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Assessment of Hematological Biomarkers, Including Neutrophil-Lymphocyte and Platelet-Lymphocyte Ratios, in Diabetic Nephropathy for Patients with Type 2 Diabetes

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Abstract

Background: Diabetic nephropathy (DN) is a significant T2DM complication. The neutrophil-lymphocyte ratio (NLR) and platelet-lymphocyte ratio (PLR) are tested for their ability to detect DN in T2DM patients.

Aim of Study: To evaluate the role of inflammatory markers (neutrophil to lymphocyte ratio and platelet to lymphocyte ratio) in the detection of early diabetic nephropathy in Egyptian patients.

Patients and Methods: A cross-sectional study was conducted on 150 patients with T2DM. The albumin-to-creatinine ratio divided participants into normoalbuminuria, microalbuminuria, and macroalbuminuria. Complete blood counts were used to calculate NLR and PLR and analyze their relationship to DN stages.

Results: This study revealed insightful findings about the relationships among various hematological biomarkers and DN in patients with T2DM. Notably, while the NLR and PLR did not directly correlate with DN, a significant positive correlation was discovered between NLR and total leukocyte count (TLC), shedding light on the intricate link between leukocyte dynamics and diabetes. Additionally, the study found encouraging results in terms of glycemic control; patients with well-managed diabetes exhibited lower levels of both NLR and PLR. Moreover, an increased monocyte-to-lymphocyte ratio (MLR) was associated with poor glycemic control, highlighting its potential as a marker for monitoring diabetes management.

Conclusion: This study does not directly link NLR and PLR to DN, but it opens new avenues for using these ratios as part of a broader diagnostic framework for DN risk in patients with T2DM. The study emphasizes the complexity of DN pathogenesis and the importance of systemic inflammation, supporting the idea that a multi-biomarker approach could improve DN risk assessment. This knowledge of T2DM and DN hematological biomarker dynamics helps improve patient outcomes through early detection and tailored management.

Key Words: *Type 2 diabetes – Diabetic nephropathy – Inflammation – Inflammatory markers – Neutrophils/ lymphocytes ratio – Platelets/lymphocytes ratio.*

High lights

- The study shows a correlation between NLR & TLC, indicating that higher leukocyte levels might be linked to diabetic DN in T2DM.
- Research suggests that effective diabetes management can reduce NLR and PLR levels, emphasizing the need to control blood sugar to lower diabetic complication risks.
- Elevated Monocyte-to-Lymphocyte Ratio is linked to poor glycemic control and may play a role in developing diabetic nephropathy, suggesting its potential as a monitoring tool.

Introduction

DIABETES Mellitus (DM) represents a significant and escalating threat to global health, marked by rising prevalence and incidence rates. In 2019, the global diabetic population was estimated at 463 million, and projections by the International Diabetes Federation (IDF) anticipate reaching approximately 700 million by 2045 **[1]**. Diabetic nephropathy (DN), a syndrome characterized by excessive proteinuria, specific diabetic glomerular lesions, and a decreased glomerular filtration rate (GFR), is now recognized as the leading cause of chronic kidney disease (CKD). Despite its prevalence, the complete pathogenesis of DN remains not fully un-

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derstood. Both Type 1 and Type 2 diabetes can lead to CKD and, ultimately, end-stage renal disease (ESRD), with T2DM being more prevalent among ESRD patients [2]. The clinical manifestation of DN often begins with an increase in urinary albumin excretion, progressing from microalbuminuria to macroalbuminuria and eventually to ESRD. The current diagnostic approach for DN relies heavily on albuminuria as a biomarker, although its early-stage diagnostic value is limited since renal injury often precedes detectable changes in urinary albumin [3].

Inflammation is recognized as playing a pivotal role in the development and progression of DN. Various inflammatory cytokines, such as interleukin-1 (IL-1), interleukin-6 (IL-6), interleukin-18 (IL-18), and tumor necrosis factor α (TNF-α), are implicated in DN pathogenesis. However, routine clinical measurement of these markers is not commonplace due to their associated costs and technical challenges in testing [4].

NLR and PLR, derived from complete blood count (CBC) tests, are emerging as novel markers of chronic inflammation, reflecting a balance between active inflammatory neutrophils and regulatory lymphocytes [5]. Platelets interact with various cell types, suggesting chronic inflammation may contribute to atherosclerosis development, with PLR found to be elevated in some inflammatory conditions [6]. Recent studies have highlighted a close association between these two indicators and T2DM and its microvascular complications, further emphasizing their potential as valuable biomarkers in diabetes management [7].

DN, the most prevalent microvascular complication of T2DM, is the primary cause of ESRD globally, leading to significant morbidity and mortality [8,9]. DN is characterized by proteinuria, kidney lesions specific to diabetes, and decreased kidney filtration rate [10]. While microalbuminuria does not always indicate DN, renal impairment often occurs without proteinuria. However, proteinuria is a consistent hallmark of DN, typically accompanied by hypertension [11]. Early manifestations include edema and fatigue, with nausea occurring in advanced stages [12].

Biomarkers are crucial in diagnosing and monitoring diseases, guiding targeted therapy, and assessing therapeutic responses. An ideal biomarker for kidney diseases like AKI or CKD should be rapid, reliable, sensitive, specific, and informative about kidney injury's severity, site, cause, and prognosis [13,14].

However, standard biomarkers like serum creatinine and albuminuria have limitations, as they are non-specific and altered in various chronic glomerulopathies. Many patients with T2DM do not have DN but other kidney diseases [14-16]. Emerging biomarkers, classified into glomerular, tubular, inflammatory, and oxidative stress markers, offer potential for early DN prediction, though most require further validation [17,18]. This study investigates the potential of NLR and PLR as biomarkers in early DN, contributing to the evolving understanding of DN pathogenesis and management in the context of T2DM.

Patients and Methods

In this cross-sectional study conducted at the endocrinology clinic of Kasr El-Aini Hospital, Cairo University, between January 2023 and May 2023, we evaluated the role of inflammatory markers, particularly the NLR and PLR, in detecting early DN among patients with T2DM. A total of 150 patients diagnosed with T2DM, according to the American Diabetes Association (ADA) 2020 criteria, were enrolled through stratified random sampling.

The study comprised male and female patients with T2DM, aged 30 years or older, who had received a diagnosis for a duration exceeding 4 years. The study excluded individuals with type 1 diabetes, acute or chronic infections (such as urinary tract infections, respiratory infections, gastrointestinal infections, middle ear infections, viral hepatitis, unexplained fever, parasitic infections, and tuberculosis), systemic disorders (including cardiovascular disease, chronic kidney disease, chronic liver disease, blood disorders, autoimmune disorders, malignancy, poisoning), individuals taking anti-inflammatory drugs or steroids, and those with conditions that affect urinary protein excretion (such as nephritic syndrome, urinary stones, kidney insufficiency, renal artery narrowing, dehydration, urinary tract infections), or hypertension. All participants involved in the study provided written informed consent as required. This study obtained the required ethical approval from the Ethical and Scientific Committee of the Department of Internal Medicine at Kasr El-Ainy Hospital, Cairo University, with the approval granted on December 20, 2022.

Patients were categorized into three groups based on their urinary albumin-to-creatinine ratio (UACR), which was measured in a random urine sample. These groups were Group A with normoalbuminuria (UACR <30mg/g), Group B with microalbuminuria (UACR = 30–300mg/g), and Group C with macroalbuminuria (UACR ≥300mg/g). The clinical evaluation encompassed a comprehensive history taking (covering age, gender, BMI, duration of T2DM, treatment history, and comorbidities) and a full clinical examination.

Laboratory workup:

The laboratory workup involved comprehensive testing, including fasting blood glucose levels, HbA1c, serum creatinine, serum urea, serum albumin, urinary albumin creatinine ratio (UACR), C-reactive protein (CRP), and a complete blood count (CBC). The CBC included total white blood cell count, neutrophil count, lymphocyte count, NLR, monocyte count, total red blood cell count, hemoglobin, platelet count, and platelet/lymphocyte ratio (PLR).

HbA1c levels were categorized into three groups for analysis: Good control (HbA1c <6.5), fairly controlled (HbA1c 6.5-8), and poor control (HbA1c >8). The NLR was calculated by dividing the number of neutrophils by the number of lymphocytes, and the PLR was determined by dividing the number of platelets by the number of lymphocytes.

Statistical analysis:

The collected data were meticulously coded and inputted into the Statistical Package for the Social Sciences (SPSS) software, version 28, developed by IBM Corp. Descriptive statistics were employed to summarize the data. Quantitative variables were expressed as means and standard deviations, while categorical variables were represented through frequencies and percentages.

The study utilized various statistical tests for inferential analysis to draw meaningful conclusions from the data. The Analysis of Variance (ANOVA) with subsequent multiple comparisons post hoc tests was applied to assess group differences for normally distributed quantitative variables. In cases where the quantitative variables did not follow a normal distribution, non-parametric tests such as the Kruskal-Wallis and Mann-Whitney U tests were employed **[19].** When examining categorical data, the Chi-square (χ^2) test was utilized. In instances where the expected frequency was less than five, the Fisher's Exact Test was employed as an alternative to ensure robustness in the results **[20].**Additionally, the study used the Spearman correlation coefficient to explore and quantify the relationships between various quantitative variables **[21].**

A p-value threshold of less than 0.05 was set throughout the analysis to determine statistical significance. This threshold was chosen to balance the need for statistical rigor while acknowledging the possibility of type I errors inherent in multiple testing scenarios.

Results

The present cross-sectional study was carried out on 150 patients with T2DM from the endocrinology clinic of Kasr El-Aini Hospital Cairo University. The field study was conducted from January 2023 to May 2023.

Table (1) summarizes the demographic and clinical characteristics of the participants included in the study. The data indicates that the majority of participants in this study were female, representing 80.70% of the total sample, with an average age of 52.95 years. Notably, most patients have a mean Body Mass Index (BMI) of 33.45kg/m2, classifying them as overweight or obese. The allocation of treatments demonstrates a substantial reliance on oral therapy, constituting 56.00% of the overall count. Table (2) presents a concise overview of the hematological and biochemical parameters of the individuals who were part of the study.

Table (3) presents a comparative analysis of demographic and clinical characteristics across different stages of diabetic nephropathy: Normoalbuminuria (Group A), microalbuminuria (Group B), and macroalbuminuria (Group C). There was a significant difference in diabetic control across groups (p=0.01), with a higher percentage of patients achieving good glycemic control (<6.5) in the microalbuminuria group (65.50%) compared to normo-albuminuria (47.70%) and macroalbuminuria (42.10%) groups. Conversely, the proportion of patients with poor control (>8) was substantially higher in the macroalbuminuria group (36.80%) than in the normo-albuminuria (11.40%) and microalbuminuria (8.00%) groups. This data underscores the importance of glycemic control in the progression of diabetic nephropathy, highlighting a potential area for targeted intervention in patient management.

Table (4) shows the differences among normoalbuminuria, microalbuminuria, and macroalbuminuria patients. Notably, significant variations were found in BMI, fasting blood sugar, and A1c concentration, with the macroalbuminuria group exhibiting the highest BMI and fasting blood sugar levels. In addition, there are significant differences in monocyte counts and the monocyte/lymphocyte ratio between the various groups.

Paired Comparisons between each 2 groups:

The paired comparisons revealed significant findings: BMI was notably higher in Group C than in Group B and nearly significant between Groups A and B. Monocyte counts were significantly lower in Group B compared to others. Fasting blood sugar and A1c concentration showed higher levels in Group C compared to Groups A and B, indicating worsening glycemic control with advanced albuminuria. Serum creatinine was also significantly higher in Group C, suggesting more pronounced renal impairment. These results are highlighted (Table 5).

Table (1): Demographic and Clinical Characteristics of Individuals Included in the study.

Characteristic	Mean ± SD	Range (Minimum-Maximum)	Count (%)
Gender:			
Male	–	–	29 (19.30%)
Female	–	–	121 (80.70%)
Age (years)	52.95±8.83	35 - 72	–
Weight (Kg)	86.87±15.11	60 - 145	–
Height (Cm)	161.93±11.62	100 - 185	–
BMI (kg/m^2)	33.45±8.67	20.05 - 82.66	–
Treatment type:			
Oral therapy	–	–	84 (56.00%)
Insulin therapy	–	–	34 (22.70%)
Oral & insulin therapy	–	–	32 (21.30%)
Blood pressure:			
Systolic (mmHg)	117.13±8.62	100 - 140	–
Diastolic (mmHg)	76.8±8.46	60 - 90	–
Duration of DM (years)	10.71±6.18	4.5 - 8	–
Presence of albuminuria:			
Yes	–	–	106 (70.70%)
No	–	–	44 (29.30%)
Albuminuria:			
Group A (normoalbuminuria)	–	–	44 (29.30%)
Group B (microalbuminuria)	–	–	87 (58.00%)
Group C (macroalbuminuria)	–	–	19 (12.70%)
Fasting Blood Sugar (mg/dl)	123.55±34.91	75 - 238	–
HbA1c Conc. (%)	6.17±1.43	4 - 11.2	–
Diabetic Control:			
Good <6.5	–	–	86 (57.30%)
Fairly 6.5-8	–	–	45 (30.00%)
Poor >8	–	–	19 (12.70%)

Table (2): Hematological and Biochemical Parameters in included individuals.

Characteristic	Mean ± SD	Range (Minimum - Maximum)	Count (%)
Total leucocyticcount (10^3/UI)	7.13±2.21	1.1 - 15.5	–
Neutrophils count 10^3/u	3.8±1.65	0.7 - 9.3	–
lymphocytes count 10^3/u	2.55±0.83	0.28 - 5.9	–
Neutrophils/lymphocytes ratio	1.59±0.76	0.46 - 4.85	–
platelets (10^3/UI)	246.54±81.8	36.0 - 455.0	–
Platelet/lymphocytes ratio	105.36±45.51	8.64 - 297.69	–
Monocytes (10^3/UI)	0.55±0.51	0.1 - 2.5	–
Hemoglobin g/dl	12.12±1.52	7.7 - 15.3	–
Monocytes/lymphocytes ratio	0.23±0.21	0.03 - 1.03	–
Serum albumin g/dl	4.37±0.39	3.2 - 5.2	–
Serum creatinine mg/dl	0.9±0.24	0.5 - 1.9	–
Serum urea mg/dl	25.49±11.05	10.0 - 93.0	–
hs-CRP (0.2-10 mg/L)	12.27±3.11	2.5 - 23.0	–
hs-CRP interpretation Elevated	–	–	118 (78.7%)
hs-CRP interpretation Normal	–	–	32 (21.3%)

Table (3): Comparative analysis of demographic and clinical characteristics across diabetic nephropathy stages.

	Group A (normo-albuminuria)		Group B (microalbuminuria)		Group C (macroalbuminuria)		P-value
	Count	%	Count	%	Count	%	
Sex:							
Male	7	15.90	17	19.50	5	26.30	0.637
Female	37	84.10	70	80.50	14	73.70	
Type of treatment:							
Oral therapy	26	59.10	48	55.20	10	52.60	0.872
Insulin therapy	8	18.20	22	25.30	4	21.10	
Oral & insulin therapy	10	22.70	17	19.50	5	26.30	
Diabetic control:							
Good <6.5	21	47.70	57	65.50	8	42.10	0.01
Fairly 6.5-8	18	40.90	23	26.40	4	21.10	
Poor >8	5	11.40	7	8.00	7	36.80	

Table (4): Comparative analysis of clinical parameters acrossnormo-albuminuria, microalbuminuria, and macroalbuminuria patients.

	Group A (normo-albuminuria)		Group B (microalbuminuria)		Group C (macroalbuminuria)		P-value
	Mean	SD	Mean	SD	Mean	SD	
Age	53.7	9.53	52.94	8.34	51.26	9.59	0.605
Systolic BP	116.14	8.68	117.36	8.82	118.42	7.65	0.588
Diastolic BP	75.23	8.76	78.05	8.19	74.74	8.41	0.103
BMI (kg/m2)	35.44	10	31.67	8	36.99	6.27	0.009
Fasting blood sugar	120.84	28.96	119.78	33.28	147.11	46.07	0.006
A1c conc%	6.71	1.19	5.75	1.35	6.89	1.64	<0.001
TLC (10^3/UI)	6.85	2.04	7.32	2.34	6.88	2	0.463
Neutrophils count 10^3/u	3.4	1.34	4.07	1.77	3.44	1.51	0.125
lymphocytes count 10^3/u	2.45	0.79	2.62	0.87	2.43	0.76	0.669
Neutrophils/lymphocytes ratio	1.51	0.74	1.66	0.82	1.44	0.53	0.497
Platelet/lymphocytes ratio	105.55	39.5	103.96	46.29	111.29	55.97	0.922
Monocytes (10^3/UI)	0.76	0.62	0.39	0.35	0.78	0.56	<0.001
Monocytes/lymphocytes ratio	0.32	0.23	0.16	0.15	0.35	0.26	<0.001
Hemoglobin g/dl	12.15	1.24	12.26	1.56	11.38	1.78	0.073
Platelets (10^3/UI)	241.7	79.16	248.2	81.58	250.16	92.41	0.894
Serum albumin	4.33	0.38	4.42	0.4	4.24	0.38	0.146
Serum creatinine	0.91	0.23	0.87	0.23	1.03	0.27	0.029
Serum urea	24.61	10.33	25.1	11.42	29.32	10.71	0.111
hs-CRP (0.2-10mg/L)	12.39	3.38	12.38	3.02	11.52	2.89	0.531

Table (5): Posthoc pairwise comparison (p-value between each 2 groups).

	Group A vs. B	Group A vs. C	Group B vs. C
BMI (kg/m^2)	0.052	1.000	0.042
Monocytes (10^3/UI)	<0.001	0.987	< 0.001
Fasting blood sugar	1.000	0.017	0.005
A1c conc%	0.001	1.000	0.003
Serum creatinine	1.000	0.215	0.025

Discussion

The pathogenesis of DN is notably multifaceted, with inflammation identified as a key contributing factor. Inflammatory cytokines such as interleukin-1 (IL-1), IL-6, and IL-18 are implicated in DN development, alongside C-reactive protein and tumor necrosis factor-alpha, which are associated with severe diabetic organ damage and play a critical role in predicting DN risk [22,23].

Inflammatory marker levels in the serum exhibit variability corresponding to the severity of diabetic renal damage [24]. Novel inflammatory markers,

such as the NLR and platelet-to-lymphocyte ratio (PLR), have been recognized for their diagnostic and prognostic utility in inflammatory conditions, including coronary artery disease and diabetic kidney injury *[25-27]*. The value of these markers lies in their accessibility and cost-effectiveness, allowing frequent testing as needed. The MLR, derived from routine hemogram parameters, has been used as an inflammation indicator in various studies, though its relationship with T2DM and DN is not fully elucidated *[28,29]*.

This study aimed to assess the prognostic value of NLR and PLR in patients with T2DM for predicting DN. We analyzed data from 150 patients with T2DM stratified into three groups based on albumin-to-creatinine ratios: Group A (normoalbuminuria), Group B (microalbuminuria), and Group C (macroalbuminuria). The study population was predominantly female (80.7%), with an average age of 52.95 years and a mean diabetes duration of 10 years. Most were treated with oral hypoglycemic agents (56.0%), and a significant number belonged to the microalbuminuria group.

Contrary to other research indicating elevated NLR and PLR in DN patients *[30,31]*, our study did not find a significant correlation between these ratios and DN. While Moradi et al. (2012) and Tong et al. (2004) linked increased white blood cell counts with long-term diabetes complications, our findings did not support a significant association between leukocyte count and microvascular complications *[32,33]*.

Notably, our study's participants were largely well-controlled regarding diabetes, which may contribute to the lower systemic inflammation and consequently normalized NLR and PLR values. This observation coincides with Rena et al. (2017), who reported that metformin therapy could suppress inflammatory markers in both diabetic and non-diabetic patients *[34]*. However, while some studies have found PLR to indicate diabetes progression *[35,36]*, our findings did not show an independent association of PLR with DN.

Our results also indicated negative correlations between PLR and total leukocyte count, monocytes, and hemoglobin levels, highlighting a potential dysregulation in the immune system commonly seen in diabetics. This study's mean NLR was lower than that reported by Huang W et al. *[37]* and Calixte et al. *[38]*, which might account for the absence of statistical significance in our findings. Demographic factors such as race, age, and smoking status have been shown to influence NLR and PLR values *[39]*, suggesting the need for further research on the Egyptian population.

Moursy et al. *[40]* reported the prognostic significance of NLR for microvascular complications in Egyptian patients with T2DM, yet our study, with its smaller sample size and female predominance, did not replicate these findings. Estrogen levels, known for their anti-inflammatory effects, might have influenced our results Poor glycemic control has been linked to the progression of DN *[41]*, and while a positive correlation between MLR and A1c concentration was observed, no significant correlation was found with NLR & PLR *[42-45]*. In line with this, MLR was found to be an independent predictor for DN, reinforcing its potential as a predictive marker *[46,47]*.

Lastly, the study recognized anemia as a frequently overlooked complication of diabetes that exacerbates oxidative stress and could precipitate a cycle of worsening complications *[48-51]*. The observed negative correlation between PLR & and TLC, alongside the higher CRP levels across all groups, underscores the persistent inflammation in diabetes *[52-58]*. This research adds to understanding inflammation's role in diabetes, proposing further exploration of NLR, PLR, and MLR in the context of DN.

The study presents several notable strengths that enhance its contribution to medical research, particularly within the realm of diabetes management. It provides valuable insights into the Egyptian demographic, thereby enriching the understanding of diabetic nephropathy in this specific population and aiding in the development of targeted healthcare strategies. By evaluating novel biomarkers such as the NLR and the platelet-to-lymphocyte ratio (PLR), the study stands at the forefront of innovative approaches to predict diabetic nephropathy, offering potentially non-invasive and cost-effective predictive tools.

The comprehensive data collection on these inflammatory markers may pave the way for a more nuanced understanding of the inflammatory processes underlying diabetic complications. The study's interdisciplinary relevance touches upon endocrinology, nephrology, and immunology, making its findings valuable across multiple fields of medical research. Serving as a potential baseline for future longitudinal research, this study lays the ground work for subsequent investigations that could establish a clearer temporal relationship and causality between diabetes and nephropathy.

Moreover, by focusing on diabetic nephropathy a prevalent comorbidity of diabetes the study addresses a critical aspect of diabetes that significantly impacts patient outcomes. The clinical implications of this research are significant, offering potential pathways to improve patient care through early detection and intervention strategies tailored to manage inflammation in diabetic patients. The study's design and focus contribute substantially to the ongoing dialogue on managing and understanding diabetes and its associated complications.

The study in question, while insightful, is subject to several limitations that merit consideration. Firstly, the modest sample size constrains the robustness and generalizability of the findings. As a cross-sectional analysis, the study design inherently precludes the establishment of causality between the NLR and diabetic complications.

Furthermore, the participant pool consisted solely of Egyptian individuals, which introduces a degree of demographic limitation, potentially affecting the broader applicability of the results to diverse ethnic groups. The study's multivariate analysis was also potentially compromised by the inability to control all confounding factors, which may have influenced the outcomes.

An additional constraint was the gender imbalance within the sample, which could have impacted the inflammatory markers under study due to differences in hormonal influence on inflammation. Moreover, the study did not consider the potential anti-inflammatory effects of various antidiabetic medications, which could confound the association between NLR and diabetic control.

Lastly, the inclusion criteria may have inadvertently allowed for the enrollment of patients with undiagnosed comorbidities, which could have a bearing on both T2DM and nephropathy outcomes. These limitations underscore the need for a cautious interpretation of the study results and suggest avenues for future research to build on the preliminary findings.

Conclusion:

The study concludes that while the NLR and PLR are not significantly related to the occurrence of DN and therefore cannot be solely relied upon as early predictors, there is a significant positive correlation between NLR and TLC, suggesting that higher leukocyte counts within the normal range may be indicative of DN in T2DM. Adequate diabetic control appears to mitigate the inflammatory state, which is reflected in lower NLR and PLR levels. Furthermore, the study identifies the MLR as potentially relevant to the development of DN, with elevated MLR levels being associated with poorer glycemic control in patients with T2DM. These findings highlight the complex interplay between inflammatory markers, glycemic control, and the risk of DN and underscore the need for a multifactorial approach to predict and manage this condition.

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تقييم المؤشرات الحيوية الدموية، بما فى ذلك نسب الخلايا اللمفاوية المتعادلة والصفائح الدموية واللمفاوية، فى اعتلال الكلية السكرى لدى المرضى المصابين بداء السكرى من النوع ٢

الخلفية: اعتلال الكلية السكرى هو أحد مضاعفات داء السكرى من النوع الثانى الهامة. يتم اختبار نسبة العدلات إلى الخلايا الليمفاوية (NLR) ونسبة الصفائح الدموية إلى الخلايا اللمفاوية (PLR) لقدرتهما على اكتشاف اعتلال الكلية السكرى فى مرضى السكرى من النوع الثانى.

الطرق: أجريت دراسة مقطعية على ١٥٠ مريضا يعانون من داء السكرى من النوع الثانى . قسمت نسبة الألبومين إلى الكرياتينين المشاركين إلى بيلة ألبومينية طبيعية، وبيلة ألبومينية دقيقة، وبيلة ألبومينية كبيرة. تم استخدام تعداد الدم الكامل لحساب NLR وPLR وتحليل علاقتهما بمراحل اعتلال الكلية السكرى.

النتائج: كشفت هذه الدراسة عن نتائج ثاقبة حول العلاقات بين المؤشرات الحيوية الدموية المختلفة واعتلال الكلية السكرى. في المرضى الذين يعانون من داء السكرى من النوع الثانى. على وجه الخصوص، فى حين أن NLR وPLR لم يرتبطا بشكل مباشر مع اعتلال الكلية السكرى، تم اكتشاف علاقة إيجابية كبيرة بين NLR وإجمالى عدد الكريات البيض (TLC)، مما يسلط الضوء على العلاقة المعقدة بين ديناميات الكريات البيض ومرض السكرى. بالإضافة إلى ذلك، وجدت الدراسة نتائج مشجعة فيما يتعلق بضبط نسبة السكر فى الدم؛ أظهر المرضى الذين يعانون من مرض السكرى المُدار بشكل جيد مستويات أقل من كل من NLR وPLR. علاوة على ذلك، ارتبطت زيادة نسبة الخلايا الوحيدة إلى الخلايا الليمفاوية (MLR) بضعف التحكم فى نسبة السكر فى الدم، مما يسلط الضوء على إمكاناتها كعلامة لمراقبة إدارة مرض السكرى.

الاستنتاج: لا تربط هذه الدراسة بشكل مباشر بين NLR وPLR واعتلال الكلية السكرى، ولكنها تفتح طرقًا جديدة لاستخدام هذه النسب كجزء من إطار تشخيصى أوسع لخطر اعتلال الكلية السكرى. لدى المرضى الذين يعانون من داء السكرى من النوع الثانى. تؤكد الدراسة على تعقيد التسبب فى اعتلال الكلية السكرى. وأهمية الالتهاب الجهازى، مما يدعم فكرة أن نهج العلامات الحيوية المتعددة يمكن أن يحسن تقييم مخاطر اعتلال الكلية السكرى. تساعد هذه المعرفة بديناميكيات العلامات الحيوية الدموية داء السكرى من النوع الثانى واعتلال الكلية السكرى. على تحسين نتائج المرضى من خلال الكشف المبكر والإدارة المخصصة.