



## A study of comparison of mean platelet volume in diabetic and nondiabetic individuals

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### ABSTRACT

#### Introduction

Platelets with larger volume have more activity compared to smaller ones. Increased platelet activity was considered as one of the pathogenic mechanism for complications of diabetes. Thus Mean platelet volume (MPV) can be utilized as a marker for diabetic complications.

#### Aim

1. To determine the difference in MPV in Diabetic and non-diabetic individuals and
2. To correlate MPV with fasting blood glucose, Post prandial blood glucose and HbA1C.

#### Materials and methods

A cross - sectional study with 150 diabetics and 150 non diabetic individuals attending Medicine op at tertiary hospital were included. Patients with anemia, malignancies and on antiplatelet were excluded from the study. All the patients underwent complete clinical examination and FBS, PPBS, HbA1C, Platelet count and MPV were estimated and the results were analyzed using SPSS 20 version

#### Results

MPV was significantly higher in diabetic individuals and MPV was higher in diabetic patients with complications than in patients without complications. MPV has no significant association with BMI, Duration of diabetes, FBS, PPBS, HbA1C.

#### Conclusion

Mean platelet volume was significantly ( $p < 0.01$ ) higher in diabetic patients. MPV can be used as marker for diabetic complications

**Keywords:** Mean platelet volume, Diabetes, Platelet count

## INTRODUCTION

Diabetes is a complex metabolic syndrome characterized by hyperglycemia resulting in micro vascular complications and macro vascular complications. The micro vascular complications are Diabetic neuropathy, nephropathy and retinopathy. The macrovascular complications are cerebrovascular disease; cardiovascular disease and peripheral vascular disease [1]. The prevalence of the complications are higher in patients with poor glycaemic control and duration of diabetes mellitus [2].

Platelets play a major role in homeostasis. Platelets seal the vascular defect by forming primary plug thus required phospholipid surface for the recruitment and activation of coagulation factors. In response to stimuli from the endothelium, platelets change shape, adhere to sub endothelial surfaces, secrete the contents of intracellular organelles, and aggregate to form a thrombus. These pro-aggregatory stimuli include thrombin, collagen, epinephrine, ADP, and thromboxane A<sub>2</sub>. Thus, platelets may assume an important role in signaling of the development of advanced atherosclerosis in diabetes [3]

Large platelets contain denser granules that are metabolically and enzymatically more active than smaller ones thus having higher thrombotic potential. Mean platelet volume is an indicator of size and activity of the platelet. Larger platelets synthesize more thromboxane A<sub>2</sub>, are able to aggregate better, and are able to secrete more serotonin and  $\beta$ -thromboglobulin than smaller platelets this might be the basis of the link between increased MPV and increased thrombotic potential [4].

The aim of our study was to determine the difference in the size of platelets by measuring the MPV in the diabetics compared to the non-diabetics, to see if there were a difference in MPV in diabetics with and without vascular complications, and to determine the correlation of MPV with fasting blood glucose (FBS), postprandial plasma glucose (PPBS), glycosylated haemoglobin (HbA1c), body-mass index (BMI), and duration of diabetes in the diabetic patients, respectively

## MATERIALS AND METHODS

This was a cross-section study conducted with 150 diabetics and 150 non diabetic individuals attending OPD of General medicine at saveetha medical college hospital. Patients with anemia (Males < 13g/dLl and Females < 12 g/dL) with thrombocytopenia and patients on anti-platelets and with any malignancy were excluded from the study

After obtaining consent All the 300 patients has undergone complete clinical examination pertaining to micro and macrovascular complications of diabetes The following investigations has been done - ECG,Fasting Blood Glucose, Post Prandial Blood Glucose, HbA1C,peripheral smear, platelet count and Mean Platelet volume (MPV). The two groups were compared pertaining to MPV and the association of MPV with FBS, PPBS, HbA1C is derived using student t test analysis with statistical package for the social sciences SPSS 20 software.

### Statistical analysis

The data was expressed as Mean  $\pm$  and p value was derived and a value  $\leq 0.05$  was considered significant.

## RESULTS

Among 150 diabetic individuals 87 were male and 63 were female .The mean age of the individuals was  $53 \pm 9.8$  years. The mean BMI was  $26.8 \pm 2.8$ . The mean duration of diabetes was  $6.5 \pm 2.5$  years .The mean FBS was  $139 \pm 46$  mg/dl. The mean PPBS was  $224 \pm 58$  mg/dl. The mean HbA1c was  $8.1 \pm 3.1\%$ . The mean platelet count was  $253 \pm 70 \times 10^9/L$  and the mean platelet volume was  $8.9 \pm 0.9$  fl

Among 150 non diabetic individuals 81 were males and 69 were females. The mean age of the individuals was  $51 \pm 8.1$  years. The mean BMI was  $25.9 \pm 3.1$ . The mean FBS was  $81 \pm 32$  mg/dl. The mean PPBS was  $139 \pm 48$  mg/dl. The HbA1C was  $6 \pm 1.8\%$ . The mean platelet count was  $261 \pm 0.9 \times 10^9/L$  and the mean platelet volume was  $7.6 \pm 0.8$  fl

Hence the mean platelet volume was <sup>higher</sup> in diabetic individuals compared to non-diabetic individuals and this difference was statistically significant ( $p < 0.01$ ). The mean platelet volume in diabetic individual was not significantly correlated with FBS, PPBS, HbA1c ( $p > 0.05$ )

The results are shown in the Table 1

Parameter	Diabetic patients	Non Diabetic patients	P value
Number	150	150	-
Age	53±9.8	51±8.1	-
Males	87	81	-
Females	63	69	-
BMI (Kg/m <sup>2</sup> )	26.8±2.8	25.9±3.1	-
Mean duration of Diabetes(Yrs)	6.5±2.5	—	-
FBS(mg/dl)	139±46	81±32	< 0.01
PPBS(mg/dl)	224±58	139±48	< 0.01
HbA1c (%)	8.1±3.1	6±1.8	< 0.03
Platelet count(× 10 <sup>9</sup> /L	253±0.7	261±0.9	> 0.05
Mean platelet volume(fl)	8.9±0.9	7.6±0.8	< 0.05

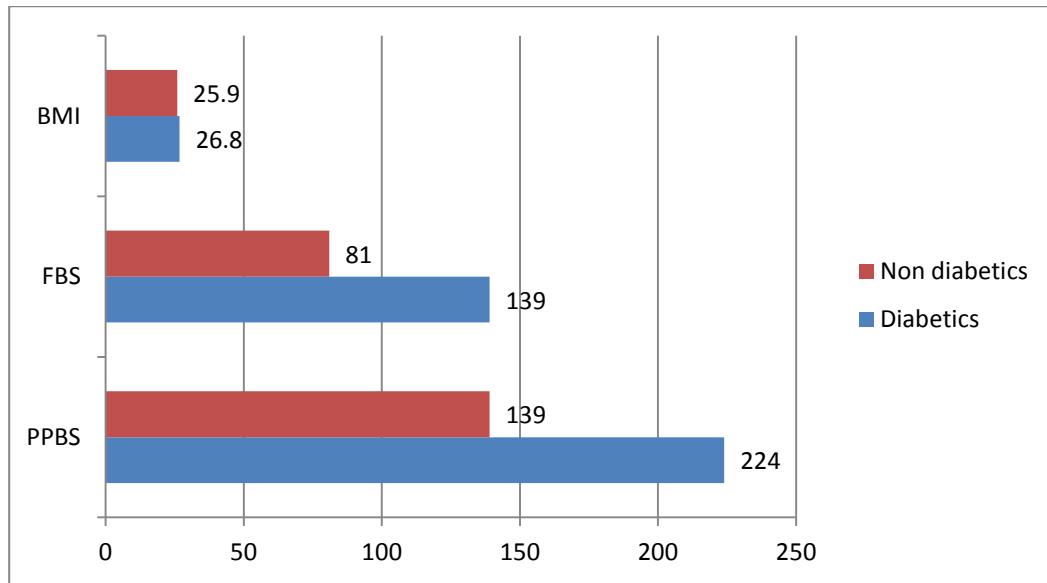


Fig - 1: Comparison of BMI, FBS, PPBS in Diabetic and non diabetic patients

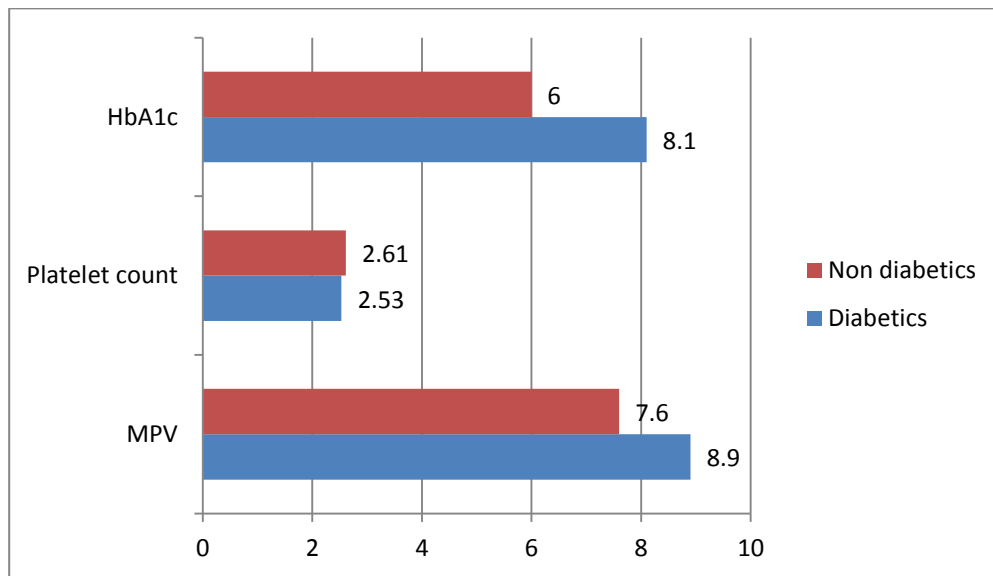


Fig – 2: Comparison of HbA1c, Platelet count and MPV in diabetic and nondiabetic individuals.

## DISCUSSION

The MPV and platelet counts are indicators of thrombotic potential and risk factors for micro and macro vascular complications [5]. Larger platelets synthesize more thromboxane A<sub>2</sub>, are able to aggregate better, and are able to secrete more serotonin and  $\beta$ -thromboglobulin than smaller platelets [6]

In our study equal diabetic individuals and non-diabetic individuals were taken and their glucose control and platelet count and mean platelet volume has been measured and compared.

The mean platelet volume was higher in females than in males. It is in contrast to Giovanetti et al [7]. The mean platelet volume was not significantly associated with duration of diabetes mellitus and FBS, PPBS, HbA<sub>1c</sub>. This observation was similar to Yeniguen et al [8]. An inverse relation was observed between mean platelet count and platelet count. This relation is due to consumption of small

platelets to maintain constant platelet functional mass.

The Mean platelet count in diabetic individuals was higher compared to non-diabetic individual and this observation was similar to Kodiattat al [9]

The mean platelet volume in diabetic individuals was significantly higher compared to non-diabetic individuals and among the diabetic individuals MPV is higher in patients with complications of diabetes. This suggests the role of increased platelet activity in the pathogenesis of complications of diabetes.

## CONCLUSION

Our study showed that platelets become more active in diabetic individuals and play a significant role in the pathogenesis of the complications of diabetes. But further studies in large scale are required to generalize this conclusion to the whole community.

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