Original Research Article

Assessment of Macrovascular Compilations in Type 2DiabetesMellitus Patients with Special Reference to Platelet Indices

Rakesh Patel[1], Karan Saran Kapur[2], Gaurav Agrawal[3*]

[1]Associate Professor, Department of Medicine, SSMC & SGMH, Rewa, Madhya Pradesh, India

[2]Assistant Professor, Department of Medicine, SSMC & SGMH, Rewa, Madhya Pradesh, India

[3]PG Resident, SSMC & SGMH, Rewa, Madhya Pradesh, India

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Abstract

Introduction: Diabetes mellitus (DM) is not a single disease entity but rather a group of metabolic disorders sharing the common underlying features of hyperglycemia. Larger and younger size of the platelets are suggestive of increased risk of thrombosis and also associated with increased risk for hyperglycemic complication.**Objective:**To assess correlation of macrovascular complications in T2DM patients with special reference toplatelet indices (MPV).**Material and method:** A crosssectional analytical study was carried out in our institution for Total of 500 subjects was enrolled in the study and presence of macrovascular complications was noted. **Result:**MPV is significantly higher in patients with poor glycemic control(HbA1c>7)and presence of macrovascular complications compared to patients with good glycemic control (HbA1c≤7) and absence of macrovascular complications(pvalue is<0.05which is highly significant).**Conclusion:**Our study showed that changes in platelet indices were found to be associated with T 2 diabetes mellitus and its macrovascular complication.Hence MPVcan be used as a simple and cost effective indicator to find the association between T2 diabetes mellitus and its macrovascular complication.

Keywords: Diabetes mellitus(D.M),hyperglycemia,Mean Platelet Volume(MPV)

Introduction

Diabetes mellitus (DM) is not a single disease entity but rather a group of metabolic disorders sharing the common underlying features of hyperglycemia. Hyperglycemia in diabetes results from defects in insulin secretion, insulin action, or, most commonly both. The chronic hyperglycemia and attendant metabolic deregulation of diabetes mellitus may be associated with secondary damage in multiple organ systems especially kidneys, eyes, peripheral nerves and blood vessels[1].Macrovascular complications such as Coronary artery disease, cerebro vascular disease and peripheral arterial disease are associated with considerable medical and economic impact among person with diabetes.Increased platelet activation has been suggested to be involved in the pathogenesis of vascular complications. It is being found that MPV values are high in patients with diabetes mellitus, more so in uncontrolled diabetes. Platelet volume, a marker of the platelet function and activation, is proposed as to be involved as a causative agent with respect to altered platelet morphology and function. Larger and younger size of the platelets are suggestive of increased risk of thrombosis and also associated with increased risk for hyperglycemic complications[2].

Materials and methods

This cross sectional analytical study was carried out in our institution for duration of 1 year.Total of 500 subjects was enrolled in the study. Informed Patient Consent was obtained before clinical examination. Thorough history taking and clinical examination were done. Patient's proforma was maintained which included all demographic particulars,past medical, surgical, drug, personal and family history.

Selection criteria

Inclusion criteria

Type 2 Diabetic patients with macrovascular complications.

Exclusion Criteria

Patients suffering from:-Type 1diabetes, Genetical disorder, Bone marrow disorder, Autoimmune disorders,Platelet disorder, Patients suffering from thyroid-related disorders, Infectious diseases, AIDS, Sepsis, Pregnant women, Patients on anti-platelet drugs and cancer chemotherapy.

Statistical analysis

Descriptive statistics was done for all data and suitable statistical tests of comparison were done. Continuous variables were analysed with the Unpaired t test/single factor ANOVA and categorical variables were analysed with chi squared test/ Fisher Exact Test. regression analysis done and odds ratio with confidence interval calculated. Statistical significance was taken as $P < 0.05$. The data was analysed using SPSS Version 16. Microsoft Excel 2010.was used to generate charts.

Results

Among the 500 diabetic patients enrolled in the study,we divide them in two groups,good glycemic control group and poor glycemic control group based on their HbA1c values.Good glycemic control group (HbA1c≤7) contains 170 patients and poor glycemic control group (HbA1c>7) contains 330 patients.MPV is significantly higher in patients with poor glycemic control(HbA1c>7)and presence of macrovascular complications compared to patients with good glycemic control (HbA1c≤7) and absence of macrovascular complications (p value is <0.05 which is highly significant).

**Correspondence*

Dr.Gaurav Agrawal

PG Resident, SSMC & SGMH, Rewa, Madhya Pradesh, India

E-mail: mastergaurav27@gmail.com

Table 1: MPV distribution according to good and poor glycemic control

Mean platelet volume Distribution	Good Glycemic Control Group (HbA1c≤7)	Poor Glycemic Control Group (HbA1c>7)	P value Unpaired t Test
Mean	7.85	9.961	
SD	0.466	1.214	<0.0001

Table 2: Association of MPV among CAD

Mean platelet volume vs CAD Status	CAD+ GROUP	CAD- GROUP	P value Unpaired t Test
Mean	9.80	9.43	<0.0001
SD	1.29	1.19	

Table 3: Association of MPV among CVA

Mean platelet volume vs CVA status	CVA+ GROUP	CVA- GROUP	P value Unpaired t Test
Mean	9.93	8.95	
SD	1.31	1.20	<0.0001

Table 4: Association of MPV among PAD

Mean platelet Volume vs PAD status	PAD+ GROUP	PAD- GROUP	P value Unpaired t Test
Mean	10.25	8.65	<0.0001
SD	1.47	1.22	

Table 5:Correlation study between MPV and other parameters

S.N	Parameters	Pearson's R	R square	P value
1.	HbA1c VS MPV	0.75	0.56	0.00001
2.	FBS VS MPV	0.62	0.38	0.00001
3.	PPBS VS MPV	0.61	0.37	0.00001

Discussion

In our study, platelet parameters such as mean platelet voume (MPV),were compared between diabetic population with good glycaemic control(HbA1c <7) and poor glycaemic control(HbA1c> 7) and relation of mean platelet volume with macrovascular complications like CAD, CVA and PAD.The data subjected to statistical unpaired t test reveals the existence of statistically significant association between MPV distribution and glycemic control based on HbA1c levels($p< 0.05$).This significance is exhibited by the increased mean MPV(9.96±1.21,p value=0.0001) levels in poor glycemic control group compared to good glycemic control group (2.11 fl increase). This was similar to studies done by Zuberi et al[3] and Kodiatte et al[4].Our study showed increased mean MPV levels in hypertension +ve group compared to hypertension-ve group similar to the study conducted by Coban et al [5], increased mean MPV levels in CAD +ve group compared to CAD -ve group similar to the studies done bySushma KL et al[6].In agreement with the studies done by Nabil A. El-Kafrawy et al[7],in case of CVA increased mean MPV levelsin CVA+ve group compared to CVA-ve group which is similar to the studies done by Philip Bath et al[8]. In case of PAD increased mean MPV levels in PAD +ve group compared to PAD-ve group.This is in agreement with the studies done by Jeffrey S. Berger et al[9].By conventional criteria the relationship between the HbA1c levels and MPV levels is considered to be statistically significant since $p<0.05$. This means as HbA1c levels increases MPV levels also increases in a direct and linear fashion in our study subjects. This observation was similar to the studies done by Kodiatte et al[4] and Alhadas et al[10]. Our study suggested that there is a relationship between the prevalence of macrovascular complications in type 2 DM with MPV.Growing evidence revealed that increased MPV is an important risk factor for the vascular complications regarding type 2 DM and it is believed that type 2 DM is a prothrombotic state due to increased platelet activity. Hence increased MPV can generate a procoagulant effect and cause thrombotic vascular complications in diabetes mellitus.

Conclusion

Our study showed that changes in platelet indices were found to be associated with Type 2 diabetes mellitus and its macrovascular complication. Hence MPV can be used as a simple and cost effective indicator to find the association between Type 2 diabetes mellitus and its macrovascular complication.

Limitation

The major limitation of the study was that it was conducted in small population that may not represent the entire population.. Moreover, it could have been possible to correlate and check the reversibility of platelet dysfunction with glycaemic control over a period of time.

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