EARLY PREDICTION OF DIABETIC RETINOPATHY BY MPV AND P-LCR

General Medicine

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ABSTRACT

BACKGROUND: Mean platelet volume (MPV), platelet-large cell ratio (P-LCR) are the indicators of enhanced platelet activity and can be considered as potential biomarkers for diabetic microvascular complications like diabetic retinopathy. **PURPOSE:** To study MPV and P-LCR in Type 2 diabetics with and without complications of diabetic retinopathy. **MATERIAL AND METHODS:** A cross sectional study was conducted on 75 Type 2 diabetes patients. Detailed clinical history regarding duration, and complications was taken. MPV and P-LCR were obtained using automated cell counter. Fasting blood glucose, HbA1c were also obtained. Diabetics were further categorized into patients with complications and without complications of diabetic retinopathy. Statistical analysis was performed by Statistical Package for the Social Sciences Version 16 (Chicago, IL), the Chi-square test and the unpaired t-test. The receiving operating curve (ROC) analysis was carried out. The area under the curve (AUC) was calculated. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated. **RESULTS:** MPV and P-LCR were significantly ($p=0.001$) higher among patients with retinopathy than without retinopathy. **CONCLUSION:** MPV and P-LCR are predictive markers of diabetic microvascular complication diabetic retinopathy. They are more significant in microvascular complication diabetic retinopathy.

KEYWORDS

Diabetes, Mean Platelet Volume, Platelet Large Cell Ratio, Platelet Indices.

INTRODUCTION:

Diabetes mellitus (DM) is the most common metabolic disease in the world and according to International Diabetes Federation estimates; approximately 415 million people in the world had DM in 2015 which is expected to increase to 642 million by 2040.¹ Platelet indices are widely used as a biological marker of platelet function and activity. Diabetes Mellitus (DM) is the most prevalent endocrinal disorder distinguished by hyperglycaemia arising from faults in insulin secretion, insulin action or both and is related with remarkable morbidity and mortality. DM is classified as type 1 and type 2 DM. Diabetic retinopathy is one of the microvascular complications of DM resulting in organ and tissue destruction. Studies have shown that inflammation play a key part in the evolution of Diabetes Mellitus.² Platelets are important for haemostasis and compression of their function is basic to the understanding of the pathophysiology of vascular disease in diabetes mellitus.³ Mean Platelet Volume (MPV), and Platelet Large Cell Ratio (P-LCR) are easily measured platelet indices, which rise during platelet activation and during platelet activation platelets change their shape from discoid to spherical.⁹ Mean platelet volume (MPV), a structural parameter of platelets is a readily available indicator in routine blood test, could consider the size and activity of platelets. Big platelets clump more effortlessly and exercise their pro-inflammatory functions with substantial effectiveness.

MATERIAL AND METHODS:

This study was conducted in Department of Medicine, SGT Medical College, SGT University, Gurugram, Haryana, India. 75 patients in the age group 35 years to 70 years were selected for the study. MPV and P-LCR were studied in the cases and were correlated with diabetic retinopathy to evaluate the predictive values of MPV and P-LCR in predicting diabetic retinopathy.

RESULTS:

MPV and P-LCR had statistically significant correlation with diabetic microvascular complication diabetic retinopathy.

Table-1: Comparison of platelet indices between with & without retinopathy.

Platelet indices	Retinopathy		p-value ¹
	Present	Absent	
MPV	12.28±0.95	10.92±1.16	0.001*
P-LCR	42.43±5.19	35.00±6.61	0.001*

¹Unpaired t-test, *Significant

Table-1 shows the comparison of MPV and P-LCR with between with and without retinopathy. MPV and P-LCR were significantly ($p=0.001$) higher among patients with retinopathy than without retinopathy.

Table- 2: Predictive values of MPV and P-LCR in predicting retinopathy.

Platelet indices	Retinopathy				Total		AUC	Sensitivity	Specificity	PPV	NPV
	Present		Absent								
	No.	%	No.	%	No.	%					
MPV											
>11.00	23	30.7	15	20.0	38	50.7	0.83	82.1	68.1	60.5	86.5
≤11.00	5	6.7	32	42.7	37	49.3					
Total	28	37.3	47	62.7	75	100.0					
P-LCR											
>36.50	22	29.3	6	8.0	28	37.3	0.84	78.6	87.2	78.6	87.2
≤36.50	6	8.0	41	54.7	47	62.7					
Total	28	37.3	47	62.7	75	100.0					

Table-1 shows the predictive values of MPV and P-LCR in predicting retinopathy. MPV>11 correctly predicted retinopathy in 30.7% patients with sensitivity and specificity of 82.1% and 68.1% respectively. P-LCR>36.50 correctly predicted retinopathy in 29.3% patients with sensitivity and specificity of 78.6% and 87.2% respectively.

DISCUSSION:

The morphologic and functional forms of platelets, which are related to enhanced platelet activity, were found to be increased in patients with DM⁴. Statistically significant correlation of MPV with diabetic retinopathy and association of elevated MPV with pre-diabetes, diabetes and diabetic vascular complications is seen in previous literature.⁵ Findings in our study are in concordance with the available literature. Similarly, high values were also seen in the studies done by Dindar et al.⁶ and Ates et al.⁷, MPV was also associated with retinal neovascularization of diabetic retinopathy. Platelets in diabetics are active and have enhanced aggregation because of dysregulated signalling pathway. This causes thrombus formation and microcapillary embolization. The release of constrictive, oxidative, and mitogenic substances like platelet-derived growth factor and vascular endothelial growth factor accelerates the progression of local vascular lesions such as neovascularization of lens in diabetic retinopathy.

CONCLUSION:

Platelet indices MPV and P-LCR were significantly ($p=0.001$) higher among patients with retinopathy than without retinopathy in our study. MPV and P-LCR can be considered as biomarkers for detection of impending complication at the earliest. We found that these platelet indices were more statistically significant in microvascular complications. These platelet indices MPV and P-LCR which are readily available and cost-effective methods can be used to predict diabetic retinopathy at an early stage for early and effective management and better prognosis of the patients.

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