



A cross sectional study on MPV, HbA1c and diabetic retinopathy in patients with diabetes mellitus

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Abstract

Introduction: The increased platelet activity is recognized to play a role in the development of vascular complications of diabetes mellitus. Increased platelet activity is characterized by larger and young platelets. The mean platelet volume (MPV) is an indicator of the average size and activity of platelets. HbA1c indicates severity and propensity to develop complications. Diabetic retinopathy is one of the microvascular complications.

Objectives

1. To estimate the mean platelet volume (MPV) in patients with diabetic retinopathy (DR).
2. To compare the MPV in patients with and without DR.
3. To assess the relationship between glycaemic control and MPV in diabetics.

Materials and methods: A cross sectional study conducted in 100 diabetic patients to assess the MPV, HbA1c levels and retinopathy due to diabetes. The patients were selected by systematic random sampling. They were examined in medicine ward and blood investigations were performed in KVG MCH laboratory.

Observations: MPV in patients with and without diabetic retinopathy was estimated to be 9.15 ± 0.94 and 8.73 ± 0.85 respectively. The mean platelet volume in patients with diabetic retinopathy is more than those patients without retinopathy. This difference is statistically significant with p value < 0.05 . As HbA1c value increase, MPV also increases significantly. This indicates that MPV is a reliable marker of vascular complications i.e. Diabetic retinopathy.

Conclusion: Changes in MPV reflect the state of thrombogenesis. High MPV is emerging as a new risk factor for the vascular complications of DM of which atherothrombosis plays a major role. MPV can be used as a simple tool to monitor the progression and control of DM and its cardio-vascular complications.

Keywords: MPV, HbA1c, diabetic retinopathy

Introduction

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Materials and methods

A cross sectional study conducted in 100 diabetic patients to assess the MPV, HbA1c levels and retinopathy due to diabetes. The patients were selected by systematic random sampling. They were examined in medicine ward and blood investigations were performed in KVG MCH laboratory. Informed consent was taken from each of participant before

start of study. A proforma was used to enter the data of patients.

Student T test was done to find the statistical difference between 2 continuous variables. ANOVA test was used to find the statistical significance between groups more than two in number.

Pearson's correlation was used to find the relationship between MPV and HbA1c/stages of

DR/ duration of diabetes. P value < 0.05 was considered statistically significant.

Observations

Table 1: age and gender distribution of the study population

S no.	Age distribution	Males	Females
1	21 – 30 Years	0 (0%)	1 (1%)
2	31 – 40 Years	5 (5%)	2 (2%)
3	41 – 50 Years	11 (11%)	7 (7%)
4	51 – 60 Years	15 (15%)	17 (17%)
5	61 – 70 Years	11 (11%)	13 (13%)
6	71 – 80 Years	4 (4%)	11 (11%)
7	81 – 90 Years	2 (2%)	0 (0%)
8	91 – 100 Years	1 (1%)	0 (0%)
	Total	49 (49%)	51 (51%)
	Mean age	57.83 ± 13.15	59.09 ± 11.37
	Overall Mean age	58.48 ± 12.23	

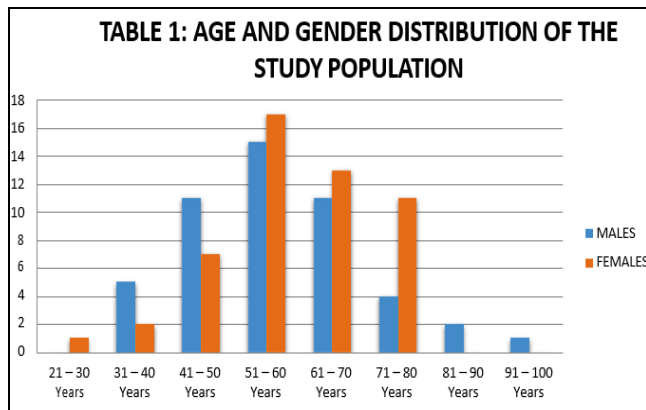


Fig 1

Majority of the study participants were in the age group of 51 – 60 years accounting for 32% of the study population. Least number of participants were in the 91 – 100years age group accounting for 1%.

Table 2: proportion of patients with diabetic retinopathy

S no.	Diabetic Retinopathy	No. of patients	Percentage
1	Diabetic Retinopathy-Absent	40	40 %
2	Diabetic Retinopathy	60	60%

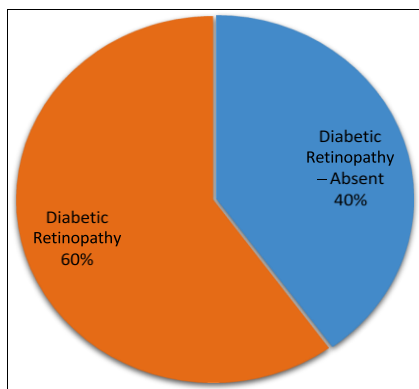


Fig 2: proportion of patients with diabetic retinopathy

Diabetic retinopathy was seen in 60% of the study population and in 40% of the patients there was no signs of retinopathy.

Table 3: age and duration of diabetes in patients with and without diabetic retinopathy

S no.	Variables	Diabetic retinopathy	No retinopathy	T value	P value
1	Age	57.98 ± 12.86	59.22 ± 11.34	0.4948	0.6219
2	Duration of diabetes	9.46 ± 5.20	5.4 ± 3.44	4.3415	<0.0001*

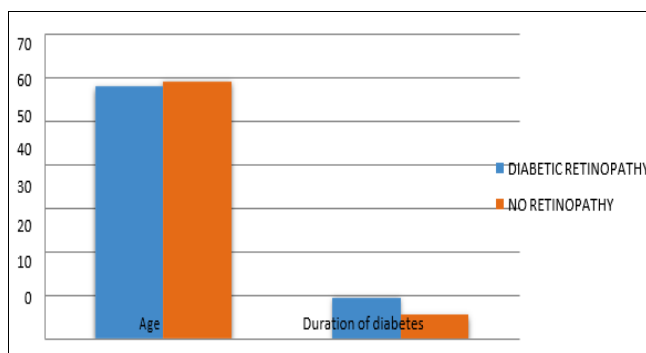


Fig 3: age and duration of diabetes in patients with and without retinopathy

Diabetic retinopathy was common in patients with longer duration of the disease. This was found to be statistically significant.

Table 4: mean platelet volume in the study population

Sn o.	Patients	Mean platelet Volume	T value	P value	95% ci
1	Diabetic Retinopathy	8.73 ± 0.85	2.3199	0.022	-0.7793 to -0.0607
2	Non Diabetic Retinopathy	9.15 ± 0.94			

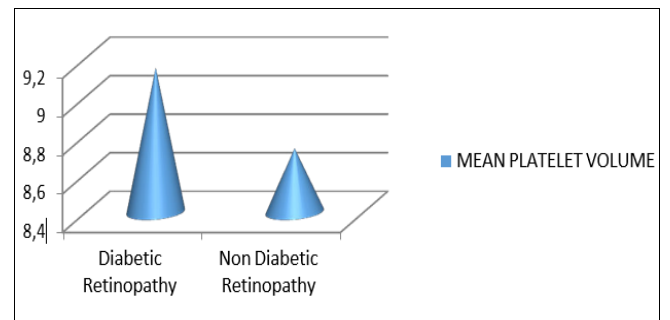


Fig 3: mean platelet volume in patients with and without diabetic retinopathy

The mean platelet volume in patients with diabetic retinopathy is higher than those patients with no retinopathy. This difference is statistically significant with p value < 0.05.

Table 5: difference in mean platelet volume in patients with different stages of DR

S. no.	Diabetic retinopathy	Mean p latelet volume	F value	P value
1	Stage 1 Diabetic Retinopathy	9.16±0.5	1.446	0.239
2	Stage 2 Diabetic Retinopathy	9.41 ± 0.99		
3	Stage 3 Diabetic Retinopathy	8.78 ± 0.67		
4	Stage 4 Diabetic Retinopathy	8.57 ± 0.83		

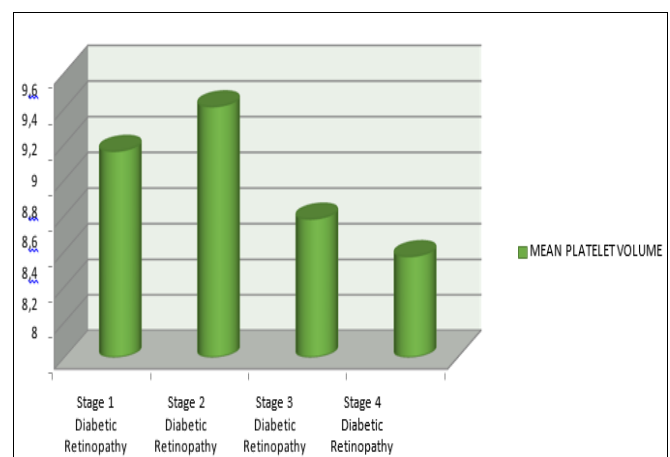


Fig 3: difference in mean platelet volume in patients with different stages of diabetic retinopathy

The mean platelet volume is decreasing with increasing stage of diabetic retinopathy. But this relationship is not statistically significant.

Table 6: HbA1c values in patients with diabetes mellitus

S no.	Patients	Hba1c	T value	P value	95% ci
1	Diabetic Retinopathy	9.87 ± 2.39	3.0477	0.0030	0.5093 to 2.4107
2	Non Diabetic Retinopathy	8.41 ± 2.28			

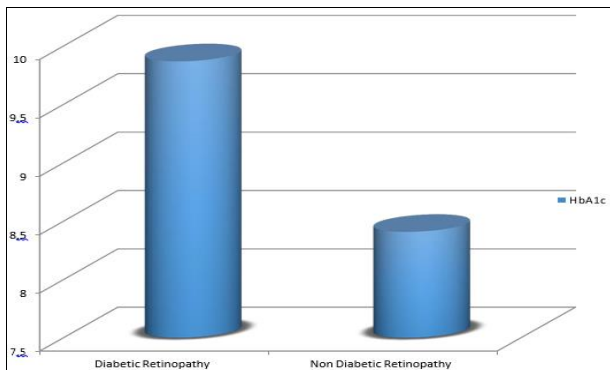


Fig 4: HbA1c values in patients with diabetes

The patients with diabetic retinopathy had a higher HbA1c value when compared to patients who did not have retinopathy. This difference was statistically significant

Table 7: relationship between duration of diabetes and MPV values

Variable	R value	P value
Duration of diabetes Vs Mean Platelet Volume	0.2152	0.03153*

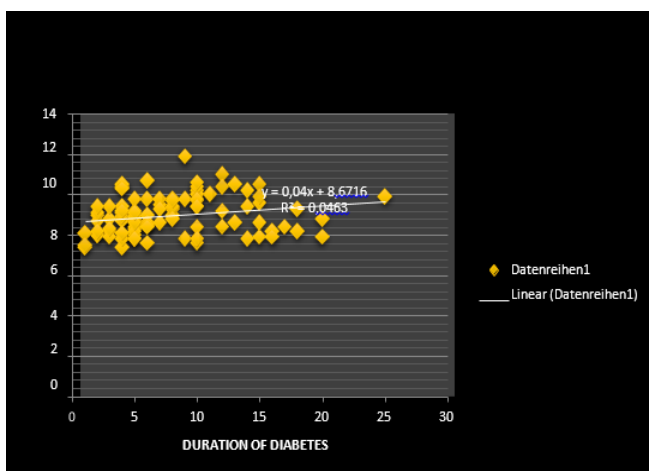


Fig 5: relationship between duration of diabetes and MPV values

There is a statistically significant positive correlation that exists between duration of diabetes and MPV values. This suggests that, as the duration of diabetes increases, there is increase in MPV values.

Conclusion

MPV in patients with and without diabetic retinopathy was estimated to be 9.15 ± 0.94 and 8.73 ± 0.85 respectively. The mean platelet volume in patients with diabetic retinopathy is more than those patients without retinopathy. This difference is statistically significant with p value < 0.05. As HbA1c value increase, MPV also increases significantly. This indicates that MPV is a reliable marker of vascular complications i.e. Diabetic retinopathy.

Discussion

Platelet hyper-reactivity in patients with diabetes is multifactorial. It is associated with biochemical factors such as hyperglycemia and hyperlipidemia, insulin resistance, an inflammatory and oxidant state and also with increased expression of glycoprotein receptors and growth factors. Changes in MPV reflect the state of thrombogenesis. High MPV is emerging as a new risk factor for the vascular complications of DM of which atherothrombosis plays a major role. However, platelet reactivity alone cannot explain the progression of vascular complications in DM since there are other vascular risk factors that may be influenced by the degree of control of diabetes. Thus, MPV can be used as a simple tool to monitor the progression and control of DM and its cardio-vascular complications.

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