SLE disease activity. **Methods:** This is a cross-sectional study of 189 SLE patients for disease activity for SLEDAI-2K (SLE Disease activity index), ESR (erythrocyte sedimentation rate), CRP (C reactive protein) and hemogram with N/L and P/L ratio. **Results:** N/L ratio demonstrated correlation with SLEDAI (rho=0.24; p=0.0009) ESR (rho =0.17; p=0.02) and CRP (rho=0.23; p=0,004); P/L correlated with SLEDAI (rho=0.21; p=0.003), CRP (rho=0.26; p=0.001), ESR (rho=0.23; p=0.003) and levels of anti-dsDNA (rho=0.29; p=0.02) and had a negative correlation with hemoglobin (rho=-0.27; p=0.0001). A cut-off of 2.28 in N/L ratio had sensitivity of 68.6% and specificity of 68.2% for active disease; a cut-off of 124.1 in P/L ratio had sensitivity of 82.9 and specificity of 41.1% for active SLE. **Conclusions:** N/L and P/L ratio are useful in the evaluation of SLE disease activity.

Keywords: Systemic lupus erythematosus, Neutrophils, Platelets, Lymphocyte, Inflammation.

RESUMO

Fundamento: Identificar a atividade da doença no Lúpus Eritematoso Sistêmico (LES) é importante para a escolha do tratamento correto. A relação neutrófilo/linfócito (N/L) e plaqueta/linfócito (P/L) tem sido considerada como reflexo do estado inflamatório em diversas situações. Neste estudo, objetivamos avaliar a associação de N/L e P/L com a atividade da doença do LES. **Métodos:** Este é um estudo transversal de 189 pacientes com LES para atividade da doença para SLEDAI-2K (SLE Disease activity index), VHS (velocidade de hemossedimentação), PCR (proteína C reativa) e hemograma com N/L e P/L Razão. **Resultados:** A relação N/L demonstrou correlação com SLEDAI (rho=0,24; p=0,0009) VHS (rho=0,17; p=0,02) e PCR (rho=0,23; p=0,004); P/L correlacionado com SLEDAI (rho=0,21; p=0,003), PCR (rho=0,26; p=0,001), VHS (rho=0,23; p=0,003) e níveis de anti-dsDNA (rho=0,29; p= 0,02) e teve correlação negativa com a hemoglobina (rho=-0,27; p=0,0001). Um ponto de corte de 2,28 na relação N/L teve sensibilidade de 68,6% e especificidade de 68,2% para doença ativa; um ponto de corte de 124,1 na relação P/L teve sensibilidade de 82,9 e especificidade de 41,1% para LES ativo. **Conclusões:** As relações N/L e P/L são úteis na avaliação da atividade da doença do LES.

Palavras-chave: Lúpus eritematoso sistêmico, Neutrófilos, Plaquetas, Linfócitos, Inflamação.

[1]Mackenzie Evangelical Hospital. Rheumatology Unit., Curitiba, (PR), Brazil.
[2]Mackenzie Evangelical School of Medicine Paraná, Curitiba, (PR), Brazil.

https://doi.org/10.11606/issn.2176-7262.rmrp.2024.200940

INTRODUCTION

Systemic lupus erythematosus (SLE) is a chronic multisystemic autoimmune disease with a variable spectrum of severity. Its treatment is grounded on immunosuppression that should be tailored to the degree of disease activity not only to avoid the disease cumulative damage but also the excessive use of drugs that could cause severe collateral side effects (1,2).

Measuring disease activity in SLE is not an easy task. There is not a single biomarker with good sensitivity and/or specificity that could be used in such context, so biomarkers combination and composite indexes have been applied to fulfil this task. Some of these instruments are SLEDAI (SLE Disease activity index) (3), BILAG (British Isles Lupus Assessment Group index) (4), ECLAM (European Consensus Lupus Activity Measure) and SLAM (Systemic Lupus Activity Measure) (5) that quantify several clinical aspects and laboratory findings. They are complex, time consuming and difficult to apply in daily care.

The neutrophils /lymphocytes (N/L) and platelets/lymphocytes (P/L) ratio in the hemogram has been used to evaluate inflammatory activity in several situations, including autoimmune diseases (6-9) such as rheumatoid arthritis (8,9), ankylosing spondylitis (10) and scleroderma (11). N/L and P/L have been shown to be prognostic factors in several solid tumors, including lung, colorectal, pancreatic, breast, ovarian and gastric cancer (12,13) Additionally, they have been associated with disease severity, hospitalization, malnutrition, recurrences and mortality in chronic illnesses, such as lung, cardiovascular and kidney diseases (12).

In SLE, these hematological indicators were analyzed by Firizal et al. (14) who stablished that N/L ratio could be used to determine disease activity. Wu et al. (15) studying both N/L and P/L ratio found that the two measurements are useful inflammatory markers for assessment of disease activity and that patients with nephritis had higher N/L ratio than those without nephritis. Several cut-off points have been stablished for these hematological ratios according to different studied populations (15-16). Kweon et al. (17) studying healthy Korean population drew attention to the fact that race is a variable to be taken into account establishing N/L and P/L ratio cut-off values. SLE is a disease known to have a strong genetic link (18). Therefore, in SLE, racial/ethnic distinctions have been observed and seem to influence not only clinical and serological features but also disease activity, cumulative damage and mortality (18).

There are few studies on this area, most of them in Asiatic population; to the author's knowledge none of them in Brazilian SLE patients. Herein, a sample of Brazilian SLE patients were studied for N/L and P/L aiming to know its relationship to disease activity.

METHODS

This is a retrospective study approved by the Committee of Ethics in Human Research from Faculdade Evangélica Mackenzie do Paraná under protocol 4.192.537 from 2020 agost, 4. Due to the retrospective nature of the research, the Ethics Committee waived the consent form. Patient's data was collected by two of the authors (JP and TAGS) and to preserve patients' identity, numbers were used for identification. All research participants compromise to preserve

the patients' privacy and anonymity as well as the data confidentiality.

SLE patients of both genders, older than 18 years, that fulfilled the SLICC classification criteria (19) for this disease and with disease onset after 16 years of age were included. Pregnant, patients with any other associated chronic inflammatory disease, infectious disease or cancer were excluded. All included patients were from a single Rheumatology Unit of a Tertiary Hospital that cares for SLE patients from Public Health System and comprised the charts of those who attended for regular consultations during the period of 1 year (2019 January to 2020 January, respecting the inclusion and exclusion criteria.

Charts were reviewed for epidemiological, clinical and serological data.

Complete blood cell (CBC) counts and differential values were recorded. At this institution, CBC is done through automatized equipment model DXH 900 (Beckman Coulter, USA).

The N/L ratio was defined as the absolute count of neutrophils divided by the absolute count of lymphocytes and P/L as the absolute platelet count divided by the absolute count of lymphocytes.

Simultaneously with blood cell count collection, ESR (erythrocyte sedimentation rate), and C reactive protein, C3, C4 (by turbidimetry, Alinity/Abbott, USA), and anti-dsDNA (by indirect immunofluorescence – Wama Diagnostica, Brazil) were measured as well as SLEDAI-2K.

The SLEDAI-2K is an instrument to measure disease activity that takes into account clinical and laboratory findings in the past 10 days and has a range from zero to 105 were zero means no activity and 105 the most severe flare (20).

Data distribution was studied by Shapiro Wilk's test. Non-parametric numerical data were expressed as median values and interquartile range (IQR). Frequency distribution was expressed in percentage. Correlation studies of N/L and P/L with SLEDAI, ESR, CRP, C3, C4 were done by Spearman test. Receiver Operating Characteristic (ROC) curves were used to analyze and determine optimal cut off values of N/L and P/L. To construct the ROC curve patients were divided in two groups: 1) active-SLE- if the SLEDAI ≥4 and (2) inactive-SLE, if the SLEDAI <4 (14,22-23). The adopted significance was 5%. Calculus was done with help of the MedCalc® Statistical Software version 19.6.

RESULTS

a. Description of studied sample

In the period, we studied retrospectively 189 patients with SLE. None case was excluded.

Demographic data of studied sample is on **Table 1** that shows that most of the patients were middle aged females.

The clinical and serological profile of this sample is on **Table 2** that shows that the most common clinical manifestations were articular and cutaneous and that almost half of the sample have had glomerulonephritis. None of the patients used rituximab or belimumab, but almost 20% were on glucocorticoid.

In this sample, the SLEDAI ranged from 0 to 14; median of 0 (IQR=0-2). The results of laboratory data collected simulta-

neously with SLEDAI determination are on **Table 3**. This table shows that the median N/L ratio was 2.1 and the median P/L ratio was 149.8.

b. Study of N/L and P/L in relationship to inflammatory activity

The correlation studies of N/L ratio with inflammatory parameters are on **Table 4**. A positive correlation with SLEDAI, ESR, CRP was observed.

Table 5 shows the correlation studies of inflammatory parameters with P/L ratio with a positive correlation with SLEDAI, ESR, CRP and anti-dsDNA titer. In addition, a negative correlation was found with hemoglobin.

The **Figure 1** shows the Receiver Operating Characteristic (ROC) curves used to analyze and determine optimal cut off values of N/L and P/L.

DISCUSSION

The results of the present study showed that both N/L and P/L ratio are useful determining SLE disease activity. These results are in agreement with previous reports in samples of population from other ethnic background. We have found that the best cutoff of N/L ratio was of 2.28 while a study from Indonesia in 112 patients found the value of 2.94 (with sensitivity and specificity of 60.7% and 76.7% respectively) and Wu et al. (15), studying lupus patients from China, found a value of 2.26 (with 75% sensitivity and 50% specificity). Also, a metanalysis by Ma et al. (23) of nine studies including 1128 SLE patients displayed that N/L ratio was positively correlated with SLEDAI (correlation coefficient=0.42). The same meta-analysis showed that that P/L had a positive correlation with SLEDAI (correlation coefficient=0.30).

The N/L ratio was found to be higher in SLE individuals than in healthy controls (24). According to Han et al. (24), this may be due to lymphopenia rather than to neutrophilia. However, the neutrophil count may be important in certain subgroups of lupus patients. Neutrophils are central players in the SLE physiopathology, mainly the low-density granulocytes (LDG) that are a subset associated with spontaneous NETs (extracellular traps) formation, a process in which nuclear and cytosolic debris are extruded from dying polymorphonuclear cells. Once released, NETs expose important intracellular autoantigens, including histones and DNA favoring immune complex formation, as well as inducing type I interferon (IFN) production (24). A recent study has found an association of N/L with the presence of low-density granulocytes (LDG), with immune complex mediated inflammation and with type I INF production. The frequency of LDGs is curiously associated with low lymphocyte count rather than neutrophilia, suggesting that their production may share a common mechanism (24).

We also found that P/L was associated with disease activity (15,23). A cut off of 124.1 was found to have 82.9% of sensitivity of and 41.1% of specificity. This number is lower than those found by Wu et al. (15) of 203.8 (with 42.3% sensitivity and 83.9% specificity) but these latter authors used different SLEDAI cut-off for considering disease activity.

Platelets have important roles in innate and adaptive immune responses having interactions with immune cells (25). They can adhere to leukocytes through adhesion mo-

lecules and chemokines, facilitating leukocyte recruitment to the sites of tissue damage. It has been reported that activated platelets induce the creation of NETs (25). They may also interact with mononuclear cells inducing a proinflammatory monocyte phenotype (25). However, data on the interactions of platelets and lymphocytes are scarce. Gerdes et al. (26) found that platelets control CD4+ T-cell activation and differentiation.

This work has several limitations. The low number of patients is one of them. The median incidence rate of SLE in our region in Brazil during years of 2017-2019 was of 160.2 per million people showing that this disease is not very common (27). So, it is difficult to obtain large samples. Another limitation is its retrospective design; prospective studies could offer more precise data. Moreover, the studied sample had relatively low disease activity not allowing the study of these hematological ratios according to the activity spectra in different organs and systems. The patients presently studied were already on treatment and this is an additional limitation. Despite the fact that none of them were using anti B cell therapy, almost 20% of the sample used glucocorticoid that are known to modify the leukocyte count. In this context, the study of lupus treatment naïve patients would be desirable. Nevertheless, despite the fact that the glucocorticoid may alter neutrophil and lymphocyte counts, it is reasonable to think that the high hematological ratios observed in these patients do reflect a more active disease which is more likely to be treated. On the other hand, this work has the merit of showing that a simple and available test such as blood cell count, when well explored and interpreted, may give additional information about disease activity, a crucial aspect to be understood in order to properly treat SLE patients. CBC is a low-cost test that can be obtained and was evaluable even in places with low resources. This finding is not related to age or type of population.

Concluding, we have found that N/L and P/L ratio are associated with disease activity in SLE and that this information can be applied to adult SLE patients from Brazilian population.

REFERENCES

1. Tsang-A-Sjoe MWP, Bultink IEM, Heslinga M, Voskuy AE. Both prolonged remission and lupus low disease activity state are associated with reduced damage accrual in systemic lupus erythematosus. Rheumatology (Oxford). 2017;56(1):121-8.

2. Apostolopoulos D, Morand EF. It hasn't gone away: the problem of glucocorticoid use in lupus remains. Rheumatology (Oxford). 2017;56 (suppl-1):i114-i22.

3. Buyon JP, Petri MA, Kim MY, Kalunian KC, Grossman J, Hahn BH, et al. The effect of combined estrogen and progesterone hormone replacement therapy on disease activity in systemic lupus erythematosus: a randomized trial. Ann Intern Med. 2005; 142:953–62.

4- Gordon C, Sutcliffe N, Skan J, Stoll T, Isenberg DA. Definition and treatment of lupus flares measured by the BILAG index. Rheumatology. 2003;42:1372–9.

5- Ward MM, Marx AS, Barry NN. Comparison of the validity and sensitivity to change of 5 activity indices in systemic lupus erythematosus. J Rheumatol. 2000;27(3):664-70.

6- Qian G, Hongxia D, Jin LI. Neutrophil-lymphocyte ratio at 14th week predicts loss of response to 52-week infliximab therapy in patients with Crohn's disease. Nan Fang Yi Ke Da Xue Xue Bao. 2020;40:453-458

7- Ruta VM, Man AM, Alexescu TG, Motoc NS, Tarmure S, Ungur RA, et al. Neutrophil-to-lymphocyte ratio and systemic immune-inflammation index-biomarkers in interstitial lung disease. Medicina (Kaunas). 2020;56(8):381.

8- Chandrashekara S, Lingaraju DC, Renuka P, Anupama KR. Potential of neutrophil to lymphocyte ratio in predicting sustained remission in rheumatoid arthritis compared to other immune activation markers. Indian J Med Res. 2020;152:234-43.

9-Targońska-Stępniak B, Zwolak R, Piotrowski M, Grzechnik K, Majdan M. The Relationship between hematological markers of systemic inflammation (neutrophil-to-lymphocyte, platelet-to-lymphocyte, lymphocyte-to-monocyte ratios) and ultrasound disease activity parameters in patients with rheumatoid arthritis. J Clin Med. 2020; 9:2760.

10- Xu S, Ma Y, Wu M, Zhang X, Yang J, Deng J et al. Neutrophil lymphocyte ratio in patients with ankylosing spondylitis: A systematic review and meta-analysis. Mod Rheumatol. 2020;30:141-8.

11- Kim A, Kim Y, Kim GT, Ahn E, So MW, Sohn DH, et al. Platelet-to-lymphocyte ratio and neutrophil-to-lymphocyte ratio as potential makers for digital ulcers and interstitial lung disease in patients with systemic sclerosis: cross-sectional analysis of data from a prospective cohort study. Rheumatol Int. 2020;40:1071-9.

12- Paliogiannis P, Fois AG, Sotgia S, Mangoni AA, Zinellu E, Pietro Pirina P, et al. Neutrophil to lymphocyte ratio and clinical outcomes in COPD: recent evidence and future perspectives Eur Respir Rev. 2018;27(147):170113.

13-Wang N, Li C, Yang Y, Guan Y, Wang F, Wang Y, et al. The Usage of Platelet/Lymphocyte Ratio, Carbohydrate Antigen 125 Combined with Magnetic Resonance Diffusion Weighted Imaging in Diagnosis of Recurrent Ovarian Cancer and Neuropathic Pain. World Neurosurg. 2020:S1878-8750(20)32502-X.

14- Firizal AS, Sugianli AK, Hamijoyo L. Cut off point of neutrophil-to-lymphocyte ratio as a marker of active disease in systemic lupus erythematosus. Lupus. 2020;29:1566-70.

15- Wu Y, Chen Y, Yang X, Chen L, Yang Y. Neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) were associated with disease activity in patients with systemic lupus erythematosus. Int Immunopharmacol. 2016;36:94-9.

16- Gasparyan AY, Ayvazyan L, Mukanova U, Yessirkepov M, Kitas GD. The platelet-to-lymphocyte ratio as an inflammatory marker in rheumatic diseases. Ann Lab Med. 2019;39:345-7.

17- Kweon OJ, Lee MK, Kim HJ, Chung JW, Choi SH, Kim HR. Neutropenia and neutrophil: lymphocyte ratio in a healthy Korean population: race and sex should be considered. Int J Lab Hematol. 2016;38:308-18.

18- Lewis MJ, Jawad AS. The effect of ethnicity and genetic ancestry on the epidemiology, clinical features and outcome of systemic lupus erythematosus Rheumatology (Oxford). 2017;56 (suppl-1):i67-i77.

19- Petri M, Orbai AM, Alarcón GS, Gordon C, Merrill JT, Fortin PR et al. Derivation and Validation of the Systemic Lupus International Collaborating Clinics Classification Criteria for Systemic Lupus Erythematosus. Arthritis & Rheumatism 2012;64:2677–86.

20-Gladman DD, Ibanez D, Urowitz MB. Systemic Lupus Erythematosus Disease Activity Index 2000. J Rheumatol 2002;29: 288–91.

21- Soliman WM, Sherif NM, Ghanima IM and EL-Badawy MA. Neutrophil to lymphocyte and platelet to lymphocyte ratios in systemic lupus erythematosus: relation with disease activity and lupus nephritis. Rheumatol Clin 2020;16: 255–61.

22-Yee C-S, Farewell VT, Isenberg DA, Griffiths B, The L-S, Bruce IN et al. The use of systemic lupus erythematosus disease activity index-2000 to define active disease and minimal clinically meaningful change based on data from a large cohort of systemic lupus erythematosus patients. Rheumatology (Oxford) 2011;50: 982–8.

23- Ma L, Zeng A, Chen B, Chen Y, Zhou R. Neutrophil to lymphocyte ratio and platelet to lymphocyte ratio in patients with systemic lupus erythematosus and their correlation with activity: A meta-analysis. Int Immunopharmacol. 2019;76:105949.

24- Han BK, Wyham KD, Cain KC, Tyden H, Anders A Bengtsson AA, Lood C. Neutrophil and lymphocyte counts are associated with different immunopathological mechanisms in systemic lupus erythematosus Lupus Sci Med . 2020;7(1):e000382.

25- Mekaj YH. The roles of platelets in inflammation, immunity, wound healing and malignancy. Int J Clin Exp Med. 2016;9:5347-58.

26- Gerdes N, Zhu L, Ersoy M, Hermansson A, Hjemdahl P, Hu H, Hansson GK, Li N. Platelets regulate CD4+ T-cell differentiation via multiple chemokines in humans. Thromb Haemost. 2011; 106:353-62.

27- Marques NP, Marques NCT, Lucena EHG, Martelli DRB, Oliveira EA, Martelli-Junior H. The continuous increase in the number of systemic lupus erythematosus cases in Brazil in the COVID-19 era. Braz Oral Res. 2023;37:e066.

Author contributions:

All authors contributed to the study conception and design. Material preparation, data collection were performed by JP, TAFGS and TS. The data analysis and the first draft of the manuscript was done by RN and TS and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Conflicts of interest/Competing interests: All authors declare that there are not conflict of interest.

Funding: No Fundings

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the Committee of Ethics in Research from Evangelic Mackenzie School of Medicine under number 4192537.

Consent to participate All participants signed an informed consent.

Consent for publication: Yes.

Transparency declaration

The authors affirm that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Corresponding Author:
Renato Nisihara
renatonisihara@gmail.com
renato.nisihara@fempar.edu.br

Editor: Prof. Dr. Felipe Villela Gomes
Received: aug 10, 2022
Approved: aug 23, 2023

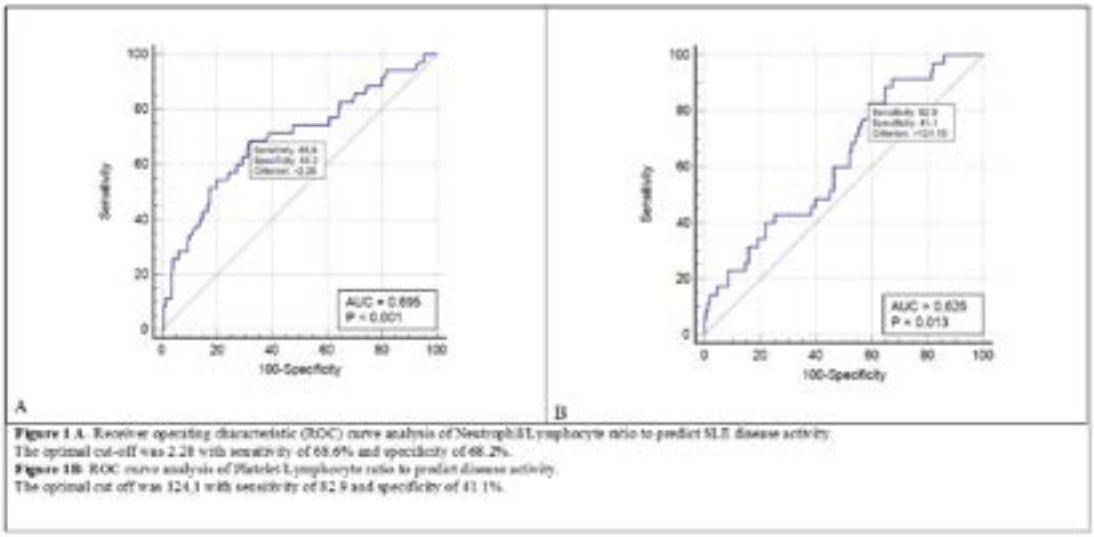

Figure 1 A. Receiver operating characteristic (ROC) curve analysis of Neutrophil/Lymphocyte ratio to predict SLE disease activity.
The optimal cut-off was 2.28 with sensitivity of 68.6% and specificity of 68.2%.
Figure 1B. ROC curve analysis of Platelet/Lymphocyte ratio to predict disease activity.
The optimal cut off was 124.1 with sensitivity of 82.9 and specificity of 41.1%.

Figure Legends

Figure 1 A- Receiver operating characteristic (ROC) curve analysis of Neutrophil/Lymphocyte ratio to predict SLE disease activity.

The optimal cut-off was 2.28 with sensitivity of 68.6% and specificity of 68.2%.

Figure 1B- ROC curve analysis of Platelet/Lymphocyte ratio to predict disease activity.

The optimal cut off was 124.1 with sensitivity of 82.9 and specificity of 41.1%.

TABLE 1 – DEMOGRAPHIC DATA OF STUDIED SAMPLE:189 SLE PATIENTS

Sex: female/male	29 (15.3%)/169 (89.4%)
Median age (IQR) - years	43 (30.0-52.5)
Median age at disease onset (IQR)- years	32 (20.0-41.0)
Auto declared ethnic background	Caucasians – 87/189 (46.0%)
	Afro descendants – 101/189 (53.4%)
	Asian – 1/189 (0.5%)

TABLE 2 – CLINICAL, SEROLOGICAL AND TREATMENT PROFILE OF PATIENTS WITH SYSTEMIC LUPUS ERYTHEMATOSUS STUDIED (n=189)

Clinical Data	
Articular manifestations (n)	148/187 - 79.1%
Discoid manifestations (n)	21/189 - 11.1%
Butterfly rash (n)	88/189 - 46.5%
Photosensitivity (n)	132/189 - 69.8%
Raynaud's phenomena (n)	65/189 - 34.3%
Oral ulcers (n)	71/189 - 37.5%
Alopecia (n)	90/189 - 47.6%
Convulsions (n)	22/189 - 11.6%
Psychosis (n)	15/188 – 7.9%
Glomerulonephritis (n)	86/189 - 45.5%
Serositis (n)	49/189 - 25.9%
Hemolytic anemia (n)	29/189 - 15.3%
Leucopenia (n)	61/189 - 32.2%
Thrombocytopenia (n)	50/189 - 26.4%
Serological data	
Anti-Ro (n)	78/187 - 41.7%
Anti-La (n)	31/188 - 16.4%
Rheumatoid factor (n)	30/183 - 16.3%
Anti-ds DNA (n)	102/189 - 53.9%
Anti-Sm (n)	51/188 - 27.1%
Anti-RNP (n)	65/185 - 35.1%
Anti-cardiolipin IgG (n)	25/188 -13.2%
Anti-cardiolipin IgM (n)	20/188 - 10.6%
Lupus anticoagulant (n)	25/186 - 13.4%
Direct Coombs (n)	29/183 - 15.8%
Treatment data	
Antimalarial users (n)	171/189 - 90.4%
Glucocorticoid users (n)	38/189 – 20.1%
Glucocorticoid - dose - mg /day	2.5 to 60 (median 7.5; IQR=5-30)
Azathioprine users (n)	22/189 – 11.6%
Methotrexate users (n)	18/189 – 9.5 %
Mophetil mycophenolate users (n)	61/189 – 32.2%
Rituximab users (n)	0
Belimumab users (n)	0

N= number

TABLE 3 - LABORATORY DATA IN SYSTEMIC LUPUS ERYTHEMATOSUS PATIENTS (n=189)

	Range	Median (Interquartile range)
ESR (mm)	1 - 170	29 (14.2 - 50.0)
CRP (mg/dL)	0 - 34	1.42 (0.50 - 3.90)
C3 – mg/dL	40 - 269	106 (87 - 126)
C4 – mg/dL	7.8 - 63.0	25.0 (15.5 - 33.50)
Positive anti-dsDNA	0 to 1:1280	0 (0 to 1:80)
24 h urine protein	0 - 6,980 mg	170.0 (0 - 425.0)
Hemoglobin - g/dL	6.7 -18.5	13.2 (12.3 - 14.2)
Neutrophil count/ mm^3	847 - 23,048	3,167 (2,298 - 4,182)
Lymphocyte count/ mm^3	306 - 5,516	1,566 (1,038 - 2,054)
Platelet count/mm^3	49,000 - 586,000	226,000 (175,500 - 274,000)
Neutrophil/lymphocyte ratio	0.46 - 18.0	2.1 (1.45 - 3.09)
Platelet/lymphocyte ratio	11.7 - 732.1	149.8 (110.2 - 220.3)

ESR= erythrocyte sedimentation rate; CRP= C reactive protein.

C3 reference value =88 to 201 mg/dL

C4 reference value=15 to 45 mg/dL

C-reative protein reference value < 1.0 mg/L.

TABLE 4 - CORRELATION STUDIES OF NEUTROPHIL/LYMPHOCYTE RATIO WITH INFLAMMATORY PARAMETERS.

Variable	Spearman rho	95% Confidence Interval	p
SLEDAI	0.24	0.09 to 0.37	0.0009
ESR	0.17	0.01 to 0.33	0.02
CRP	0.23	0.06 to 0.38	0.004
C3	-0.07	-0.30 to +0.16	0.53
C4	0.02	-0.22 to 0.26	0.86
Titer of anti-dsDNA	0.19	-0.07 to +0.43	0.14
Hemoglobin	-0.14	-0.28 to 0.005	0.05

SLEDAI- Systemic lupus erythematosus disease activity index

ESR= erythrocyte sedimentation rate

CRP= C reactive protein

TABLE 5- CORRELATION STUDIES OF PLATELET/LYMPHOCYTE RATIO WITH INFLAMMATORY PARAMETERS.

Variable	Spearman rho	95% Confidence Interval	P
SLEDAI	0.21	0.06 to 0.35	0.003
ESR	0.23	0.07 to 0.38	0.003
CRP	0.26	0.09 to 0.40	0.001
C3	-0.17	-0.39 to 0.06	0.13
C4	-0.10	-0.33 to 0.14	0.39
Titer of anti-dsDNA	0.29	0.02 to 0.51	0.02
Hemoglobin	-0.27	-0.40 to -0.13	0.0001

SLEDAI = Systemic lupus erythematosus disease activity index

ESR = Erythrocyte sedimentation rate

CRP = C-reactive protein