



**CHANGES IN PLATELET AND PLATELET INDICES DURING PREGNANCY AS
POTENTIAL MARKERS FOR PREDICTION OF PREECLAMPSIA DEVELOPMENT,
2016**

Mervit Hassan*¹ and Dr. Enaam Abdelrahman Abdelgader²

¹Department of Hematology, Faculty of Medical Laboratory Sciences, Al-Neelain University, Khartoum, Sudan.

²Associated Professor of Haematology, Department of Haematology, Faculty of Medical Laboratory Sciences, Al-Neelain University, Khartoum, Sudan.

*Corresponding Author: Mervit Hassan

Department of Hematology, Faculty of Medical Laboratory Sciences, Al-Neelain University, Khartoum, Sudan.

Article Received on 07/11/2016

Article Revised on 28/11/2016

Article Accepted on 18/12/2016

ABSTRACT

Background: Platelets, also called thrombocytes, are a component of blood whose function (along with the coagulation factors) is to stop bleeding by clumping and clotting blood vessel injuries. Preeclampsia is a condition that pregnant women develop. It is marked by high blood pressure in women who have previously not experienced high blood pressure before. **Objective:** The purpose of this study was to assess the role of platelet count and platelet indices as marker for development of Preeclampsia. **Materials and Methods:** Eighty samples included in this study, 50 were pregnant women with Preeclampsia and other 30 as a control group were evaluated to determine the changes in Platelets and platelet indices among pregnant women with Preeclampsia. The platelet count and indices was determined using Sysmex® Kx21-N Analyzer. **Results:** The Platelets count (mean +/- SD) were 246.4 (± 55.8) in pregnant women with Preeclampsia and 284 (± 65.03) in control group, Platelets were significantly Lower in pregnant women with Preeclampsia (P=0.002). Platelet indices showed no significant change between two groups (P> 0.05). **Conclusion:** A among the Platelets count and platelet indices, Platelet count is considered to be an ideal early monitoring index for pre-eclampsia and potential marker for predicting the severity of pre-eclampsia in early pregnancy.

KEYWORDS: Platelets, Preeclampsia, MPV, PDW, P-LCR.

INTRODUCTION

Platelets, also called thrombocytes, are a component of blood whose function (along with the coagulation factors) is to stop bleeding by clumping and clotting blood vessel injuries.^[1] Platelets have no cell nucleus: they are fragments of cytoplasm that are derived from the megakaryocytes^[2] of the bone marrow, and then enter the circulation. These unactivated platelets are biconvex discoid (lens-shaped) structures,^{[3] [4]} 2–3 µm in greatest diameter.^[5] The main function of platelets is to contribute to hemostasis: the process of stopping bleeding at the site of interrupted endothelium. They gather at the site and unless the interruption is physically too large, they plug the hole. First, platelets attach to substances outside the interrupted endothelium: adhesion. Second, they change shape, turn on receptors and secrete chemical messengers: activation. Third, they connect to each other through receptor bridges: aggregation.^[6] The three broad categories of platelet disorders are "not enough"; "dysfunctional"; and "too many. Platelet indices (PI) — platelet crit, mean platelet volume (MPV) and platelet distribution width (PDW) — are a group of derived platelet parameters obtained as a

part of the automatic complete blood count. Emerging evidence suggests that PIs may have diagnostic and prognostic value in certain diseases.^[7]

Preeclampsia is a condition that pregnant women develop. It is marked by high blood pressure in women who have previously not experienced high blood pressure before. Preeclamptic women will have a high level of protein in their urine and often also have swelling in the feet, legs, and hands. This condition usually appears late in pregnancy, generally after the 20 week mark, although it can occur earlier.^[8]

If undiagnosed, preeclampsia can lead to eclampsia, a serious condition that can put you and your baby at risk, and in rare cases, cause death. Women with preeclampsia who have seizures are considered to have eclampsia.^[8] There's no way to cure preeclampsia, and that can be a scary prospect for moms-to-be. When preeclampsia is caught early, it's easier to manage.^[8]

MATERIALS AND METHODS

This study is a case-control study, conducted in Dongola, Sudan, in the period from September to November 2016. Eighty samples included in this study, 50 were pregnant women with Preeclampsia and other 30 as a control group were evaluated to determine the changes in Platelets and platelet indices among pregnant women with Preeclampsia.

Blood samples were collected from all subjects in EDTA containers for measurement of complete blood count using Sysmex® Kx21-N hematological analyzer. The control group consisted of healthy volunteers without a medical history of diseases. This study was approved by ethical committee of ministry of health, and informed consent was obtained from each participant before sample collection.

Haematological assay

PLTs were counted using the direct current detection method with coincidence correction. Automatic discriminators separate the cell populations based on complex algorithms. The intensity of the electronic pulse from each analyzed cell is proportional to the cell volume. Even with samples at extremely low or unusually high concentrations, the Sysmex cell counters analyze PLTs with uncompromised precision and accuracy.

RESULTS

Demographic, clinical and characteristics of study participants

In total of 80 subjects included in our study, 50 pregnant women with Preeclampsia and other 30 as a control group. The mean age (mean \pm SD) was 30.6 (\pm 4.5) and 31.2 (\pm 4.3) years for pregnant women with Preeclampsia and controls, respectively. (Table1) The results showed that the mean level of BMI, systolic and diastolic blood pressure were significantly higher in case group than control group ($P < 0.05$). (Table1).

Comparison of Platelets count and indices of the study participants

The Platelets count (mean \pm SD) were 246.4 (\pm 55.8) in pregnant women with Preeclampsia and 284 (\pm 65.03) in control group, Platelets were significantly Lower in pregnant women with Preeclampsia ($P = 0.002$).

MPV, PDW and P-LCR (mean \pm SD) in pregnant women with Preeclampsia were 8.7 (\pm 0.73), 15.9 (\pm 0.31) and 0.20 (\pm 0.065), respectively. MPV, PDW and P-LCR (mean \pm SD) in control group were 8.0 (\pm 0.67), 15.7 (\pm 0.30) and 0.22 (\pm 0.47), respectively. Platelet indices showed no significant change between two groups ($P > 0.05$). (Table2).

Table 1. Show Demographic, clinical and characteristics of study participants and controls.

	Case (mean \pm SD)	Control (mean \pm SD)	P.Value
Age	30.6 (\pm 4.5)	31.2 (\pm 4.3)	0.850
BMI	30.7 (\pm 4.1)	24.1 (\pm 3.5)	0.002
Blood pressure (systolic)/median	150 (130-170)	120 (110-130)	
Blood pressure (diastolic)/median	90 (70-100)	80 (70-90)	

Table 2. Show comparisons of Platelets count and indices of the study participants

	Case (mean \pm SD)	Control (mean \pm SD)	P.Value
Platelets	246.4 (\pm 55.8)	284 (\pm 65.03)	0.002
MPV	8.7 (\pm 0.73)	8.0 (\pm 0.67)	0.241
PDW	15.9 (\pm 0.31)	15.7 (\pm 0.30)	0.897
P-LCR	0.20 (\pm 0.065)	0.22 (\pm 0.47)	0.323

DISCUSSION

Blood platelets participate in the pathological processes of hemostasis and thrombosis and are regenerated from megakaryocytes in bone marrow hematopoietic tissues. Therefore, platelet Count, platelet Ratio, MPV and PDW, are valuable markers for thromboembolic diseases and platelet activation. The platelet Counts of the subjects in our study decreased in pregnancy compared to control (Table 1.). However, the platelet Ratio, MPV and PDW were not significantly different among the normal control and pregnant women. These findings show agreement with study done in Nigeria 2015 by Pughikumo *et al.*,^[9] they found that Platelets count was significant decrease in pregnant women while the mean platelet volume

(MPV) and the platelet distribution width (PDW) increase with gestational age, and this is not agree with our findings. These physiologic changes should be noted while interpreting the results of platelet parameters as they are helpful in the early detection of states of super-imposed platelet consumption like pre-eclampsia, ectopic pregnancy, preterm labour and the HELLP syndrome. Another study done in Egypt 2015 by Ahmed Mohamed Nooh *et al.*,^[10] show agreement with us in that Platelets count were significant low in case group and it does not agree with our results in platelets indices. Therefore, although Platelet Count is an important clinical characteristic of pre-eclampsia, it should not be considered an absolute marker for the progression of pre-

eclampsia. We speculate that the reason Platelet Count failed to be identified as a marker for pre-eclampsia in our study may be due to our elimination of patients with HELLP syndrome, GT and abnormal liver enzymes. The strict screening and good homogeneity of the subjects may also be the reason for our finding of no significant difference in MPV, PDW and P-LCR among the different groups and gestational periods, despite the fact that MPV, PDW and P-LCR have been considered a potential predictive maker for pre-eclampsia in previous research.

CONCLUSION

Normal late pregnancy shows a decrease in Platelets count. This result may be caused by platelet consumption and aggregation followed by a secondary regeneration. However, among the Platelets count and platelet indices, Platelet count is considered to be an ideal early monitoring index for pre-eclampsia and potential marker for predicting the severity of pre-eclampsia in early pregnancy.

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