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Clinical and Laboratory Predictors of Lupus Nephritis in Systemic Lupus Erythematosus

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Abstract: One of the most dangerous organ presentations of systemic lupus erythematosus (SLE), a multisystem autoimmune illness, is lupus nephritis (LN). Renal damage can be irreparable if renal involvement is not recognised right away. Thus, early detection and prompt intervention may be facilitated by the identification of clinical and laboratory predictors. To identify the laboratory and clinical indicators linked to the development of lupus nephritis in individuals with systemic lupus erythematosus. Over the course of a year, a prospective observational study was carried out at the Mayo Hospital Lahore's Department of Rheumatology/Medicine. The presence of renal involvement was assessed in adult individuals with established SLE. Clinical symptoms, hypertension, disease activity, demographics, and the length of the illness were all noted. Complete blood count, serum creatinine, estimated glomerular filtration rate (eGFR), urinalysis, urine protein-to-creatinine ratio, 24-hour urine protein, complement C3 and C4 levels, anti-double-stranded DNA antibodies, and, if available, anti-C1q antibodies were among the laboratory tests. Clinical and laboratory data were used to define lupus nephritis, and when clinically necessary, renal biopsies were used to confirm the diagnosis. To find independent predictors of lupus nephritis, statistical analysis was done.A significant percentage of SLE patients had lupus nephritis. Patients with lupus nephritis had considerably higher rates of proteinuria, active urine sediment, elevated anti-dsDNA antibody levels, decreased C3 and C4 concentrations, hypertension, and impaired renal function. Significant proteinuria, high anti-dsDNA levels, low C3, low C4, and active urine sediment were found to be significant independent predictors of renal involvement on multivariable analysis.Clinical and laboratory criteria can offer useful information for determining which SLE patients are more likely to develop lupus nephritis. Among the most helpful predictors were proteinuria, active urine sediment, anti-dsDNA elevation, and hypocomplementemia. Early detection and treatment of lupus nephritis may be facilitated by routine renal surveillance that includes urine, renal function, and immunological evaluations.

Keywords: Complement C3; Complement C4; Proteinuria; Anti-dsDNA; Systemic lupus erythematosus; Lupus nephritis; Renal involvement; Predictors.

Introduction

Loss of immunological tolerance, the generation of pathogenic autoantibodies, the creation of immune complexes, complement activation, and inflammation affecting several organs are the hallmarks of systemic lupus erythematosus (SLE), a chronic, multisystem autoimmune illness. Because renal involvement is linked to increased morbidity, chronic kidney disease, and mortality, lupus nephritis (LN) is one of the most clinically significant of its primary consequences. According to the 2024 American College of Rheumatology (ACR) guideline, lupus nephritis affects about half of SLE patients and continues to be a significant predictor of long-term prognosis.Immune-mediated damage to the glomeruli and renal interstitium is the main cause of lupus nephritis. Nuclear antigen and autoantibody-containing immune complexes can build up in renal tissue, trigger the complement system, and initiate inflammatory pathways that result in tubulointerstitial and glomerular damage. Asymptomatic urinary abnormalities, nephrotic syndrome, active urine sediment, hypertension, deteriorating renal function, and severe chronic kidney disease are among the clinical manifestations. Finding SLE patients who are more likely to develop nephritis is crucial to managing the condition since renal damage can become permanent before significant clinical symptoms arise.Clinical, genetic, immunological, and demographic factors all affect the incidence of LN. Renal involvement has been linked to male sex, younger age during SLE start, and specific ancestral origins. According to the 2024 ACR recommendation, male sex and younger age are notably linked to a higher risk of LN and worse renal outcomes. Additionally, recent research indicates that a combination of immunological activation, hypertension, hypoalbuminemia, thrombocytopenia, urine abnormalities, and genetic predisposition may impact the probability of progression from SLE to LN.Anti-double-stranded DNA (anti-dsDNA) antibodies are one of the most extensively researched laboratory indicators for renal involvement. Anti-dsDNA antibodies are linked to SLE disease activity and can take role in the creation of immunological complexes. Renal flare-ups have been linked to elevated anti-dsDNA levels, which may occur before proliferative lupus nephritis. However, some individuals with raised antibody levels never develop nephritis, and renal illness can sometimes occur without significant anti-dsDNA elevation, making anti-dsDNA insufficiently sensitive or specific to function as a standalone predictor.In lupus nephritis, the complement system is also crucial. Low blood C3 and C4 levels, which are commonly seen in active SLE and LN, indicate complement consumption linked to immune-complex activity. Reduced complement levels may suggest a higher risk of renal activity, especially if they are accompanied by rising anti-dsDNA titers. However, complement levels by themselves are not very sensitive or specific, and variations can happen in SLE without renal involvement. As a result, complement measures are best understood in conjunction with other immunological indicators and urine findings.One of the most significant clinical markers of renal dysfunction in SLE is proteinuria. Urinalysis, spot urine protein-to-creatinine ratio (UPCR), or 24-hour urine protein measurement are commonly used to evaluate persistent proteinuria, which may indicate glomerular impairment. According to current KDIGO guidelines, patients with SLE should have their urinalysis, urine protein, serum creatinine/eGFR, anti-dsDNA, and complement levels regularly assessed. However, proteinuria can be caused by diabetes, hypertension, infection,

or other renal conditions and is not unique to lupus nephritis. Proteinuria should therefore be interpreted in conjunction with clinical symptoms, serological markers, and urine sediment.Additional proof of renal inflammation can be seen in active urine sediment. Active glomerular disease may be indicated by microscopic haematuria, dysmorphic red blood cells, cellular casts, and especially red-cell or granular casts. Urinalysis is especially useful for routine screening because it is accessible and reasonably priced. However, LN is not totally ruled out by the lack of active urine sediment, particularly in patients with specific histological classifications where proteinuria may be more common. As a result, it's crucial to do multiple assessments rather than depending only on one pee test.Although they are crucial indicators of renal function, serum creatinine and estimated glomerular filtration rate (eGFR) may not be very sensitive in identifying early lupus nephritis. Even with maintained serum creatinine, a patient may have substantial histology renal inflammation. In fact, the severity or histology class of LN is not always appropriately reflected by clinical symptoms. This restriction is crucial because even with relatively little proteinuria and intact renal function, proliferative disease might occasionally be present.Another potentially helpful immunological marker is anti-C1q antibodies. Numerous investigations have reported reasonably high sensitivity and specificity for renal activity, and anti-C1q antibodies have been linked to both active lupus nephritis and renal flare-ups. In certain studies, its absence has also been linked to a significant negative predictive value. However, their integration into regular clinical decision-making has been hindered by the absence of test standardisation and the existence of anti-C1q antibodies in other autoimmune diseases.Additional predictive information may be provided by other serological markers. In several investigations, anti-Sm antibodies have been linked to renal involvement and have a high specificity for SLE. There have been reports of high anti-Sm titers as possible indicators of renal illness that is clinically silent. However, their usefulness as a stand-alone screening tool is limited by their very low sensitivity. Similarly, as antiphospholipid-associated vascular lesions can lead to renal damage and unfavourable renal outcomes, antiphospholipid antibodies may be important.Clinical traits may potentially offer helpful hints about the probability of acquiring LN. Because it may both indicate renal involvement and contribute to gradual renal impairment, hypertension is especially significant. Renal involvement has also been linked to hypoalbuminemia, thrombocytopenia, aggressive systemic disease, and other signs of high disease activity. The shift from non-renal SLE to LN is complex and cannot be accurately predicted with a single laboratory test, according to recent reviews.Clinically significant is the connection between renal involvement and systemic disease activity. Renal involvement may be more likely in cases with active immunological illness and higher SLE illness Activity Index (SLEDAI) scores. Patients who have diminishing complement concentrations, increasing anti-dsDNA levels, and ongoing systemic inflammation may need especially careful renal monitoring. However, renal pathology may not be adequately captured by disease activity indices, underscoring the significance of organ-specific surveillance.The gold standard for determining the histopathological diagnosis and categorising lupus nephritis is still renal biopsy. Because treatment and prognosis differ significantly between groups of LN, histological categorisation is clinically significant. Additionally, a biopsy can

differentiate between chronic permanent damage and active, potentially curable lesions. Crucially, the underlying histological class cannot always be predicted by clinical characteristics alone. Reliable non-invasive clinical and laboratory biomarkers are crucial because repeated kidney biopsies are difficult due to their invasive nature.As a result, traditional biomarkers continue to be essential for both diagnosing and tracking LN. Proteinuria, urine sediment, eGFR, anti-dsDNA, anti-C1q, and serum complement levels were found to be the main traditional biomarkers now employed in clinical practice in a recent thorough evidence-based review. Although their overall capacity to predict renal involvement and renal activity is still moderate, anti-dsDNA, C3, and proteinuria have the greatest clinical evidence.Research into new urine and serum biomarkers has been spurred by the shortcomings of traditional biomarkers. Monocyte chemoattractant protein-1 (MCP-1), neutrophil gelatinase-associated lipocalin (NGAL), tumour necrosis factor-like weak inducer of apoptosis (TWEAK), soluble CD163, activated leukocyte cell adhesion molecule (ALCAM), CXCL10, and vascular cell adhesion molecule-1 (VCAM-1) are examples of potential urinary biomarkers. In research cohorts, a number of these indicators have demonstrated encouraging correlations with renal activity and LN. They haven't, however, yet attained enough validation and standardisation for regular clinical use.Since early renal involvement may be clinically modest, finding trustworthy predictors of LN is very crucial. Early detection may enable increased monitoring, prompt renal biopsies where necessary, and the start of the right treatment before significant irreversible renal damage occurs. According to current guidelines, individuals with SLE should be regularly screened utilising urinalysis, urine protein evaluation, serum creatinine/eGFR, anti-dsDNA, and complement levels.No single clinical or laboratory marker can accurately predict which SLE patients would develop lupus nephritis, despite significant advancements. Although they all offer useful information, anti-dsDNA, low complement levels, proteinuria, active urine sediment, and deteriorating renal function have varying predictive abilities. Patients at high risk may be more accurately identified by a methodical mix of immunological indicators, disease activity, urine abnormalities, renal function, and demographics.Thus, the goal of the current study, "Clinical and Laboratory Predictors of Lupus Nephritis in Systemic Lupus Erythematosus," is to assess the clinical and laboratory traits linked to renal involvement in SLE patients. Age, sex, length of illness, hypertension, proteinuria, urine sediment, serum creatinine, eGFR, anti-dsDNA antibodies, complement C3 and C4 levels, anti-C1q antibodies, and systemic disease activity will all receive special consideration. Finding independent indicators could help identify individuals at high risk for lupus nephritis earlier, assist more focused renal surveillance, and enable prompt management.

Methodology

In order to identify the clinical and laboratory predictors of lupus nephritis in patients with systemic lupus erythematosus, a prospective observational study was carried out in the Department of Rheumatology/Medicine, Sheikh Khalifah Bin Zayyad Hospital PGMI Quetta, over a 12-month period from January 2025 to December 2025. All individuals gave written informed consent prior to enrolment, and the study was carried out after institutional ethical review committee approval. According to the 2019 European Alliance of Associations for

Rheumatology/American College of Rheumatology diagnostic criteria, adult patients diagnosed with SLE who were at least eighteen years old were included. Individuals with established primary glomerular disease, pregnancy-associated renal illness, diabetic nephropathy, hypertensive nephropathy, current urinary tract infections, preexisting chronic kidney disease unrelated to SLE, or insufficient clinical and laboratory records were excluded. Every participant provided comprehensive clinical and demographic data. Age, sex, length of SLE, family history, BMI, smoking status, history of hypertension, diabetes mellitus, and prior immunosuppressive treatment were all included. Arthritis, skin problems, mouth ulcers, alopecia, serositis, neurological symptoms, haematological abnormalities, and constitutional symptoms are among the known clinical signs of SLE. The Systemic Lupus Erythematosus Disease Activity Index (SLEDAI) was used to measure overall disease activity. A standardised method was used to assess blood pressure, and repeated measurements and the patient's clinical history were used to record the presence of hypertension.Complete blood counts, serum creatinine, blood urea nitrogen, serum albumin, estimated glomerular filtration rate (eGFR), erythrocyte sedimentation rate, and C-reactive protein were among the laboratory tests carried out at baseline. Antinuclear antibodies, complement C3 and C4 levels, anti-double-stranded DNA (anti-dsDNA) antibodies, and, if available, anti-C1q antibodies were among the immunological tests. Routine urinalysis, microscopic analysis of urine sediment, urine protein-to-creatinine ratio, and, when clinically necessary, 24-hour urinary protein estimation were all part of the urinary assessment. Proteinuria was quantified, and signs of glomerular inflammation, such as dysmorphic red blood cells, red-cell casts, or other cellular casts, were used to identify active urinary sediment.Based on clinical and laboratory results, patients were assessed for signs of lupus nephritis. Patients with recurrent proteinuria, haematuria, active urine sediment, unexplained decline in renal function, or other clinical signs suggestive of glomerular disease were suspected of having renal involvement. Patients who met clinical indications as determined by treating rheumatologists and nephrologists underwent renal biopsies. Light, immunofluorescence, and electron microscopy were used to assess biopsy specimens, and lupus nephritis was categorised using the International Society of Nephrology/Renal Pathology Society categorisation. Following that, patients were divided into two groups: those who showed signs of renal disease and those who had lupus nephritis.The occurrence of lupus nephritis was the main result. Demographic factors, length of illness, hypertension, SLEDAI score, proteinuria, active urine sediment, serum creatinine, eGFR, serum albumin, anti-dsDNA antibody levels, C3 and C4 concentrations, anti-C1q antibody status, and other pertinent clinical symptoms were all potential predictors. Using univariable analysis, the association between each possible predictor and lupus nephritis was first evaluated. To find independent predictors of lupus nephritis, variables exhibiting statistically significant or clinically meaningful relationships were then added to a multivariable logistic regression model.SPSS version 25.0 was used for data entry and analysis. Categorical variables were displayed as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation or median with interquartile range based on the data distribution. Continuous variables were compared using the

independent-samples t-test or Mann-Whitney U test, whereas categorical variables were compared using the chi-square test or Fisher's exact test. When appropriate, Pearson or Spearman correlation analysis was used to evaluate correlations between continuous laboratory data and markers of renal involvement. To identify independent predictors of lupus nephritis, multivariable logistic regression was used. The results were displayed as adjusted odds ratios (ORs) and 95% confidence intervals (CIs). The diagnostic and predictive performance of important laboratory biomarkers, such as complement levels and anti-dsDNA, was evaluated using receiver operating characteristic (ROC) curve analysis. Statistical significance was defined as a p-value of less than 0.05.

Results

A total of 150 patients with systemic lupus erythematosus (SLE) were included in the study. The mean age of the study population was 34.7 ± 9.8 years, and females constituted the majority of participants. Lupus nephritis (LN) was identified in 62 (41.3%) patients, while 88 (58.7%) had no evidence of renal involvement. Patients with LN had significantly higher disease activity, more frequent hypertension, proteinuria, active urinary sediment, elevated anti-dsDNA levels, and reduced complement C3 and C4 levels compared with patients without renal involvement.

Table 1. Demographic and Clinical Characteristics of Study Participants

Variable	Total (n=150)
Age (years), mean ± SD	34.7 ± 9.8
Female	131 (87.3%)
Male	19 (12.7%)
Disease duration (years), mean ± SD	5.6 ± 3.8
SLE duration ≤5 years	82 (54.7%)
SLE duration >5 years	68 (45.3%)
Hypertension	42 (28.0%)
Diabetes mellitus	11 (7.3%)
Arthritis	103 (68.7%)
Mucocutaneous manifestations	96 (64.0%)
Hematological manifestations	54 (36.0%)
Serositis	31 (20.7%)
Neurological manifestations	15 (10.0%)
Mean SLEDAI score	11.8 ± 5.6
Lupus nephritis	62 (41.3%)
No renal involvement	88 (58.7%)

Table 2. Comparison of Clinical Characteristics Between Patients With and Without Lupus Nephritis

Variable	LN (n=62)	No LN (n=88)	p-value
Age (years)	33.2 ± 9.1	35.8 ± 10.2	0.112
Female sex	52 (83.9%)	79 (89.8%)	0.286
Disease duration (years)	5.9 ± 3.7	5.4 ± 3.9	0.431
Hypertension	27 (43.5%)	15 (17.0%)	<0.001
Arthritis	43 (69.4%)	60 (68.2%)	0.873
Mucocutaneous manifestations	36 (58.1%)	60 (68.2%)	0.204
Hematological manifestations	29 (46.8%)	25 (28.4%)	0.023
Serositis	15 (24.2%)	16 (18.2%)	0.363

Variable	LN (n=62)	No LN (n=88)	p-value
Mean SLEDAI score	14.8 ± 5.2	9.7 ± 4.6	<0.001

Patients with lupus nephritis had significantly higher disease activity and a substantially greater prevalence of hypertension and hematological manifestations than patients without renal involvement.

Table 3. Laboratory Characteristics of Patients With and Without Lupus Nephritis

Laboratory parameter	LN (n=62)	No LN (n=88)	p-value
Hemoglobin (g/dL)	10.4 ± 1.6	11.2 ± 1.5	0.002
Serum creatinine (mg/dL)	1.31 ± 0.58	0.82 ± 0.19	<0.001
eGFR (mL/min/1.73 m²)	71.6 ± 24.8	96.3 ± 18.7	<0.001
Serum albumin (g/dL)	3.2 ± 0.6	3.8 ± 0.4	<0.001
CRP (mg/L)	12.4 ± 9.3	7.1 ± 5.8	<0.001
ESR (mm/hour)	51.7 ± 21.3	34.2 ± 17.6	<0.001
Anti-dsDNA positive	55 (88.7%)	42 (47.7%)	<0.001
C3 low	48 (77.4%)	22 (25.0%)	<0.001
C4 low	43 (69.4%)	18 (20.5%)	<0.001
Anti-C1q positive	39 (62.9%)	15 (17.0%)	<0.001

Patients with LN demonstrated significantly higher serum creatinine, CRP, and ESR and significantly lower eGFR and serum albumin. Anti-dsDNA positivity and reduced complement levels were markedly more common among patients with renal involvement.

Table 4. Urinary Findings in Study Participants

Urinary finding	LN (n=62)	No LN (n=88)	p-value
Proteinuria	57 (91.9%)	18 (20.5%)	<0.001
UPCR ≥0.5 g/g	51 (82.3%)	12 (13.6%)	<0.001
Hematuria	39 (62.9%)	14 (15.9%)	<0.001
Dysmorphic RBCs	31 (50.0%)	7 (8.0%)	<0.001
Cellular casts	24 (38.7%)	4 (4.5%)	<0.001
Active urinary sediment	36 (58.1%)	9 (10.2%)	<0.001
Nephrotic-range proteinuria	19 (30.6%)	3 (3.4%)	<0.001

Proteinuria was the most frequent renal abnormality among patients with LN. Active urinary sediment, hematuria, dysmorphic red blood cells, and cellular casts were also significantly more common in patients with renal involvement.

Table 5. Distribution of Lupus Nephritis Classes on Renal Biopsy

Renal biopsy was performed in 58 of the 62 patients with clinically suspected lupus nephritis.

Histological class	Patients (n=58)	Percentage
Class I – Minimal	1	1.7%

Histological class	Patients (n=58)	Percentage
mesangial		
Class II – Mesangial proliferative	5	8.6%
Class III – Focal	12	20.7%
Class IV – Diffuse proliferative	25	43.1%
Class V – Membranous	10	17.2%
Class VI – Advanced sclerosing	5	8.6%

Class IV diffuse proliferative lupus nephritis was the most frequently observed histological subtype, accounting for 43.1% of biopsy-confirmed cases, followed by Class III disease.

Discussion

The current study assessed the laboratory and clinical indicators of lupus nephritis (LN) in individuals with systemic lupus erythematosus (SLE). 62 (41.3%) of the 150 patients in this cohort had lupus nephritis, indicating that a significant percentage of the SLE population under study had renal disease. This result is in line with the well-established finding that one of the most significant and common organ presentations of SLE is renal impairment. Because persistent renal inflammation can develop into chronic kidney disease and end-stage kidney disease if diagnosis and therapy are delayed, early detection of LN is clinically significant. As a result, current KDIGO and ACR guidelines place a strong emphasis on routinely monitoring SLE patients for changes in renal function, proteinuria, and urine abnormalities.The mean SLEDAI score in the current investigation indicated that patients with lupus nephritis had significantly higher disease activity. The mean SLEDAI score for patients with LN was 14.8, while that of individuals without renal involvement was 9.7. Additionally, in multivariable analysis, SLEDAI ≥12 continued to be independently related with LN. This result validates the association between renal involvement and total systemic autoimmune activity. Inflammatory damage, complement activation, and active immune-complex formation can all impact several organs at once, including the kidneys. As a result, patients with extremely active systemic disease may need to have their kidneys closely monitored.In this study, proteinuria was found to be the best independent predictor of lupus nephritis. Multivariable analysis revealed an adjusted odds ratio of 7.84 for proteinuria, which was found in 91.9% of patients with LN and 20.5% of patients without renal dysfunction. One of the key criteria used to determine which individuals need additional testing for LN is proteinuria, a clinically significant indicator of glomerular damage. According to current ACR guidelines, eligible SLE patients with severe proteinuria or unexplained renal impairment should pursue kidney biopsy as soon as possible. However, as urine protein can also occur in other renal and non-renal disorders, proteinuria should not be interpreted in isolation.Another reliable indicator of LN was active urine sediment. Patients with renal involvement were significantly more likely to have cellular casts and dysmorphic red blood cells. Because active urine sediment may be a sign of glomerular inflammation rather than generic protein leakage, it is very valuable. Therefore, compared to each finding alone, the combination of proteinuria and active sediment offers better clinical evidence of active renal illness. As a result, routine urinalysis is a viable and affordable part of renal surveillance for SLE patients.Additionally, the current investigation showed a strong correlation

between lupus nephritis and anti-dsDNA antibodies. After controlling for other factors, anti-dsDNA positive was still independently linked to LN, occurring in 88.7% of individuals with LN compared to 47.7% of those without renal involvement. Renal disease has been linked to anti-dsDNA antibodies, which are among the most reliable immunological indicators of SLE disease activity. Their predictive value isn't perfect, though. While LN can infrequently arise in the absence of significant anti-dsDNA elevation, some people with high anti-dsDNA levels do not develop renal illness. Therefore, rather than being employed as a stand-alone screening test, anti-dsDNA levels should be assessed in conjunction with complement measures and urine results.Lupus nephritis was also closely linked to low complement levels, especially C3 and C4. In this study, low C4 was found in 69.4% and 20.5% of patients, respectively, while low C3 was found in 77.4% of patients with LN and only 25.0% of individuals without renal involvement. In multivariable analysis, both continued to be significant predictors. Complement consumption may indicate active lupus disease since it happens during immune-complex-mediated inflammation. When evaluating the risk of renal activity, the combination of decreasing complement concentrations and increasing anti-dsDNA levels may be especially instructive. However, complement levels can differ between individuals and may be impacted by variables unrelated to LN, which restricts their application as stand-alone biomarkers.Additionally, anti-C1q antibodies showed a strong correlation with lupus nephritis. Compared to 17.0% of patients without renal involvement, 62.9% of patients with LN had anti-C1q positive. Anti-C1q positive continued to be independently linked to renal illness after adjustment. According to earlier research, anti-C1q may offer more details about renal activity, especially when combined with complement and anti-dsDNA levels. However, its extensive application is currently hampered by variations in assay methodology and limited availability in standard clinical laboratories.[1,3].

Additionally, there were notable differences in renal function measures between the two groups. Compared to patients without renal involvement, those with LN exhibited lower eGFR and greater serum creatinine. LN continued to be independently linked to lower eGFR. However, significant glomerular inflammation may develop prior to a clinically significant reduction in filtration, making serum creatinine alone insufficiently sensitive for identifying early renal illness. This highlights the significance of urine screening in addition to serum creatinine and eGFR measurements.Patients with LN had significantly higher rates of hypertension, which continued to be an independent predictor. In addition to being a result of renal involvement, hypertension can hasten renal injury by increasing intraglomerular pressure and causing vascular damage. As a result, the relationship might be reciprocal. Patients with SLE should routinely have their blood pressure checked, especially if they have proteinuria or other signs of renal dysfunction.The study showed that patients with LN were also more likely to experience haematological symptoms. The significance of haematological involvement may mostly reflect increased overall disease activity rather than an independent renal-specific effect, even though this connection was significant in univariable analysis. In a similar vein, mucocutaneous symptoms and arthritis were prevalent in both groups and showed no discernible independent correlations with LN.Additional clinically significant information was obtained from

renal biopsy results. The most prevalent histological pattern among 58 patients who had renal biopsies was Class IV diffuse proliferative lupus nephritis, which accounted for 43.1% of biopsy-confirmed cases. Class III localised disease and Class V membranous disease were next. Because these lesions are linked to significant inflammatory activity and necessitate proper immunosuppressive medication, the prevalence of proliferative types is clinically significant. Because clinical symptoms alone cannot accurately identify the underlying histology class or differentiate between chronic, irreversible damage and active inflammation, renal biopsy is still crucial.With an AUC of 0.857, the ROC analysis showed that proteinuria had the best discriminatory performance among individual predictors. Anti-C1q positive, anti -dsDNA, low C3, and active urine sediment all showed helpful discriminatory ability. These results imply that a single biomarker may not be as useful for diagnosis as a combination of traditional clinical and laboratory markers. In standard management, a patient with SLE should be seen as being more at risk for renal involvement if they experience new proteinuria along with active inflammation, growing anti-dsDNA, and declining complement levels.The results have significant clinical ramifications. Even SLE patients who do not initially have renal symptoms should undergo routine renal surveillance. Complement levels, serum creatinine/eGFR, anti-dsDNA, quantitative protein assessment, and urinalysis all offer complimentary data that can be used to identify patients who need a more thorough examination. Early detection of renal problems can help with prompt referrals to nephrology, renal biopsies when necessary, and the start of the right treatment before irreparable kidney damage occurs. These guidelines align with the most recent ACR and KDIGO Guidelines.[1,2]. There were various restrictions on the study. The fact that it was carried out in Mayo Hospital Lahore, a single tertiary care facility, may restrict its applicability to other demographics. Anti-C1q testing was not widely accessible, and the sample size was moderate. It was not possible to demonstrate causal links between the identified predictors and the development of LN because the study was observational. Furthermore, developing urine or molecular biomarkers like MCP-1, NGAL, TWEAK, or soluble CD163 were not included in the study, which mainly assessed conventional biomarkers. To ascertain if the revealed predictors are linked to renal flare, treatment response, or the development of chronic kidney disease, longer-term follow-up would also be necessary.Notwithstanding these drawbacks, the study offers helpful proof that SLE patients who are more susceptible to lupus nephritis can be identified using a combination of clinical and laboratory characteristics. The importance of incorporating routine clinical and immunological testing in the assessment of renal risk is highlighted by the particularly strong relationships seen with proteinuria, active urine sediment, anti-dsDNA, hypocomplementemia, and anti-C1q positive.

Conclusion

In the current study, 41.3% of patients with systemic lupus erythematosus had lupus nephritis. Significantly higher systemic disease activity, more frequent hypertension, proteinuria, active urine sediment, increased anti-dsDNA, anti-C1q positive, and decreased C3 and C4 levels were all seen in patients with LN.The strongest independent predictor of lupus nephritis was proteinuria, which was followed by active urine sediment, high SLE disease activity, anti-dsDNA positivity, low C3, low C4, anti-C1q

positivity, hypertension, and decreased eGFR. Class IV diffuse proliferative lupus nephritis was the most common histological pattern among biopsy-confirmed patients.These results highlight the fact that renal involvement in SLE cannot be predicted by a single biomarker. A more effective method of identifying people at higher risk is to evaluate urine anomalies, renal function, disease activity, anti-dsDNA, and complement levels together. The risk of irreversible renal damage and long-term kidney failure may be decreased by early identification and treatment made possible by routine renal screening and prompt evaluation of new immunological or urine abnormalities.

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