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STUDY OF MEAN PLATELET VOLUME IN PATIENTS WITH TYPE-2 DIABETES MELLITUS AND ITS CORRELATION WITH DIABETIC RETINOPATHY.

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ABSTRACT

Background/Aim: Diabetes mellitus (DM), a major global health problem. Diabetic retinopathy(DR) is one of those important complications and leading cause of blindness. Platelet volume is a marker of platelet activation and thought to be associated with these complications. In this study, we aimed to investigate the association between mean platelet volume and diabetics with and without retinopathy.

Material and Methods: In this study, 88 subjects were divided into two groups, group A is diabetics without retinopathy and group B is diabetics with retinopathy.

Results: A Significant difference was seen in HbA1c, FBS, PPBS when compared between two groups. MPV in group 1 was 7.79±0.48 and MPV in group 2 was 11.52±1.26 which was statistically significant ($p < 0.001$).

Conclusion: Diabetics with retinopathy have higher MPV when compared to diabetics without retinopathy. We think that platelets may play a role in diabetic retinopathy.

KEYWORDS

Diabetes, Mean Platelet volume, Retinopathy

INTRODUCTION

Diabetes mellitus (DM), a major global health problem, is commonly associated with increased risk of developing micro- and macrovascular disease (1). Despite its clinical importance, the pathophysiology of diabetic complications is not completely understood. Platelets have been thought to be involved in these complications. Diabetic retinopathy(DR) is one of those important complications and leads to a considerable increase in morbidity.

Platelet volume is a marker of platelet function and activation. It can be quantified as mean platelet volume (MPV). Normal mean platelet volume in healthy subjects ranges between 7.2 and 11.7 fL(5). Platelet volume is a marker of platelet activation and function that can be measured easily as mean platelet volume (MPV) by clinical analyzers.DM is characterized by enhanced platelet activation and coagulation proteins and reduced fibrinolytic activity (6). The increased platelet activity is emphasized to play a role in development of vascular complications in diabetes (7). It is now known that larger platelets are more reactive and produce more prothrombotic factors (5). Increased MPV has been demonstrated in diabetes (5–7). MPV is simple and effective and cheap test that may predict micro vascular complications in type 2 DM.

Many studies have been done before relating mean platelet volume and macro vascular complications, and very few studies have been done to establish the relationship between micro vascular complications and mean platelet volume. This gives a potential scope to correlate MPV and diabetic retinopathy, and may help us in predicting patients who are at risk of developing micro vascular complications. In this study, we compared the mean platelet volume of diabetics with and without retinopathy

MATERIALS AND METHODS:

Cross sectional study was conducted in diabetic patients with and without retinopathy above the age of 18 years, visiting medicine OPD of R L Jalappa Hospital, Tamaka, Kolar. Diabetic patient with low hemoglobin, on antiplatelet drugs, pregnant females, and patient with malignancy and collagen vascular disorders were excluded.

Detailed history, family history of diabetes and hypertension and finally any history of drug intake was taken. MPV and platelet count in the above diabetic subjects was analyzed using automatic blood counter (Alere H 560). Fundoscopy was done to look for retinopathy changes. At least two micro aneurysms and/or retinal hemorrhages and/or other signs of retinal damage were recognized as diabetic retinopathy. Study population was divided into two groups: Diabetics without retinopathy and diabetics with retinopathy. Sample size of 44 patient in each group were included. Calculations were performed using SPSS 22 version software. Categorical data was represented in the form of frequencies and proportions. Continuous data was represented as mean and standard deviation. p value <0.05 was considered as statistically significant. The local ethic committee approved this study and all the subjects gave written informed consent.

RESULTS:

A total of 88 patients were included in the study. Two groups were formed: Group 1= DM without retinopathy. Group 2= DM with retinopathy. The mean ages in group 1 and 2 were 55.73±12.05 and 56.14±9.23 respectively. Significant difference was seen in HbA1c, FBS, PPBS when compared between two groups. MPV in group 1 was 7.79±0.48 and MPV in group 2 was 11.52±1.26 which was statistically significant ($p < 0.001$).

Duration of diabetes and MPV values were significantly correlated, ie along with increase in duration of diabetes mean platelet volume also increased (Table 3). MPV among the retinopathy patients also showed significant correlation between mild, moderate and severe retinopathy (Table 3)

Table 1:- Comparison mean age and clinical parameter between the groups

	Group	Mean	Std. Deviation	P Value
Age	1	55.73	12.053	0.859 NS
	2	56.14	9.230	
HBA1c	1	7.625000	.3348898	<0.001 S
	2	10.147727	1.3443229	
FBS	1	136.43	5.187	<0.001 S
	2	151.05	13.978	
PPBS	1	236.39	18.147	<0.001 S
	2	262.05	29.677	
MPV	1	7.793182	.4809863	<0.001 S
	2	11.525000	1.2361089	
Urea	1	32.05	5.158	<0.001 S
	2	36.73	5.078	
Creatinine	1	.906818	.2481539	<0.001 S
	2	1.163636	.2711654	

Table 2:- Duration of DM and MPV levels

Duration of DM	Mean MPV	Std. Deviation	P value
1-5yrs	8.351111	1.3511985	<0.001 S
6-10yrs	10.976471	2.0009178	
>10yrs	11.222222	1.2039288	
Total	9.659091	2.0955144	

Table 3:- Comparison of MPV levels in different type of Retinopathy

		MPV
MILD NPDR	Mean	10.323529
	N	17
	Std. Deviation	.4815722
MODERATE NPDR	Mean	11.573333
	N	15
	Std. Deviation	.3954503
SEVERE NPDR	Mean	13.166667
	N	12
	Std. Deviation	.5122736
P Value		**<0.001 S**

DISCUSSION

DM is a global disease associated with micro and macrovascular complications. Platelet volume is a marker of platelet function and activation. It can be quantified as mean platelet volume (MPV). Normal mean platelet volume in healthy subject's ranges between 7.2 and 11.7 fL[16]. High MPV indicates large platelet size. Large platelets are shown to be more active, contain denser granules, and produce more β-thromboglobulin, serotonin, and thromboxane A2(5,6). In the present study MPV was significantly higher in diabetic patients with retinopathy when compared with diabetics without retinopathy. This is in accordance with most of the previous studies (7-9). The underlying mechanism of increased MPV in DM has not been properly demonstrated yet. Osmotic swelling as one of the hypothesis of larger platelet size in diabetics (11). Insulin, either exogenous or endogenous, was thought to be responsible by causing megakaryocytes to produce larger platelets (12). Another possible explanation would be a shorter life span of diabetic platelets and larger size of younger platelets (13). We demonstrated that platelet activation may have a role in the development of DR, similar to the results of a limited number of studies (13,14). It was interesting to note that as the severity of NPDR increased from mild to severe, MPV values were also increased.There was significant difference between FBS, PPBS and HbA1c between the two groups. Group 2 had higher FBS, PPBS and HbA1c when compared with group 1.

On the other hand, Aydinli et al. found that there was no relationship between vascular complications and MPV values in cases with DM [16]. In the present study, a significant difference was found in MPV values between the two groups. Consistent with the literature, these results suggest that MPV values are higher in cases with DM. When the diabetic patient groups were compared according to MPV values, there was a significant difference between patients without diabetic retinopathy and those with diabetic retinopathy. Zhong et al. suggested that MPV values could be a risk factor in retinal neovascularization following their study showing that MPV values were significantly higher in nonproliferative diabetic retinopathy patients than in those in healthy controls [17].

CONCLUSION:

The current study has shown a relationship between MPV values and diabetic retinopathy. Nevertheless, further studies with larger cohorts are needed to further evaluate the relationship between MPV values and diabetic retinopathy.

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