

## ORIGINAL RESEARCH

# Expeditious prognostication of diabetic retinopathy by platelet count and platelet distribution width (PDW)

<sup>1</sup>Dr. Divya P Wangoo, <sup>2</sup>Dr. Preeti, <sup>3</sup>Dr. Sumit Gulla, <sup>4</sup>Dr. Shivali

<sup>1</sup>Assistant Professor, Department of Physiology, North Delhi Municipal Corporation Medical College and Hindu Rao Hospital, New Delhi-110007, India

<sup>2</sup>Senior Resident, Department of Pathology, B.P.S. Govt. Medical College for Women, Khanpur Kalan, Distt. Sonapat, Haryana, India

<sup>3</sup>Ex. Junior Resident, Shree Guru Gobind Singh Tricentenary University (SGT) Gurugram & Consultant, Arvind Medicare Pvt. Ltd., Gurugram-122505, Haryana, India

<sup>4</sup>Junior Resident, Department of Pathology, All India Institute of Medical Sciences, New Delhi, India

### Corresponding Author

Dr. Shivali

Junior Resident, Department of Pathology, All India Institute of Medical Sciences, New Delhi, India

Email: [drshivaliaiiims21@gmail.com](mailto:drshivaliaiiims21@gmail.com)

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### ABSTRACT

**Background:** Platelet count and PDW are the indicators of enhanced platelet activity and can be considered as potential biomarkers for diabetic microvascular complications like diabetic retinopathy. **Aims and Objectives:** To study platelet count and PDW 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 mellitus patients. Detailed clinical history regarding duration, and complications was taken. Platelet count and PDW 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. **Results:** PDW was significantly ( $p=0.001$ ) higher among patients with diabetic retinopathy than without retinopathy. **Conclusion:** PDW can be used as predictive marker of diabetic microvascular complication diabetic retinopathy. PDW is significantly raised in diabetic retinopathy. Platelet count can predict diabetic retinopathy correctly with a good sensitivity index.

**Keywords:** Diabetes, Platelet Count, PDW, Platelet Indices

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### 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.<sup>1</sup> 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 linked with remarkable morbidity and mortality. DM is classified as type 1 and type 2 DM. Diabetic retinopathy is one of the most common microvascular complications of Diabetes Mellitus resulting in organ and tissue destruction. Studies have shown that inflammation plays a key part in the evolution of Diabetes Mellitus<sup>2</sup>. Platelets are

important for haemostasis and compression of their function is basic to the understanding of the pathophysiology of vascular disease in diabetes mellitus<sup>3</sup>. Platelet count and PDW are easily measured platelet indices, which rise during platelet activation and during platelet activation platelets mould their shape from discoid to spherical. Big platelets clump more effortlessly and exert their pro-inflammatory functions with considerable 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. Platelet count and PDW were studied in the cases and were correlated with diabetic retinopathy to evaluate the

predictive values of Platelet count and PDW in predicting diabetic retinopathy.

### STATISTICAL ANALYSIS

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 area under the curve (AUC) was calculated. The

sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated.

### RESULTS

Platelet distribution width (PDW) had statistically significant correlation with diabetic microvascular complication diabetic retinopathy.

**Table-1: Comparison of platelet indices in patients with & without diabetic retinopathy**

Platelet indices	Retinopathy		p-value <sup>1</sup>
	Present	Absent	
Platelet count	3.59±0.66	2.49±0.61	0.49
PDW	18.72±2.64	15.79±2.39	0.001*

<sup>1</sup>Unpaired t-test, \*Significant

Table 1 shows the comparison of Platelet count and PDW in patients with and without diabetic retinopathy. PDW was significantly higher

(p=0.001) among patients with diabetic retinopathy than without diabetic retinopathy but not platelet count.

**Table-2: Predictive values of platelet count and PDW in predicting diabetic retinopathy**

Platelet indices	Retinopathy				Total		AUC	Sensitivity	Specificity	PPV	NPV
	Present		Absent		No.	%					
	No.	%	No.	%							
<b>Platelet count</b>											
>2.30	19	25.3	30	40.0	49	65.3	0.53	67.9	36.2	38.8	65.4
≤2.30	9	12.0	17	22.7	26	34.7					
Total	28	37.3	47	62.7	75	100.0					
<b>PDW</b>											
>16.0	23	30.7	21	28.0	44	58.7	0.78	82.1	55.3	52.3	83.9
≤16.0	5	6.7	26	34.7	31	41.3					
Total	28	37.3	47	62.7	75	100.0					

Table 2 shows the predictive values of platelet count and PDW in predicting diabetic retinopathy. A cut-off value of ≤2.30 and >2.30 was taken with regard to platelet count and ≤16.0 and >16.0 for PDW statistically by using receiver operating characteristic (ROC) curve. Platelet count >2.30 correctly predicted diabetic retinopathy in 25.3% patients with sensitivity and specificity of 67.9% and 36.2% respectively. PDW>16 correctly predicted diabetic retinopathy in 30.7% patients with sensitivity and specificity of 82.1% and 55.3% respectively.

### DISCUSSION

The morphologic and functional forms of platelets, which are linked to enhanced platelet activity, were found to be increased in patients with DM<sup>4</sup>. Statistically significant correlation of PDW with diabetic retinopathy and association of elevated PDW with pre-diabetes, diabetes and diabetic vascular complications is seen in previous literature<sup>5</sup>. 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.<sup>6</sup> and Ates et al.<sup>7</sup>.PDW was also linked with retinal neovascularization of diabetic retinopathy. Platelets in diabetics are active and have enhanced aggregation due to dysregulated signalling pathway. This results in 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 like neovascularization of lens in diabetic retinopathy.

### CONCLUSION

Platelet index PDW was significantly (p=0.001) higher among patients with diabetic retinopathy than in diabetics without retinopathy in our study. Platelet count can be used to predict diabetic retinopathy correctly with a good sensitivity index. PDW can be considered as a biomarker for detection of impending complication at the earliest. We found in this study that PDW was statistically significant in microvascular complication diabetic retinopathy. This platelet index PDW which is readily available and cost-effective method can be used to predict diabetic retinopathy at an earlier stage for early and effective management and better prognosis of the diabetic patients.

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**Abbreviations used:** PDW: Platelet distribution width, DM: Diabetes Mellitus, AUC: Area Under the

Curve, PPV: Positive Predictive Value, NPV: Negative Predictive Value

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