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Original Article

Platelet Indices Amongst Subjects Suffering From Type 2 Diabetes Mellitus- A Prospective Study

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ABSTRACT

Background: Diabetes is a chronic insidious disorder. Platelet Indices are group of parameters which consists of MPV, PDW, P-LCR, Platelet Crit, and Platelet Count. They all correlate with the activity of platelets. Hence this study aims to estimate the platelet indices amongst subjects suffering from type 2 diabetes mellitus. **Materials and methods:** The present study enrolled 150 patients reporting to the Department of Medicine in association with Departments of Biochemistry and Pathology. Subjects with uncontrolled hypertension or on insulin or any other antiplatelet drugs were not included in the study. Platelet indices like MPV, PDW, Platelet Crit, P-LCR and Platelet Count were estimated. Clinical and laboratory features of the subjects were assessed for platelet indices and HbA1c values. All the data was arranged in a tabulated form and analyzed using SPSS software. **Results:** The controlled group of diabetes which was HbA1c ≤ 7 were 64 and were labelled as Group A and uncontrolled group with HbA1c >7 were 86 and were labelled as Group B. The MPV amongst Group A subjects was 8.72 ± 0.74 and Group B subjects was 10.39 ± 1.29 . The PDW amongst Group A subjects was 10.32 ± 1.59 and amongst Group B subjects was 14.70 ± 5.48 . **Conclusion:** According to our study subjects with diabetes had higher mean platelet indices as compare to normal subjects.

Keywords: Diabetes, Insidious, Indices, Platelet.

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INTRODUCTION

Platelet Indices are group of parameters which consists of MPV, PDW, P-LCR, Platelet Crit, and Platelet Count. They all correlate with the activity of platelets.¹ MPV measures the platelet size which when increase gives a measure of platelet activations. They are metabolically and enzymatically more active and have greater pro-thrombotic potential.² PDW is marker of activation of coagulation resulting from platelet swelling and pseudopodia formation and is recognized specific marker of platelet activation.³ P-LCR is measure of large platelets.⁴ The differences in platelet volume vividly correlates with differences in density, dense body content, enzymatic activity of lactate dehydrogenase, platelet aggregation to adenosine diphosphate and serotonin uptake and release supporting the relevance of the Mean Platelet Volume (MPV) as a measure of platelet function.⁵ Abnormal platelet and endothelial damage may play a role in microangiopathy of diabetes.⁶ Acute complications associated with Diabetes Mellitus are Diabetic ketoacidosis and

Hyperglycaemic hyperosmolar state. Chronic complications of Diabetes Mellitus affect many organ systems and are responsible for the majority of morbidity and mortality associated with disease. Chronic complications can be divided into vascular and non vascular complications Diabetes mellitus has been recognized as a prothrombotic tendency with increased platelet reactivity which plays a role in microvascular complication of diabetes.⁷ Various studies has shown increase mean platelet volume in diabetes and increased vascular complications.^{8,9,10} Very few studies have been conducted in North India regarding platelet indices and diabetes. Diabetes will be a leading cause of death by 2030. About 15% in North Indian adult population suffer from diabetes.¹¹ Hence this study aims to estimate the platelet indices amongst subjects suffering from type 2 diabetes mellitus.

MATERIALS AND METHODS

The present study enrolled 150 patients reporting to the

Department of Medicine in association with Departments of Biochemistry and Pathology. Subjects aged between 35-60 years with new or old diagnosis of diabetes were included in the study. The study was conducted in the Rajindra Hospital Patiala for the period of 1 year i.e. from 2016-2017. Subjects with uncontrolled hypertension or on insulin or any other antiplatelet drugs were not included in the study. Patients with acute recent cardiac, liver and renal dysfunction were also not included in the study. Clinical and laboratory features of the subjects were assessed for platelet indices and HbA1c values. Blood sample of all the subjects were withdrawn in an EDTA vial and platelet indices were estimated using automated analyser, Sysmex. Platelet indices like MPV, PDW, Platelet Crit. P-LCR and Platelet Count were estimated. Blood Glucose Levels was tested by glucose oxidase method and diabetes was labeled by ADA criteria. HbA1c was estimated by chromatography analyzer, Erba Mannheim. Subjects were divided into two groups GROUP A and GROUP B. In Group A subjects with HbA1c $\leq 7\%$ were included and in Group B subjects with HbA1c $>7\%$ were included. All the data was arranged in a tabulated form and analyzed using SPSS software.

RESULT

Table 1 shows the group distribution of sampled patients according to their gender. Out of 150 patients reviewed in the study 72 were male and 78 female. The controlled group of diabetes which was HbA1c ≤ 7 were 64 and were labelled as Group A and uncontrolled group with HbA1c >7 were 86 and were labelled as

Table-1: Group Distribution of Sampled Patients According to their Gender

Group	Male	Female	Total
Group-A	30 (20.0)	34 (22.67)	64 (42.67)
Group-B	42 (28.0)	44(29.33)	86 (57.33)
Total	72 (48.0)	78 (52.0)	150 (100.0)

Note: Figures in parentheses are percentages

Table-2: Demographic and Clinical Characteristics of Groups

Character	Group A (Hba1C ≤ 7) (N=64)	Group B (Hba1C > 7) (N=86)
Age (Years)	Mean= 48.82,S.D.= 8.70	Mean=53.06,S.D.= 7.87
Hba1C	Mean= 6.56,S.D.= 0.29	Mean=9.20,S.D.=1.76
RBS/FBS	Mean=163.30,S.D.=32.06	Mean=243.50,S.D.=97.4
PtCt(%)	Mean= 0.23,S.D.= 0.07	Mean=0.30,S.D.= 0.21
MPV(fl)	Mean= 8.72,S.D.= 0.75	Mean=10.40,S.D.=1.30
PDW(fl)	Mean= 10.32,S.D.= 1.60	Mean=14.70,S.D.= 5.49
PCt(1000)	Mean= 3.03,S.D.= 0.78	Mean=2.36,S.D.= 0.71
PLCR(%)	Mean=25.96,S.D.=4.2	Mean=32.32,S.D.=7.79

Note:S.D. stands for Standard Deviation

Table 3: Difference Between Platelet Parameters Between Group A (Hba1c ≤ 7) And Group B (Hba1c > 7)

Parameter	t Value	p- Value	Significance
Platelet Crit	-0.968	0.335	NS
MPV	-3.015	0.003	S
PDW	-0.728	0.468	NS
P-LCR	-1.653	0.101	NS
PCT	3.040	0.003	S

Group B. Out of the 64 patients in Group A 30 were male and 34 were female and in Group B 42 were male and 44 were females. Table 2 shows the mean platelet indices amongst the study group. The PtCt amongst Group A subjects was 0.23 \pm 0.06 and amongst Group B subjects was 0.30 \pm 0.20. The MPV amongst Group A subjects was 8.72 \pm 0.74 and Group B subjects was 10.39 \pm 1.29. The PDW amongst Group A subjects was 10.32 \pm 1.59 and amongst Group B subjects was 14.70 \pm 5.48. The PCT amongst Group A subjects was 3.03 \pm 0.77 and Group B subjects was 2.36 \pm 0.71. The PLCR amongst Group A subjects was 25.96 \pm 4.21 and Group B subjects was 32.32 \pm 7.78. The difference between values of MPV in two Groups A and B that is HbA1c ≤ 7 and HbA1c >7 was calculated after applying the t-test which showed t-value of -3.015. MPV was significantly increased in Group B that was having uncontrolled diabetes. The p-value in this case was 0.003. Similarly Platelet count was calculated after applying the t-test which showed t-value of 3.040. This showed that the Platelet count decreased significantly when the diabetes was uncontrolled. The p-value was 0.003. The Platelet Crit had a t-value of -0.968 which though was increased but was insignificant. The p-value was 0.335. PDW between the two Groups A and B showed the t-value of -0.728 which was also insignificant statistically. The p-value of PDW was 0.468. PLCR in the two Groups showed t-value of -1.653 after applying the t-test. The p-value in this case was 0.101 which was statistically insignificant. The above values are shown in Table 3.

DISCUSSION

Platelet indices act as biomarkers for diabetes and have been under study for so many years. Ulutas et al¹² found a positive correlation existed between MPV and HbA1c and FBS level. Increased platelet indices should warn us to assess the patient for microvascular complications. Based on the platelet indices in the absence of the microvascular complications diabetic patients can be warned beforehand about the impending danger and help in improving the life of the patients and prevent or delay the complications. According to a study by Atalay et al¹³ (2015) the mean platelet volume values of patients with diabetes were higher than individuals without diabetes, highest levels being in patients with diabetes with retinopathy and neuropathy. There was no a link between mean platelet volume and inflammation in patients with diabetes with or without retinopathy or neuropathy at least in our patients. In a study conducted by Sharma et al¹⁴ (2016) amongst 330 subjects it was demonstrated raised platelet indices in association with rising glycaemic levels and diabetes related vascular complications. As per a study by Sushma et al¹⁵ (2017) amongst 140 subjects it was seen that platelet indices were significantly higher in diabetic patients with vascular complications compared to those without these complications. As per present study, the PtCt amongst Group A subjects was 0.23 ± 0.06 and amongst Group B subjects was 0.30 ± 0.20 . The MPV amongst Group A subjects was 8.72 ± 0.74 and Group B subjects was 10.39 ± 1.29 . The PDW amongst Group A subjects was 10.32 ± 1.59 and amongst Group B subjects was 14.70 ± 5.48 . The PCT amongst Group A subjects was 3.03 ± 0.77 and Group B subjects was 2.36 ± 0.71 . The PLCR amongst Group A subjects was 25.96 ± 4.21 and Group B subjects was 32.32 ± 7.78 . In a study of 90 patients by Orhan Ates et al¹⁶ (2009) higher MPV and higher PDW were associated with higher mean glycosylated hemoglobin and higher fasting glucose in diabetics. Coban et al¹⁷ (2006) in their study of 150 patients showed that MPV and platelet mass were positively correlated with fasting glucose and HbA1c in diabetic and IFG groups. Increased Mean platelet volume (MPV), a determinant of platelet function, is a newly emerging risk factor for atherothrombosis.

CONCLUSION

Diabetes is becoming common these days. Many of the subjects are affected by it at younger age and during their later age they are affected by grave complications of it. Therefore it is important to determine them at an earlier stage so that proper measures can be taken to prevent them. According to our study subjects with diabetes had higher mean platelet indices as compare to normal subjects.

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