



To study Neutrophils to Lymphocytes ratio (NLR) and Platelets to Lymphocytes ratio (PLR) as predictive inflammatory markers in Diabetic Nephropathy.

¹Dr Tej Pal Bhakar, Junior Resident, Department of Medicine, S.M.S. Medical College & Hospital, Jaipur.

²Dr. R K Bhimwal, Senior Professor, Department of Medicine, S.M.S. Medical College & Hospital, Jaipur.

³Dr. Vikas Siwach, Junior Resident, Department of Medicine, S.M.S. Medical College & Hospital, Jaipur.

⁴Dr. Rohit Ishran, Assistant Professor, Department of Medicine, S.M.S. Medical College & Hospital, Jaipur.

⁵Dr Suresh Kumar Nitharwal, Junior Resident, Department of Medicine, S.M.S. Medical College & Hospital, Jaipur.

⁶Dr. Jyoti Verma, Junior Resident, Department of Medicine, S.M.S. Medical College & Hospital, Jaipur.

⁷Dr Vinod, Junior Resident, Department of Medicine, S.M.S. Medical College & Hospital, Jaipur.

Corresponding Author: Dr. R K Bhimwal, Senior Professor, Department of Medicine, S.M.S. Medical College & Hospital, Jaipur.

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Abstract

Objective: To study Neutrophils to 1 lymphocytes ratio (NIR) and Platelets to Lymphocytes ratio (PIR) as predictive inflammatory markers in Diabetic Nephropathy.

Materials & Methods: A total of 60 subjects were enrolled and divided into two study groups with 30 patients in each group: Group 1- Diabetic Patients diagnosed with Diabetic Nephropathy, and Group 2 Diabetic patients without Diabetic Nephropathy Blood samples were obtained and Neutrophils to Lymphocytes ratio (NIR) and Platelets to Lymphocytes ratio (PLR) was evaluated. All the results were subjected to statistical analysis.

Results: Men age of the parents of group I and group 2 were 53.47 years and 52 8 years respectively. Overall NI

R among diabetic patients with and without diabetic nephropathy was found to the 2.878 and 1.589 respectively. On comparing statistically, it was seen that mean NLR was significantly raised among diabetic patients with diabetic nephropathy. Overall, PI R among diaheric patients with and without diabetic nephropathy was found to be 139.22 and 82.88 respectively. On comparing statistically, it was seen that mean PTR was significantly raised among diabetic patients with diabetic nephropathy. After analyzing by univariate analysis, it was observed that NI R was in significant correlation with duration of diabetes, glycemic profile, renal profile, Toral leukocyte count, absolute neutrophil count, absolute lymphocyte count and platelet count and platelet lymphocyte ratio. After analyzing by univariate analysis, it was observed that PLR was in significant correlation

with duration of diabetes, glycemic profile renal profile.

Total leukocyte count absolute neutrophil count, absolute lymphocyte count and platelet count and neutrophil lymphocyte ratio.

Conclusion: The results of our study have shown that there was a significant correlation between NLR and DN and between PLR and DN. implying that inflammation and endothelial dysfunction could be an integral part of DN. NLR and PLR were significantly and independently raised in patients with type 2 DM having increased albuminuria. Therefore, NLR and PLR may be considered a predictor and a prognostic risk makers of DN.

Keywords: NLR, PLR, Diabetic Nephropathy.

Introduction

Diabetes mellitus (DM) has routinely been described as a metabolic disorder characterised by hyperglycemia that develops as a consequence of defects in insulin secretion, insulin action, or both. Diabetes patients usually have hyperglycemia, hyperlipidemia, and insulin resistance; all of them are risk factors for macrovascular diseases. Data are available about the effect of glucose-lowering therapies on cardiovascular risk in patients with T2DM. Diabetes-associated vascular alterations include anatomic, structural, and functional changes leading to multiorgan dysfunction. Evidence based medicine shows that diabetes morbidity and mortality are attributed to its chronic complications. According to ADA (2012), Diabetic nephropathy (DN) is a microvascular complication known to be the leading cause of ESRD worldwide. Chronic inflammation plays an important role in pathogenesis of diabetes mellitus and its complications. White blood count (WBC) is a conventional, crude but inexpensive, and sensitive marker of inflammatory status. Several other inflammatory markers such as interleukin (IL) 1, IL6,

IL8, transforming growth factor β 1, tumor necrosis factor α have been identified but most of them are time consuming, expensive, and difficult to standardize in routine clinical practice. Neutrophil to lymphocyte ratio (NLR) is defined as a novel potential marker to analyze inflammation in cardiac and non-cardiac disorders. NLR represents a combination of two markers neutrophils represent the active nonspecific inflammatory mediators that initiate the first line defense while lymphocytes represent the regulatory or protective component of inflammation. NLR can be used as a cheap and reliable predictor of the occurrence of diabetic nephropathy, which has been evaluated in this study in an Indian population. The platelet-lymphocyte ratio (PLR) is calculated as the ratio of the platelet to lymphocyte count (obtained from the same blood sample). Platelets release proinflammatory mediators, such as chemokines and cytokines. Activated platelets stimulate thrombus formation in response to rupture of atherosclerotic plaques or endothelial cell erosion, promoting atherothrombotic disease. Platelet activation plays an important role in coronary artery disease (CAD) and cardiovascular (CV) events. A higher baseline platelet count in patients with acute myocardial infarction is a powerful predictor of death. Worldwide, many investigators have evaluated the value of NLR and PLR as markers of DKD, and these have been identified as novel surrogate markers of Diabetic Nephropathy.

Study and Objectives

Study of Neutrophils to Lymphocytes ratio (NLR) and Platelets to Lymphocytes ratio (PLR) as predictive inflammatory markers in Diabetic Nephropathy.

Materials & Methods

Group 1 Diabetic Patients diagnosed with Diabetic Nephropathy.

Group 2 Diabetic patients without Diabetic Nephropathy

All these criteria ruled out by urine-analysis, USG, clinical examination and history. Patients diagnosed to have Diabetic Nephropathy were enrolled and studied as per inclusion and exclusion criteria.

Details of the study was explained. Permission was sought in the form of written consent and the study was conducted.

Blood samples were obtained.

Evaluation of NLR and PLR was done.

NLR is the ratio of neutrophils to lymphocytes and PLR is the ratio of platelets to lymphocytes.

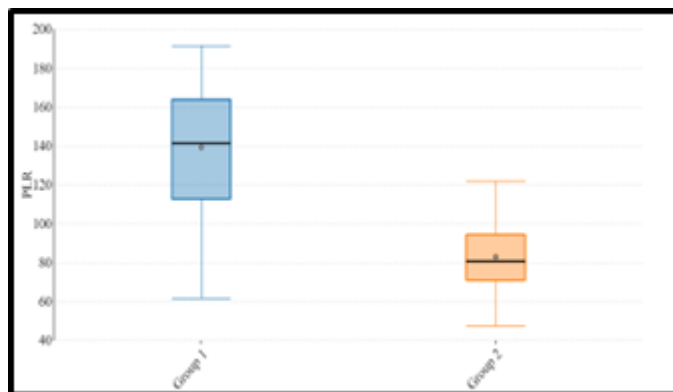
All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Chi-square test, student t test and Pearson's correlation were used for evaluation of results. P- value of less than 0.05 was taken as significant.

Result

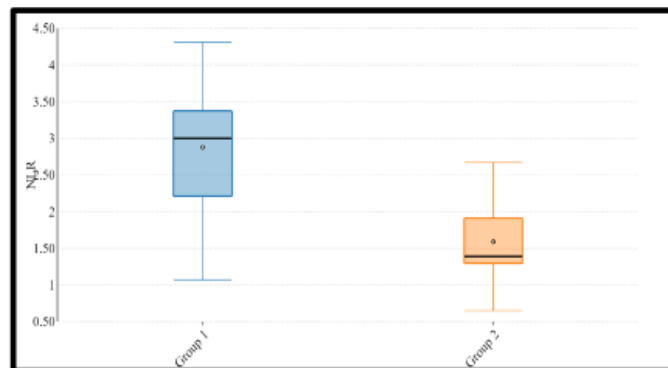
Mean hemoglobin levels among patients with and without diabetic nephropathy was 11.93 g/dL and 12.41 g/dL respectively. Mean total leukocyte count among the patients with and without diabetic nephropathy was $8.26 \times 10^3/\mu\text{L}$ and $7.58 \times 10^3/\mu\text{L}$ respectively. Mean absolute neutrophil count among the patients with and without diabetic nephropathy was $5.73 \times 10^3/\mu\text{L}$ and $4.33 \times 10^3/\mu\text{L}$ respectively. Mean absolute lymphocyte count among the patients with and without diabetic nephropathy was $2.14 \times 10^3/\mu\text{L}$ and $2.83 \times 10^3/\mu\text{L}$ respectively. Mean platelet count among the patients with and without diabetic nephropathy was $279.3 \times 10^3/\mu\text{L}$ and $229.23 \times 10^3/\mu\text{L}$ respectively. While analysing statistically, it was seen that mean total leukocyte count, absolute neutrophil count, absolute lymphocyte count and platelet count was significantly higher among the patients with diabetic nephropathy in comparison to patients without diabetic nephropathy. Hence; haematological profile is

significantly altered among patients with diabetic nephropathy.

Box presentation of Platelet to lymphocyte ratio (PLR)



Box presentation of Neutrophil to lymphocyte ratio (NLR)



Pearson's correlation analysis of NLR

Variable	r value	p- value
BMI	-0.096	0.361
Duration of diabetes	0.695	0.000 (Significant)
HbA1c	0.882	0.000 (Significant)
FBS	0.385	0.002 (Significant)
Blood urea	-0.635	0.000 (Significant)
Serum creatinine	0.138	0.001 (Significant)
eGFR	0.712	0.002 (Significant)
Hb	-0.039	0.892
Total leukocyte count	0.698	0.001 (Significant)
Absolute neutrophil count	0.231	0.000 (Significant)
Absolute lymphocyte count	0.337	0.001 (Significant)
Total platelet count	-0.119	0.001 (Significant)
PLR	0.619	0.000 (Significant)

Pearson’s correlation analysis of PLR

Variable	r value	p- value
BMI	-0.013	0.648
Duration of diabetes	0.752	0.001 (Significant)
HbA1c	0.139	0.000 (Significant)
FBS	0.628	0.000 (Significant)
Blood urea	-0.348	0.000 (Significant)
Serum creatinine	0.627	0.001 (Significant)
eGFR	0.336	0.001 (Significant)
Hb	-0.017	0.358
Total leukocyte count	0.582	0.000 (Significant)
Absolute neutrophil count	0.611	0.003 (Significant)
Absolute lymphocyte count	0.928	0.000 (Significant)
Total platelet count	-0.161	0.001 (Significant)
NLR	0.878	0.001 (Significant)

Discussion

Overall NLR among diabetic patients with and without diabetic nephropathy was found to be 2.878 and 1.589 respectively. On comparing statistically, it was seen that mean NLR was significantly raised among diabetic patients with diabetic nephropathy. Our results were found to be in concordance with the results obtained by previous authors who also reported similar findings. In a previous study conducted by Khandare SA et al, mean NLR among the patients with and without diabetic nephropathy was found to be 2.83 and 1.94 respectively (p- value < 0.05). Jaaban et al, in their study also reported significantly higher NLR among patient with diabetic nephropathy (2.3) in comparison to the patients without diabetic nephropathy (1.73) (p- value < 0.05). In another study conducted by Kamrul-Hasan et al, mean NLR among the diabetic patients with and without diabetic nephropathy was 2.16 and 1.92 respectively, on comparing the results were found to be statistically significant. Overall, NLR ratio among patients with and

without diabetic nephropathy was found to be 2.94 and 1.82 in another study conducted by Abdelaziz A et al. Recently, several studies have suggested that NLR could play a predictive role for assessing the development of microvascular complications of diabetes. In a study, Ulu et al demonstrated NLR to be a quick and reliable prognostic marker for diabetic retinopathy and its severity. Another recent study by Ulu et al concluded that NLR can be considered as a predictive and prognostic marker for sensorineural hearing loss in diabetic patients. A study conducted in geriatric population also suggested that increased NLR levels were in itself an independent predictor for microvascular complications of DM. Overall PLR among diabetic patients with and without diabetic nephropathy was found to be 139.22 and 82.88 respectively. On comparing statistically, it was seen that mean PLR was significantly raised among diabetic patients with diabetic nephropathy. Our results were found to be in concordance with the results obtained by previous authors who also reported similar findings. In a previous study conducted by Jaaban et al, authors also reported significantly higher PLR among patient with diabetic nephropathy (115.45) in comparison to the patients without diabetic nephropathy (98.35) (p- value < 0.05). In another study conducted by Kamrul-Hasan et al, mean PLR among the diabetic patients with and without diabetic nephropathy was 115.5 and 101.02 respectively, on comparing the results were found to be statistically significant. Overall, NLR ratio among patients with and without diabetic nephropathy was found to be 249.24 and 175.76 in another study conducted by Abdelaziz A et al. PLR is considered as a potential inflammatory marker in cardiac, oncologic disorders, and chronic kidney disease. Furthermore, PLR like NLR, which can be calculated by complete blood count, may be utilized as cheap predictors of diabetic microvascular complications.

Mineoka et al. reported that PLR can be serve as a useful marker for assessment of high risk diabetic foot and foot ulcers in patients with type 2 diabetes.

Correlation analysis of NLR

After analyzing by univariate analysis, it was observed that NLR was in significant correlation with duration of diabetes, glycemic profile, renal profile, Total leukocyte count, absolute neutrophil count, absolute lymphocyte count and platelet count and platelet-lymphocyte ratio. Our results were in concordance with the results obtained by Jaaban et al who also reported similar findings. In their study, univariate analysis (Pearson) found significant correlation between NLR and duration of diabetes, HbA1c, blood pressure, urea, creatinine, GFR, albumin/creatinine ratio, WBC and PLR.

Correlation analysis of PLR

After analyzing by univariate analysis, it was observed that PLR was in significant correlation with duration of diabetes, glycemic profile, renal profile, Total leukocyte count, absolute neutrophil count, absolute lymphocyte count and platelet count and neutrophil-lymphocyte ratio. Our results were in concordance with the results obtained by Jaaban et al who also reported similar findings. In their study, univariate analysis (Pearson) demonstrated significant correlation between PLR and duration of diabetes, HbA1c, blood pressure, creatinine, GFR, albumin/creatinine ratio, NLR and Platelet count.

Conclusion

The results of our study have shown that there was a significant correlation between NLR and DN and between PLR and DN, implying that inflammation and endothelial dysfunction could be an integral part of DN. NLR and PLR were significantly and independently raised in patients with type 2 DM having increased albuminuria. Therefore, NLR and PLR may be considered as a predictor and a prognostic risk markers of

DN. NLR and PLR are easy to calculate parameter in the laboratory by observing the differential leukocyte count. These tests are simple, inexpensive, and done routinely.

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