

## Euro Surgery 2020: Comparative Study of Mean Platelet Value (Mpv) in Type 2 Diabetic Patients with and without Foot Ulcers

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**D**iabetes mellitus is a major health problem with multiple micro and macrovascular complications. 15% of the patients with diabetes suffer from diabetic foot ulcers (DFU) during their lifetime. MPV is a marker of platelet activation and function. Increase in MPV implies release of highly reactive platelets and an increased risk of thrombosis and atherosclerosis.

**AIM:** Aim of this study is to compare MPV value of diabetic patients with and without foot ulcers and to study the relation of diabetic foot ulcers with MPV

**TYPE OF STUDY AND PLACE OF STUDY:** The study was a prospective study with selective sampling conducted at KEMPEGOWDA INSTITUTE OF MEDICAL SCIENCES, Bangalore for a period of 1 year from OCTOBER 2018 to OCTOBER 2019

**MATERIALS AND METHODS:** We collected MPV values of 100 patients with type 2 diabetes having non gangrenous DFU and compared them with MPV values of 100 type 2 diabetes patients without DFU after matching both the groups for age and sex. The following diagnostic criteria were used for diabetic foot ulcer: presence of systemic signs of infection, purulent wound secretion, and at least two local signs of inflammation (erythema, warmth, edema, tenderness, induration). Diabetes mellitus (DM) is a global pandemic. The increased Mean platelet volume (MPV) and its activity may play a role in the development of vascular complications of this metabolic disorder. Metformin, the first-line therapy for T2DM, the only drug demonstrated to reduce cardiovascular complications in diabetic patients. However, whether metformin can effectively prevent thrombosis and its potential mechanism of action

is not fully understood. In this study, the first aim is to determine whether there is a difference in MPV between diabetics with and without macro- and microvascular complications, compared to nondiabetics. The second aim is to examine the effects of metformin on MPV values in newly diagnosed type 2 DM patients on metformin monotherapy, and to investigate whether a correlation exists between MPV and fasting blood glucose changes after and before treatment. **Methods:** MPV values were measured in 87 newly diagnosed Type 2 diabetic patients, 25 insulin-dependent diabetic patients and 40 non-diabetic control subjects, who had complete blood count on venous blood sample taken into tripotassium EDTA, using automatic blood counter (Diagon D-Cell 60 CBC Eurup). The blood glucose level was measured by glucose oxidase method. Statistical evaluation was performed by SPSS for Windows statistics programme using linear regression analysis, Student's t, one way Anova, and Pearson correlation tests. **Results:** MPV values were significantly higher in Insulin-dependent T2DM group compared to the newly diagnosed T2DM and control [ $9.7 \pm 0.78$  FL vs  $8.52 \pm 0.8$  FL and  $8.48 \pm 0.9$  FL ( $P=0$ )], respectively. Among the newly diagnosed patients MPV values showed a low positive correlation with patient age ( $R = 0.37$ ,  $P=0$ ) but no correlation was with BMI ( $R=0.001$ ,  $P=0.99$ ) and initial fasting plasma glucose ( $P=0.111$ ,  $R=0.172$ ). MPV values were significantly reduced after 6-month metformin therapy [ $8.56 \pm 0.78$  vs  $8.18 \pm 0.70$  ( $P<0.05$ )]. There were no statistically significant associations of MPV with FBG levels (beta coefficient=0.41,  $P=0.51$ ) after metformin treatment. **Conclusions:** Our results showed that MPV values significantly higher in insulin-dependent T2DM

patients than in the newly diagnosed T2DM patients and nondiabetic controls. The increased MPV may be due to the diabetic complication which increases with disease progression. Our results suggest that metformin had decreased MPV in diabetes mellitus. Regardless of glucose lowering effect. These findings may provide a further explanation for the anti-atherogenic effect of metformin. Diabetes Mellitus is a group of metabolic disease which incidence increases every year. Some diabetic patients have diabetic foot ulcer as a complication. The occurrence of ulcers in diabetic patients can be caused by the presence of thrombosis due to increased platelet function. Therefore, a cross-sectional study on 40 diabetic patients was performed at RSUP Adam Malik Medan to see whether there were differences in platelet indices between diabetic patients with and without diabetic foot ulcers. Platelet indices were examined and looked for differences in diabetic patients with and without diabetic foot ulcers. Data were analyzed using Chi-Square and Mann-Whitney U test with 95% CI. P-value < 0.05 was considered statistically significant. There were differences in hemostasis function (prothrombin time, thrombin time, INR, aPTT, and fibrinogen) between the two groups with p values of 0.001; 0.004; 0.015; 0.021; 0.009, respectively. From the platelet indices examination, there were differences in the number of platelets, PDW and PCT with p values of 0.041; 0.027; 0.007, respectively, whereas there was no difference for MPV value ( $p=0.05$ ). Platelet indices were found to increase in diabetic patients with diabetic foot ulcers indicating more reactive and aggregatable platelet function. All data

were first analyzed for normality of distribution using the Kolmogoro-Smirnov test of normality. Data were shown as mean  $\pm$  SD for continuous variables or percentages (%) for categorical variables, respectively. Otherwise, specified comparisons of clinical and biochemical parameters among groups were performed by Chi-square ( $\chi^2$ ) tests for categorical variables, one-way analysis of variance (ANOVA) for normally distributed continuous variables, with post-hoc analysis in two-group comparisons performed by LSD tests, and Kruskal-Wallis test followed by multiple pairwise comparisons with Bonferroni's post hoc adjustment for nonparametric distributed covariates. Thereafter, Pearson correlation for normally distributed variables and Spearman's rank correlation for abnormally distributed parameters were employed to assess the relationship between MPV and PDW levels and clinical and biochemical parameters. Subsequently, the association between MPV and PDW levels and BMD values at various sites were tested by partial correlation analyses.

**RESULTS:** MPV values were higher in patients with DFU when compared with patients without DFU.

**CONCLUSION:** The underlying pathogenic factors causing diabetic foot ulcers influence the volume of platelets. High MPV can be used as marker for more active platelet release resulting in more thrombogenic episodes contributing to the development of DFU

**Biography:** Dr. Dhruva has completed his undergraduation from KIMS bangalore and is pursuing his post-graduation in general surgery at KIMS bangalore.