



## ASSESSMENT OF PLATELETS INDICES IN SUDANESE PATIENTS WITH DIABETES MELLITUS

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### ABSTRACT

**Background:** Diabetic patients are at a high risk of developing micro and macro vascular diseases. Mean platelet volume (MPV) and platelet distribution width (PDW) are indicators of platelet function and activity and they have been reported to be influenced significantly by diabetes. The complications of diabetes mellitus are a leading cause of death in people with diabetes. Recent studies suggest that platelets count and indices with altered morphology could be associated with an increased risk for developing vascular complications in diabetes. **Objective:** To assess the Platelets count and Platelets indices in Sudanese Patients with diabetes mellitus. **Method:** This case control study was conducted in Omdurman medical clinic and hospitals in Khartoum state. A total of 50 Sudanese patients were diagnosed with diabetes mellitus type I and type II were included of his study and (50) apparently healthy non-Diabetic volunteered individual were used as controls, Patients included in this study were diabetes mellitus type I and type II. 2.5 ml of Venous blood of all Diabetic patients was collected in Ethylene Diamine Tetra acetic Acid (EDTA) containers to Complete blood count Platelet count and platelets indices (RDW, MPV, PCT) were measured by using Hematology Analyzer MINDRAY (280) made in china on the same day of collection, Clinical data were collected from patient medical records. **Results:** The mean platelet count for the Diabetic patients type I was  $(270.2917 \pm 95) \times 10^9/L$ ; PDW was  $(12.31250 \pm 0.3)$ , the mean MPV  $(10.3 \pm 2.3)$  fL; the mean PCT was  $(0.25 \pm 0.06\%)$  for patients with type II mean platelet count for the Diabetic patients type I was  $(275.2917 \pm 82) \times 10^9/L$ ; PDW was  $(14.3 \pm 0.3)$  the mean MPV  $(15.5 \pm .03)$  fL; the mean PCT was  $(0.25 \pm 0.06\%)$ . **Conclusions:** Our study found higher platelet counts and MPV in Diabetic patients type II compared to type I Diabetic subjects.

**KEYWORDS:** RDW, MPV, PCT.

### INTRODUCTION

Diabetes mellitus is a chronic disease that causes increased morbidity and mortality due to its vascular complications. There is a need to develop risk factor modification to reduce the impact of complications. Diabetic patients are at risk of increased thrombosis and atherogenesis. Changes in hemostatic balance constitute a pathogenetic factor with a role in complication development in DM. Owing to the role of blood platelets in hemostatic balance, changes in platelets in diabetic patients have been studied extensively and an increase in thrombotic adhesion, aggregation and secretion has been shown in many of these.<sup>[1-2]</sup>

Diabetes mellitus (DM) impairs glucose tolerance. As such it is a genetically and clinically heterogeneous disease requiring continuous follow up. Patients with DM and vascular complications face an increased risk of mortality. Many studies are being conducted on the pathogenetic factors that play a role in complication development in DM. It is thought that platelets have an effective role in the development of vascular

complications. It has been shown that diabetic patients have increased thrombotic adhesion and aggregation, thromboxane synthesis and platelet factor 4 plasma levels.<sup>[3,4]</sup>

Platelets express procoagulant proteins such as P-selectin and glycoprotein IIIa on their surfaces.<sup>[5]</sup> Large platelets that contain denser granules are metabolically and enzymatically more active than smaller ones and have higher thrombotic potential; hence, increased MPV might be linked with increased thrombotic potential.<sup>[6]</sup> Several studies focusing on MPV and DM have suggested a relation between the presence of vascular complications and MPV.

### OBJECTIVES

The purpose of this study was aimed at evaluating the Platelet count and Platelet indices in Sudanese diabetes mellitus patients type 1 and II referring to Omdurman medical clinic and hospitals in Khartoum state.

## MATERIALS AND METHODS

Hundred (100) Sudanese diabetes mellitus and 50 apparently healthy individual subjects from Khartoum city were recruited to participate in this study, which was conducted in 2016. Two and half mL of blood was collected from each subject into Ethylene Diamine Tetraacetic Acid (EDTA) anticoagulant tube under sterile condition to perform Complete blood count(CBC) (Platelet count and Platelet indices) were measured using automated hematology analyzer (MINDRAY BC 2800-China) as soon as possible.

This study was approved by the faculty of medical laboratory sciences, Al Neelain University, and informed consent was obtained from each participant before sample collection.

### Statistical Analysis

The data collected during the study from both patients as well as healthy individuals were arranged in a tabular form and analyzed statistically by using categorical variables. These variables are compared by using unpaired t test to determine the significance of different parameters by using Statistical Package for the Social

Science SPSS package (SPSS package (SPSS package) version 17.0 data software, Data is presented as mean  $\pm$  standard deviation (SD), a p-value < 0.05 was considered significant.

### Ethical considerations

This study was approved by the faculty of medical laboratory sciences, Al Neelain University, and informed consent was obtained from each participant before sample collection.

## RESULTS

A total of 100 Sudanese patients were diagnosed with diabetes mellitus type I and type II were included of his study and 50 apparently healthy non-Diabetic volunteered individual were used as controls were included in this study.

The statistical analysis of the results showed that the platelet counts among patients with type II diabetes mellitus was slightly higher than those with type I but it was statistically insignificant difference (Table 3). Platelet indices were also shown to be different among different study groups as shown in table (1,2,3).

**Table I: Mean, SD, for platelet count and indices in diabetes mellitus type I and control subjects.**

Parameters	diabetes mellitus Type 1 (M $\pm$ STD)	Control Subjects (M $\pm$ STD)
PLT	270.2917 $\pm$ 82.25503	265 $\pm$ 72
PDW	12.31250 $\pm$ 0.3	14 $\pm$ 0.2
MPV	10.3 $\pm$ 2.3	15.4 $\pm$ 0.24
PCT	0.25 $\pm$ 0.06	0.24 $\pm$ 0.06

**Table I: Mean, SD, for platelet count and indices in diabetes mellitus type II and control subjects.**

Parameters	diabetes mellitus Type 2 (M $\pm$ STD)	Control Subjects (M $\pm$ STD)
PLT	275.6 $\pm$ 82	265 $\pm$ 72
PDW	14.3 $\pm$ 0.3	14 $\pm$ 0.2
MPV	15.5 $\pm$ .03	15.4 $\pm$ 0.24
PCT	0.25 $\pm$ .06	0.24 $\pm$ 0.06

**Table I: Mean, SD, for platelet count and indices in diabetes mellitus type I, II.**

Parameters	diabetes mellitus Type 1 (M $\pm$ STD)	diabetes mellitus Type 2 (M $\pm$ STD)	P. value
PLT	270.2917 $\pm$ 82.25503	265 $\pm$ 72	0.83
PDW	12.31250 $\pm$ 0.3	14 $\pm$ 0.2	0.00
MPV	10.3 $\pm$ 2.3	15.4 $\pm$ 0.24	0.00
PCT	0.25 $\pm$ 0.06	0.24 $\pm$ 0.06	0.9

## DISCUSSION

Our present study showed that platelet counts and indices were significantly higher in patients with diabetes than in control group and this agree with Study done by Sid Ahmed, Dalia Dafalla Osman, in 1-1-2013. Diabetic patients are at high risk of developing micro and macro vascular disease MPV and (PDW) are indicators of platelet function and activity and they have been reported to be influenced significantly by diabetes.

In fact, several authors have described platelets changes associated with diabetes. Furthermore, the wide use of electronic counters in laboratories has allowed the quantification of platelet parameters<sup>[7-8]</sup>, which may reflect the functionality of these cells. Among these parameters, MPV and PDW stand out due to their involvement in the development of thromboembolic complications.<sup>[9]</sup> previous studies showed diabetic patients had significantly larger MPV than non-diabetic controls increased platelet aggregation in DM and this

may have a role in its vascular complications. Including any patient with at least one of nephropathy, retinopathy or neuropathy complication in the 'microvascular complication group', we found a meaningful difference between the MPV levels of this group and the ones with no microvascular complications.<sup>[10,11-12]</sup> studies by Keskin et al. and Hekimsoy et al.<sup>[13,14]</sup> It is still debated whether platelet activation plays a primary pathogenetic role in the development of diabetic vascular complications or whether the increased activity is secondary to vascular complications. Based on our findings, we are of the opinion that higher MPV cannot be attributed solely to the existence of diabetes and platelets play a primary role in complication development.

### CONCLUSION

Our study found higher platelet counts and MPV in Diabetic patients type II compared to type I Diabetic subjects.

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