

Study of Platelet Count and Mean Platelet Volume in Pregnancy-Induced Hypertension – An Observational Study

B. Vijayah

Civil Surgeon, Department of Gynecology and Obstetrics, Government Headquarters Hospital, Dindigul, Tamil Nadu, India

Abstract

Introduction: Pregnancy-induced hypertension (PIH) or preeclampsia is a potential life-threatening complication, affecting 3–8% of the pregnancies. The etiology of the disease is unknown and platelet activation markers such as platelet count (PC) and mean platelet volume (MPV) can be used in early disease diagnosis. Platelet indices can be easily measured as a part of routine blood investigation. This study assesses the variations in PC and MPV in preeclamptic women during the 3rd trimester of pregnancy.

Aim: This study aims to analyze the role of PC and MPV in predicting pregnancy-induced hypertension.

Methods: Fifty patients with pregnancy-induced hypertension and proteinuria aged 18–35 years, during their 3rd trimester of pregnancy were included in the study. PC and MPV were measured during early to end of the 3rd trimester.

Results: The mean gestational period at the time of sample collection was 24 weeks. The mean platelet count was 128.27 ± 58.46 lakh/mm³ and the mean platelet volume was 6.82 ± 2.12 fl.

Conclusion: Platelet count has an association with predicting the increasing grade of PIH. Thrombocytopenia/depleted platelet count is consistently associated with severe PIH and may increase the risk of coagulopathy.

Key words: Platelet count, Mean platelet volume, Preeclampsia, Gestational hypertension, Thrombocytopenia

INTRODUCTION

Hypertensive disorders are responsible for the most common medical complications of pregnancy and are also the reasons for maternal and perinatal mortality and morbidity globally. Pregnancy-induced hypertension (PIH) begins after 20 weeks of pregnancy and is diagnosed with a blood pressure $>140/90$ mmHg with proteinuria.^[1,2] The etiology is unknown but a few studies suggest that PIH may be caused by alterations in coagulation and fibrinolysis. Endothelial dysfunction and platelet activation are one proposed theory for occurrence of PIH.^[3] The coagulation

pathway gets activated with the release of granule contents on platelet activation and leads to the clinical and biochemical manifestations of PIH. Platelet count (PC), mean platelet volume (MPV), and platelet distribution width (PDW) are the markers of platelet activation and can be easily measured in routine blood investigation. These values are analyzed usually in routine antenatal check-up for any variations. Any change in these values may serve as a marker for the diagnosis thromboembolic diseases.^[4]

About 3–10% of the pregnancies present with hypertensive disorders and PIH contributes 14% of maternal deaths. The reasons for morbidity and mortality may be a lack of understanding of the etiology of PIH or the fact that some patients do not present with the usual symptoms of blood pressure (BP) or albuminuria.^[5] Early diagnosis of PIH may reduce the maternal mortality by effective care and medication or even timely termination of pregnancy. A change in platelet count or mean platelet volume is more evident before the derangement in prothrombin time

Access this article online



www.ijss-sn.com

Month of Submission : 10-2020
Month of Peer Review : 11-2020
Month of Acceptance : 11-2020
Month of Publishing : 12-2020

Corresponding Author: B. Vijayah, Department of Gynecology and Obstetrics, Government Headquarters Hospital, Dindigul, Tamil Nadu, India.

(PT), thrombin time (TT), or activated partial thrombin time (AptT).^[6] This study was done to find if there is a significant variation in platelet count and mean platelet volume during the 3rd trimester in gestational hypertension.

Aim

This study aims to analyze the role of PC and MPV in predicting pregnancy-induced hypertension.

MATERIALS AND METHODS

This observational study was conducted in the Department of Gynecology, Government Headquarters Hospital, Dindigul. A total of 50 consenting patients with preeclampsia (BP >140/90 mmHg and proteinuria >300 mg/day in patients of >24 weeks gestation) who were of the age group 18–35 years were included in the study. Patients with pre-existing hypertension, renal disorders, diabetes mellitus, and hematological disorders were excluded from the study. Under aseptic conditions, blood sample was collected in ethylenediaminetetraacetic acid vials. The samples were analyzed on which were observed the platelet indices that include platelet count (PC) and mean platelet volume (MPV).

RESULTS

The mean age of the patients was 31.25 ± 3.8 years. Fifty patients with preeclampsia with BP >140/90 mmHg and proteinuria were included in this study. The mean gestational period at the time of sample collection was 24 weeks. The mean platelet count was 128.27 ± 58.46 lakh/mm³ and the mean platelet volume was 6.82 ± 2.12 fl. The study results show that platelet count was significantly decreased in the third trimester in patients with preeclampsia indicating it as a marker for diagnosis of pregnancy-induced hypertension. The MPV values remained within the normal range (7.5–12.0 fl).

DISCUSSION

Pregnancy-induced hypertension can cause complications such as eclampsia, placental abruption, preterm delivery, and the syndrome of hemolysis, elevated liver enzymes, and low platelets (HELLP) and can even lead to maternal and fetal morbidity and mortality. Gestational hypertension (GH) is the most common cause of hypertension during pregnancy with an incidence of 6–7% in nulliparous and 2–4% in multiparous women. Most cases of GH develop after 20 weeks of gestation. Thrombocytopenia or a decreased platelet count has been observed as an early marker in PIH.^[7–9] Many studies reported that the platelet

count was normal in the initial stages but decreased with disease progression. In our study too, there was a drop-in platelet count in the 3rd trimester of pregnancy in patients with PIH. The mean platelet count observed in this study was $128.27 \pm 58.46/\mu\text{m}^3$ (normal range: 150–450).

Earlier studies indicated that platelet activation occurs before the onset of PIH but recent evidence confirms that accumulation of activated maternal platelets within the placenta results in preeclampsia.^[10] The genetic inhibition of maternal platelet activation abolished the preeclampsia like phenotype. There is evidence that the platelet indices predated the development of PIH by 2–8 weeks. Annam *et al.* and Freitas *et al.* studied a similar inverse relationship between platelet count and severity of preeclampsia.^[11,12] Platelet activation can be measured in terms of reduced platelet count, increased mean platelet volume, elevated β -thromboglobulin, and platelet factor 4.

MPV is easily measured by automated analyzers and is elevated before the onset of PIH in general. Studies by Dadhich *et al.* reported that the MPV values increased with the duration of gestation and also with the disease severity. In our study, the mean platelet values lied within the normal range of 6.82 ± 2.12 fl. These findings are similar to the study findings of Cyehan *et al.* where no significant difference was found in the values of MPV between preeclampsia and normal pregnant women. Kashanian *et al.* also observed a similar finding. He stated that MPV changes did not predict preeclampsia or preterm labor. Altibas *et al.* also reported that MPV is not a significant predictor of severity of preeclampsia.^[13–15]

Decreased platelet levels can lead to severe postpartum bleeding that could be life threatening. Our study findings show that decreased platelet count can be an alarming factor in women with PIH and timely treatment should be administered. Although MPV is also increased in certain cases of PIH, our study did not reveal any significant changes in MPV values.

CONCLUSION

PIH is associated with increased maternal and fetal morbidity and mortality. A decreased platelet count can be a strong indicator of disease severity in women with PIH. The mean platelet values did not show a significant change in relation to preeclampsia in our study. Many other diseases can also cause thrombocytopenia and elevated transaminase levels in pregnancy and our study is limited to this extent. Till date, there are no accurate predictors or specific prediction models for PIH at an early stage and further studies in this regard should be encouraged.

REFERENCES

1. Gabbe SG, Niebyl JR, Simpson JL. *Obstetrics: Normal and Problem Pregnancies*. 5th ed. Philadelphia, PA: Churchill Livingstone; 2007. p. 863-66.
2. Gary Cunningham F, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY. *William's Obstetrics*. 23rd ed. United States, America: McGraw Hill Companies; 2010. p. 706-8.
3. Anjana S, Poonam M, Shradha B. Management of pregnancy induced hypertension. *Int J Res Ayu Pharm* 2010;1:390-8.
4. Lazarov R, Konijnenberg A, van der Post JA, Sturk A, Boer K. Preeclampsia not (yet) predictable from the blood platelet count. *Ned Tijdschr Geneesk* 1999;143:10-3.
5. Sultana R, Karim SM, Atia F, Ferdousi S, Ahmed S. Platelet count in preeclampsia. *J Dhaka National Med Coll Hos* 2012;18:24-6.
6. Karateke A, Kurt RK, Baloglu A. Relation of platelet distribution width (PDW) and platelet crit (PCT) to preeclampsia. *Ginekol Pol* 2015;86:372-5.
7. Sheeha MA, Alaboudi RS, Alghasham MA, Iqbal J, Adam I. Platelet count and platelet indices in women with preeclampsia. *Vasc Health Risk Manag* 2016;12:477-80.
8. Alkholya EA, Faragç EA, Beheryñ MA, Ibrahimã MM. The significance of platelet count, mean platelet volume and platelet width distribution in preeclampsia. *AAMJ* 2013;11:200-14.
9. Dadhich S, Agarwal S, Soni M, Choudhary R, Jain R, Sharma S. Predictive value of platelet indices in development of preeclampsia. *J SAFOG DVD* 2012;4:17-21.
10. Han L, Liu X, Li H, Zou J, Yang Z, Han J, *et al.* Blood coagulation parameters and platelet indices: Changes in normal and preeclamptic pregnancies and predictive values for preeclampsia. *PLoS One* 2014;9:e114488.
11. Annam V, Srinivasa K, Yatnatti SK, Suresh DR. Evaluation of platelet indices and platelet counts and their significance in preeclampsia and eclampsia. *Int J Biol Med Res* 2011;2:425-8.
12. Mohapatra S, Pradhan BB, Satpathy UK, Mohanty A, Pattnaik JR. Platelet estimation: Its prognostic value in pregnancy induced hypertension. *Ind J Physiol Pharmacol* 2007;51:160-4.
13. Altibas S, Togrul C, Orhan A, Yucel M, Danisman N. Increased MPV is not a significant predictor of preeclampsia during pregnancy. *J Clin Lab Anal* 2012;26:403-6.
14. Dogru YH, Yucel N, Pelit CF, Bolat G. The importance and evaluation of mean platelet volume on the severity of preeclampsia. *Prenatal J* 2011;19:108-13.
15. Santos EV, Filho JM. Measurement of platelet parameters in normal and preeclamptic pregnant women. *Rev Bras Ginecol Obstet* 2004;26:201-6.

How to cite this article: Vijayah B. Study of Platelet Count and Mean Platelet Volume in Pregnancy-Induced Hypertension – An Observational Study. *Int J Sci Stud* 2020;8(9):66-68.

Source of Support: Nil, **Conflicts of Interest:** None declared.