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# Role of Platelet Indices as Predictors of Postpartum Haemorrhage: A Case-Control Study from a Tertiary Care Hospital

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**Abstract:** ***Background: Postpartum haemorrhage (PPH) remains one of the leading causes of maternal morbidity and mortality worldwide. Early identification of women at risk is essential for timely prevention and management. Platelet indices such as mean platelet volume (MPV), platelet distribution width (PDW), plateletcrit (PCT), and platelet large cell ratio (PLCR) are readily available parameters from routine complete blood count testing and may serve as potential predictors of PPH. Aim: To evaluate the role of platelet indices in predicting postpartum haemorrhage and assess their usefulness as potential biomarkers for risk stratification. Methods: A hospital-based case–control study was conducted in the Department of Obstetrics and Gynecology in collaboration with the Department of Pathology at a tertiary care hospital in Hyderabad. A total of 200 postpartum women were included, comprising 100 cases (PPH) and 100 controls (without PPH). Pre-delivery platelet parameters including platelet count, MPV, PDW, PCT, and PLCR were obtained from complete blood count reports. Statistical analysis was performed using SPSS software. Comparisons between groups were made using Student's t-test and Chi-square test. Receiver operating characteristic (ROC) curves and logistic regression analysis were used to evaluate predictive performance. Results: Women with postpartum haemorrhage demonstrated significantly lower platelet count and plateletcrit and significantly higher MPV, PDW, and PLCR compared to controls ($p < 0.001$). Platelet indices also showed a significant association with severity of PPH. ROC analysis revealed that MPV had the highest predictive accuracy (AUC = 0.86), followed by PDW and PLCR. Multivariable logistic regression analysis identified low platelet count, elevated MPV, elevated PDW, reduced PCT, elevated PLCR, and low hemoglobin as independent predictors of postpartum haemorrhage. Conclusion: Platelet indices, particularly MPV, are significantly associated with postpartum haemorrhage and may serve as simple, inexpensive, and readily available biomarkers for early identification of high-risk women.***

**Keywords:** Postpartum haemorrhage, Platelet indices, Mean platelet volume, Platelet distribution width, Plateletcrit, PLCR

## 1. Introduction

Postpartum haemorrhage is a major obstetric emergency and remains a leading cause of maternal mortality worldwide. According to the World Health Organization, postpartum haemorrhage is defined as blood loss of ≥500 mL following vaginal delivery or ≥1000 mL after cesarean delivery, or any blood loss that causes hemodynamic instability within 24 hours of childbirth

Platelets play a central role in primary hemostasis. In addition to platelet count, automated hematology analyzers provide several platelet indices including mean platelet volume (MPV), platelet distribution width (PDW), plateletcrit (PCT), and platelet large cell ratio (PLCR). These indices reflect platelet size, activation, and turnover and may provide valuable information regarding platelet function.

Several studies have suggested that abnormal platelet indices may be associated with increased risk of postpartum haemorrhage. However, data from the Indian population remain limited. Therefore, this study was conducted to evaluate the role of platelet indices in predicting postpartum haemorrhage in a tertiary care hospital setting.

## 2. Materials and Methods

**Study Design**
Hospital-based case–control study.

**Study Setting**
Department of Obstetrics and Gynecology in collaboration with the Department of Pathology at Government Maternity Hospital, Hyderabad.

**Study Duration**
18 months.

**Study Population**
A total of 200 postpartum women were included.
Cases: 100 women with postpartum haemorrhage
Controls: 100 women without postpartum haemorrhage

**Inclusion Criteria**
Women aged 18–45 years
Availability of pre-delivery complete blood count
Informed consent

**Exclusion Criteria**
Known bleeding disorders
Autoimmune platelet disorders
Anticoagulant or antiplatelet therapy
Severe hepatic or renal disease

**Data Collection**
Venous blood samples were collected prior to delivery in EDTA tubes. Complete blood count was performed using an automated hematology analyzer.

**Parameters analyzed included:**
Hemoglobin
Platelet count
Mean platelet volume (MPV)
Platelet distribution width (PDW)
Plateletcrit (PCT)
Platelet large cell ratio (PLCR)

**Statistical Analysis**
Data were analyzed using SPSS version 26. Continuous variables were expressed as mean ± standard deviation. Student's t-test and Chi-square test were used for comparisons. Receiver operating characteristic (ROC) curve analysis was performed to assess diagnostic performance, and logistic regression was used to identify independent predictors.

## 3. Results

The study included 200 women with equal distribution of cases and controls.

The mean platelet count was significantly lower in cases compared with controls (134.69 ± 23.15 vs 244.24 ± 36.97 $\times 10^9$/L; $p < 0.001$).

Mean platelet volume was significantly higher in cases (10.93 ± 0.82 fL) compared to controls (8.55 ± 0.59 fL; $p < 0.001$). Similarly, PDW and PLCR were significantly elevated in cases, while plateletcrit was significantly lower.

ROC curve analysis showed that MPV had the highest predictive accuracy for postpartum haemorrhage (AUC = 0.86).

Multivariable logistic regression analysis demonstrated that low platelet count, high MPV, high PDW, low PCT, high PLCR, and low hemoglobin were independent predictors of postpartum haemorrhage.

## 4. Discussion

The present study demonstrates a significant association between platelet indices and postpartum haemorrhage. Women who developed PPH had significantly lower platelet count and plateletcrit and higher MPV, PDW, and PLCR compared to controls.

Among the platelet parameters, MPV showed the highest diagnostic accuracy and emerged as the strongest independent predictor of postpartum haemorrhage. This indicates that platelet size and activation may play a critical role in the pathophysiology of obstetric bleeding.

The findings of this study suggest that platelet indices may serve as useful biomarkers for early identification of women at risk of postpartum haemorrhage.

## 5. Conclusion

Mean platelet volume demonstrated the highest predictive value and may be considered a useful screening marker in routine obstetric practice.

Incorporation of platelet indices into antenatal and intrapartum risk assessment protocols may help improve early identification and management of high-risk patients.

## References

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