

ORIGINAL ARTICLE

Assessment of Mean Platelet Volume in Diabetics and Non-Diabetics- A Clinical Study

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ABSTRACT:

Background: Diabetes mellitus (DM) is a widespread disease, currently the most common endocrine disorder around the world. The present study was conducted to determine mean platelet volume in diabetics and non-diabetics. **Materials & Methods:** The present study was conducted in the department of general medicine. It comprised of 80 patients with diabetes mellitus of both genders. 40 subjects were selected as control. Patients were divided into 3 groups of 40 each. Group I were type II diabetics without retinopathy, group II were type II diabetics with retinopathy and group III were non diabetics (control). Mean Platelet volume (MPV) estimation was done in the laboratory by five part fully automatic hematology analyzer by Horiba ABX pentra 80. **Results:** In group I, maximum subjects (12) were in age group 41-50 years, in group II in age group 41-50 years (14). Similarly, in group III, maximum subjects were in 41-50 years age group (13). The difference was non-significant ($P > 0.05$). The mean platelet volume in group I was 8.58 ± 0.32 fL, in group II was 9.86 ± 0.38 fL and in group III was 7.62 ± 0.25 fL. The difference was significant ($P < 0.05$). **Conclusion:** Mean platelet volume might be used as a simple and cost-effective laboratory test in the follow up of diabetes mellitus along with HbA1c. There is a close relationship between poor glycemic control and increased platelet activity in patients with type 2 DM.

Key words: Diabetes mellitus, platelet volume, Retinopathy

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INTRODUCTION

Diabetes mellitus (DM) is a widespread disease, currently the most common endocrine disorder around the world. DM comprises a group of common metabolic disorder that share the common phenotype of hyperglycemia.¹

The onset of T2DM is often silent and insidious. Pathogenic processes causing T2DM range from autoimmune destruction of the B cells of the pancreas with consequent insulin deficiency to abnormalities that result in resistance to insulin action. DM is characterized by asymptomatic phase between actual onset of hyperglycemia and clinical diagnosis which has been estimated to last at least 4-7 years. The asymptomatic phase of hyperglycemia accounts for the relatively high prevalence of complications at initial presentation.^{2,3}

The onset of diabetes among Indians is about a decade earlier than their western counterparts and this has been noted in Asian Indians in several studies.⁵ T2DM in Indians differs from that in Europeans in several aspects: The onset is at a younger age, obesity is less common, and genetic factors appear to be stronger.⁴ The younger age of onset implies that these subjects develop diabetes in the most productive years of their life and have a greater chance of developing complications. People with diabetes have an increased risk of developing a number of serious problems affecting heart and blood vessels, kidneys, eyes, nervous system and also develop serious infections.⁵

Altered platelet morphology and function have been reported in patients with DM, and MPV was found to be

significantly higher in diabetic patients. Increased platelet activity due to abnormal insulin action is emphasized in the development of vascular complications of DM.⁶ The present study was conducted to determine mean platelet volume in diabetics and non-diabetics.

MATERIALS AND METHODS

The present study was conducted in the department of general medicine. It comprised of 80 patients with diabetes mellitus of both genders. 40 subjects were selected as control. Written ethical approval was taken from Institutional Ethics Committee, and informed written consent was obtained from all patients.

General information such as name, age, gender etc. was recorded. Patients with glycosylated hemoglobin (HbA1c) $\geq 6.5\%$ were diagnosed as diabetic mellitus.

Patients were divided into 3 groups of 40 each. Group I were type II diabetics without retinopathy, group II were type II diabetics with retinopathy and group III were non diabetics (control). Routine baseline investigations hemoglobin (Hb), total leucocyte count (TLC), differential leucocyte count (DLC), fasting blood glucose (FBS) was done in all. Mean Platelet volume (MPV) estimation was done in the laboratory by five part fully automatic hematology analyzer by Horiba ABX pentra 80. All the results were analyzed by SPSS software version 17.0. P value less than 0.05 was considered significant.

RESULTS

Table I Age wise distribution of subjects

Groups	Group I	Group II	Group III	P value
41-50 years	12	14	13	0.12
51-60 years	10	12	11	
61-70 years	8	6	7	
>70 years	10	8	9	

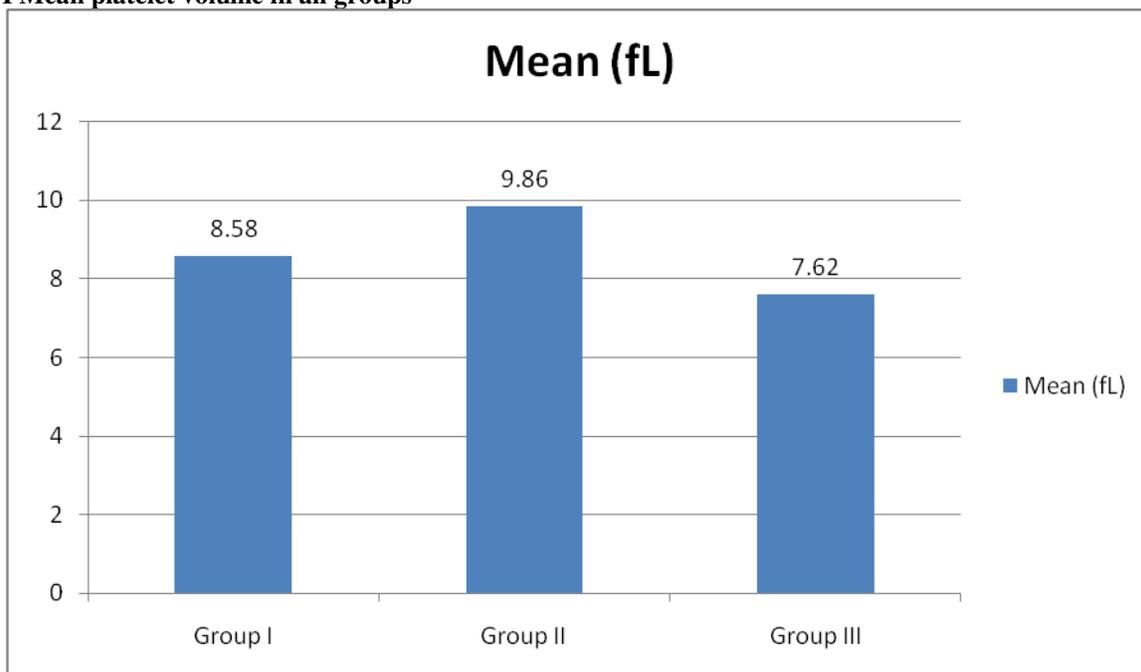
Table I shows that in group II, maximum subjects (12) were in age group 41-50 years, in group II in age group 41-50 years (14). Similarly, in group III, maximum subjects were in 41-50 years age group (13). The difference was non- significant (P> 0.05).

Table II Mean platelet volume in all groups

Groups	Mean (fL)	P value
Group I	8.58	0.01
Group II	9.86	
Group III	7.62	

Table II shows that mean platelet volume in group I was 8.58± 0.32 fL, in group II was 9.86± 0.38 fL and in group III was 7.62± 0.25 fL. The difference was significant (P< 0.05).

Graph I Mean platelet volume in all groups



DISCUSSION

Diabetes mellitus (DM) is a group of metabolic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. Uncontrolled diabetic patients are characterized by hyperglycemia, hyperinsulinemia, protein glycation and oxidative stress which causes early appearance of diabetic complications.⁷

Type 2 diabetes mellitus (T2DM) is an important cause of mortality and morbidity worldwide and a major global public health problem. The prevalence of T2DM has been increasing with the speeding up of urbanization and the improvement in living standards.² The number of persons with diabetes is expected to increase to 439 million by 2030, representing 7.7% of the total worldwide adult population 20–79 years old. Identifying patients at risk of T2DM is challenging, and we have no ideal therapy for T2DM or its chronic and serious complications, so prevention is of the utmost importance.⁸ The present study was conducted to determine mean platelet volume in diabetics and non-diabetics.

We found that that in group II, maximum subjects (12) were in age group 41-50 years, in group II in age group 41-50 years (14). Similarly, in group III, maximum subjects were in 41-50 years age group (13).

Yenigün EC et al⁹ in their study assessed correlation between MPV and hemoglobin A1c (HbA1c) and fasting plasma glucose (FPG). They examined baseline and final HbA1c, MPV and FPG values of 343 patients. Including the study group (SG) consisted of 169 patients with diabetes whose HbA1c levels decreased %1 and the control group involving 174 patients whose HbA1c levels did not change. Similar to CG, HbA1c level of SG decreased to 7.58, and MPV level reduced to 8.68. There existed a positive correlation between MPV and HbA1c levels. Additionally, positive correlation was found between MPV and HbA1c changes, and MPV and FPG changes in SG. Moreover, there was a positive correlation between MPV and HbA1c changes and MPV and FPG changes in patients underwent insulin treatment.

We found that maximum platelet volume was observed in diabetic with retinopathy patients. The mean platelet volume in group I was 8.58 ± 0.32 fL, in group II was 9.86 ± 0.38 fL and in group III was 7.62 ± 0.25 fL. The difference was significant ($P < 0.05$).

Platelets express procoagulant proteins such as P-selectin and glycoprotein IIIa on their surfaces. Large platelets contain denser granules that are metabolically and enzymatically more active than smaller ones thus having higher thrombotic potential. This might be the basis of the link between increased MPV and increased thrombotic potential. A relationship between the presence of vascular complications in DM and MPV has been suggested by several studies. Mean platelet volume (MPV), an easily and inexpensive parameter derived from routine blood counts, is usually used to evaluate platelet morphology and can be used as an indicator of platelet activity. Elevated MPV has

been demonstrated to be related to cardiovascular diseases and its risk factors such as T2DM, hypertension, and nonalcoholic fatty liver disease (NAFLD). Considering this, the present study was conducted to determine mean platelet volume in diabetics and non-diabetics and to correlate mean platelet volume in diabetics with and without retinopathy.¹⁰

CONCLUSION

Mean platelet volume might be used as a simple and cost-effective laboratory test in the follow up of diabetes mellitus along with HbA1c. There is a close relationship between poor glycemic control and increased platelet activity in patients with type 2 DM.

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