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Assessment of Neutrophil to lymphocyte ratio in patients with diabetic nephropathy

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Abstract
Aim: To assess neutrophil to lymphocyte ratio in patients with diabetic nephropathy.
Materials and Methods: The present study was conducted with the aim of assessing Neutrophils to Lymphocytes ratio (NLR) in patients with Diabetic Nephropathy. A total of 50 type 2 diabetic patients were enrolled and were divided into two study groups as follows: Group A- Diabetic Patients diagnosed with Diabetic Nephropathy, and Group B- Diabetic patients without Diabetic Nephropathy. Baseline demographic and clinical details of all the patients was obtained. Blood samples were obtained and NLR was assessed. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi-square test and student t test were used for evaluation of level of significance.
Results: Overall NLR among diabetic patients with and without diabetic nephropathy was found to be 2.96 and 1.86 respectively. On comparing statistically, it was seen that mean NLR was significantly raised among diabetic patients with diabetic nephropathy.
Conclusion: Inflammation and endothelial dysfunction could be an integral part of DN. NLR was significantly and independently raised in patients with type 2 DM having increased albuminuria.

Keywords: neutrophil, lymphocyte, 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. Type 2 diabetes encompasses individuals who have insulin resistance (IR) and usually relative (rather than absolute) insulin deficiency. Diabetes-associated vascular alterations include anatomic, structural, and functional changes leading to multiorgan dysfunction. Diabetes is a disease associated with both microvascular and macrovascular complications. Microvascular complications include retinopathy, nephropathy and neuropathy. Macrovascular complications in type 2 diabetes mellitus comprise of coronary artery disease, cerebrovascular accident and peripheral vascular disease [1- 3].
Diabetic nephropathy (DN) is a microvascular complication known to be the leading cause of ESRD worldwide, and is associated with increased cardiovascular risk. The pathogenesis of DN is very complex and is still not fully understood, resulting in poor therapeutic outcomes. Standard therapy, with strict blood sugar and blood pressure control, has been shown to be unable to stop DN progression to ESRD and DN-related mortality. 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 non-specific inflammatory mediators that initiate the first-line defence while lymphocytes represent the regulatory or protective component of inflammation [4-6]. Hence; under the light of above-mentioned data, the present study was undertaken to study Neutrophils to Lymphocytes ratio (NLR) in patients with Diabetic Nephropathy.

Materials and Methods
The present study was conducted with the aim of assessing Neutrophils to Lymphocytes ratio

(NLR) in patients with Diabetic Nephropathy. Diabetic nephropathy is defined as persistent albuminuria (>300mg/24 hrs) developing as a complication of diabetes mellitus in the absence of any clinical or laboratory evidence of other kidney or renal tract disease. A total of 50 type 2 diabetic patients were enrolled and were divided into two study groups as follows:

Group A: Diabetic Patients diagnosed with Diabetic Nephropathy

Group B: Diabetic patients without Diabetic Nephropathy

Baseline demographic and clinical details of all the patients was obtained. Blood samples were obtained and NLR was assessed. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Chi-square test and student t test were used for evaluation of results.

Results

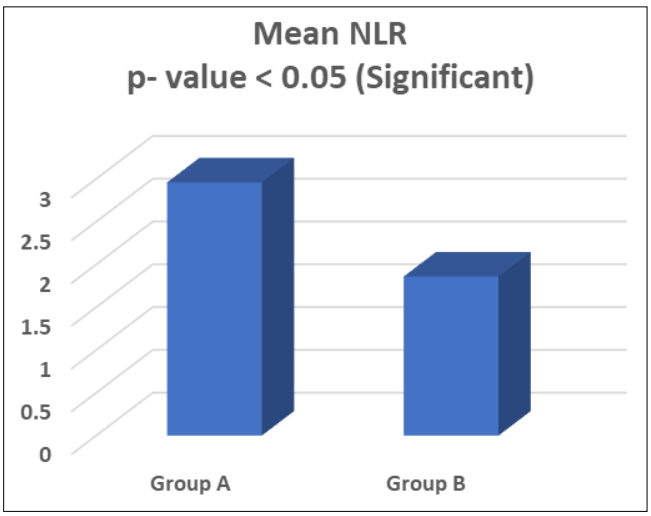
Mean age of the patients of group A and group B was 46.6 years and 44.1 years respectively. Majority proportion of patients of both the study groups were males. Mean absolute neutrophil count among the patients with and without diabetic nephropathy was 5.96 x 10^3/µL and 4.56 x 10^3/µL respectively. Mean absolute lymphocyte count among the patients with and without diabetic nephropathy was 2.01 x 10^3/µL and 2.45 x 10^3/µL respectively. While analysing statistically, it was seen that absolute neutrophil count and absolute lymphocyte 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. Overall NLR among diabetic patients with and without diabetic nephropathy was found to be 2.96 and 1.86 respectively. On comparing statistically, it was seen that mean NLR was significantly raised among diabetic patients with diabetic nephropathy.

Table 1: Demographic variables

Variable	Group A	Group B
Mean age (years)	46.6	44.1
Males (n)	15	18
Females (n)	10	7
Mean BMI (Kg/m^2)	26.5	25.7
Mean duration of diabetes (years)	12.6	8.1

Table 2: Assessment of haematological profile

Haematological profile	Group A		Group B		p- value
	Mean	SD	Mean	SD	
Absolute neutrophil count (x 10^3/µL)	5.96	0.51	4.56	0.58	0.000 (Significant)
Absolute lymphocyte count (x 10^3/µL)	2.01	0.42	2.45	0.46	0.000 (Significant)



Graph 1: Comparison of NLR

Discussion

Diabetic nephropathy (DN) or diabetic kidney disease is a syndrome characterized by the presence of pathological quantities of urine albumin excretion, diabetic glomerular lesions, and loss of glomerular filtration rate (GFR) in diabetics. Diabetes may be classified as type 1 (autoimmune β-cell destruction and absolute insulin deficiency), type 2 (relative insulin deficiency and resistance), and other types (eg, pancreatic disease). DN is characterized by structural and functional changes. In glomeruli, there is mesangial expansion, thickening of the basement membrane, and, characteristically, nodular glomerulosclerosis (Kimmelstiel–Wilson nodules). In early DN, tubular hypertrophy is present but eventually interstitial fibrosis with tubular atrophy develops, along with arteriolar hyalinosis. In advanced cases, there is an infiltrate of macrophages and T-lymphocytes [7- 10].

In the present study, mean age of the patients of group A and group B was 46.6 years and 44.1 years respectively. Majority proportion of patients of both the study groups were males. Our results were in concordance with the results obtained by previous authors who also reported similar findings. In a study conducted by Khandare SA *et al*. mean age of the patients with and without diabetic nephropathy group was 52.29 years and 50.05 years respectively [10].

In the present study, mean absolute neutrophil count among the patients with and without diabetic nephropathy was 5.96 x 10^3/µL and 4.56 x 10^3/µL respectively. Mean absolute lymphocyte count among the patients with and without diabetic nephropathy was 2.01 x 10^3/µL and 2.45 x 10^3/µL respectively. While analysing statistically, it was seen that absolute neutrophil count and absolute lymphocyte 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. Similar findings were reported in a study conducted by Jabaan *et al*. In their study also, mean total leukocyte count among the patients with and without diabetic nephropathy was 8.27 x 10^3/µL and 7.39 x 10^3/µL respectively. Mean absolute neutrophil count among the patients with and without diabetic nephropathy was 5.2 x 10^3/µL and 4.2 x 10^3/µL respectively. Mean absolute lymphocyte count among the patients with and without diabetic nephropathy was 2.2 x 10^3/µL and 2.4 x 10^3/µL respectively. They also observed significantly higher 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 [11].

In the present study, overall NLR among diabetic patients with and without diabetic nephropathy was found to be 2.96 and 1.86 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) [10, 11].

Alsayyad MM *et al*. evaluated the prognostic value of LMR in DN of type 2 diabetes mellitus, and to compare it with other ratios: NLR and PLR. A case–control study including 100 type 2 diabetes mellitus patients and 25 apparently healthy controls. The NLR mean was 1.8/2.9/3.7/1.2 and the PLR mean was 175, 8/249, 2/277, 3/108, 3 in the corresponding group. Receiver operating characteristic curve analysis for ratios between groups I and IIA demonstrated that with a best cutoff point of 2.66 for the LMR, the sensitivity was 44%, the specificity: 92% (the ability of the LMR to predict DN risk); 2.2 for the NLR, the sensitivity: 84%, the specificity: 98%; 207 for the PLR, the sensitivity: 72%, and the specificity: 80%. So, in predicting the DN risk, NLR came first as regards the specificity followed by LMR and then PLR, but followed by PLR and then LMR as regards the sensitivity. LMR may be considered as a surrogate inflammatory marker for DN in early stages and in between stages, but it is not better than NLR as a screening tool for DN diagnosis [12].

Conclusion

Inflammation and endothelial dysfunction could be an integral part of DN. NLR was significantly and independently raised in patients with type 2 DM having increased albuminuria.

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