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Original Research Article

Assessment of platelet indices in pregnancy induced hypertensive patients versus normotensive pregnant patients

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ABSTRACT

Background: Hypertensive disorders of pregnancy (HDP) represent a group of conditions associated with high blood pressure during pregnancy, proteinuria and in some cases convulsions. The most serious consequences for the mother and the baby result from pre-eclampsia and eclampsia. These are associated with vasospasm, pathologic vascular lesions in multiple organ systems, increased platelet activation and subsequent activation of the coagulation system in the micro-vasculature. It is a multisystem disease and many theories are proposed for pathophysiology. So there is a constant search for better prognostic factors to predict the progression and severity of disease. The fall in platelet count is most frequently found in preeclampsia and is probably due to consumption during low grade intravascular coagulation. The major adverse outcomes of pre-eclampsia and eclampsia include central nervous system injuries such as seizures (eclampsia), ischemic heart disease, stroke, type II diabetes, and venous thromboembolism hemorrhagic and ischemic strokes, hepatic damage, HELLP syndrome, renal dysfunction as well as increased frequency of cesarean delivery, preterm delivery, and abruptio placenta, in comparison with women without history of the disease.

Methods: Total 100 subjects, 50 control and 50 cases were taken for study. Samples for platelet count were collected and estimation was carried out by the auto-analyzers. The statistical evaluation is done using SPSS version 22 along with Anova and student t-test.

Results: There was a significant difference in platelet count in patients with preeclampsia as compared to control group. Mean platelet diameter was significantly increased in cases with preeclampsia.

Conclusions: Thrombocytopenia is directly proportional to the severity of PIH. Platelet count less than 1 lakh/cumm indicate increasing risk of DIC and HELLP syndrome. In this study we noted significant association was established when the platelet counts of PIH cases were compared with the normotensive control patients. Strong association was made out between the platelet count and MPD and MPV and the severity of PIH.

Keywords: Eclampsia, Platelet count, Preeclampsia, Pregnancy induced hypertension, Prognostic marker

INTRODUCTION

Hypertensive disorders of pregnancy (HDP) represent a group of conditions associated with high blood pressure during pregnancy, proteinuria and in some cases convulsions. The most serious consequences for the mother and the baby result from pre-eclampsia and eclampsia.¹ These are associated with vasospasm, pathologic vascular lesions in multiple organ systems,

increased platelet activation and subsequent activation of the coagulation system in the micro-vasculature. It is a multisystem disease and many theories are proposed for pathophysiology. So there is a constant search for better prognostic factors to predict the progression and severity of disease. The fall in platelet count is most frequently found in preeclampsia and is probably due to consumption during low grade intravascular coagulation.² The major adverse outcomes of pre-eclampsia and

eclampsia include central nervous system injuries such as seizures (eclampsia), ischemic heart disease, stroke, type II diabetes, and venous thromboembolism hemorrhagic and ischemic strokes, hepatic damage, HELLP syndrome, renal dysfunction as well as increased frequency of cesarean delivery, preterm delivery, and abruptio placenta, in comparison with women without history of the disease.

Thus, coagulation testing with baseline complete blood cell count including platelet count and platelet indices probably sufficient in patients with a hypertensive disorder of pregnancy is common in these patients for evidence of DIC and HELLP.³

Thus, the aim of the study is to assess the relationship between platelet indices (platelet count, mean platelet volume, platelet distribution width) with pregnancy induced hypertension and whether these indices can be used as prognostic markers.

METHODS

The total number of patients analyzed was 100. After taking ethical clearance from the Institutional Ethical b Committee six months retrospective study was carried out in Acharya Vinobha Bhawe Rural Hospital, in the department of Obstetrics and Gynecology, Wardha, during the period of January 2018 to June 2018.

This retrospective study included 100 patients aged 18-35 years, out of which 50 normotensive patients were taken as control and 50 cases which were included were clinically diagnosed as pregnancy induced hypertension with gestational age ≥ 20 weeks attending outpatient

department or admitted in antenatal ward/labour room in department of OBGY, Acharya Vinobha Bhawe Rural Hospital.

All patients presenting with preeclampsia, mild pre-eclampsia (as per ACOG guidelines; BP $\geq 140/90$ mmHg at 2 intervals 4 hours apart with or without significant proteinuria) were included in pregnancy induced hypertensive group. Patients included in the study were pregnant women beyond 28weeks gestation of pregnancy were included. Patients excluded from the study were patients with history of thromboembolic episode, hemorrhagic disorder, epilepsy, hepatic or renal disorder, preexisting DM, HTN.

CBC reports were taken of the cases and controls from department of pathology, Acharya Vinobha Bhawe Rural Hospital. Platelet count, mean platelet distribution estimation was compared between the normotensive pregnant women with PIH patients.

The statistical analysis used was mean, standard deviation and students t-test. The p value < 0.05 was accepted as significant.

RESULTS

The number of patients studied retrospectively was 100. 50 pregnancy induced hypertensive patients were taken while 50 normotensive patients in one group. Complete hemogram was studied in both the groups. Both groups were also compared on basis of demographic patterns. As shown in Table 1 elderly women and women with increased BMI were at high risk for pregnancy induced hypertension.

Table 1: Demographic and baseline characteristics of all participants.

Demographic and baseline characteristics	Normotensive pregnancy group	Pregnancy induced hypertensive group
Mean age group	22.6 \pm 3	23.1 \pm 4.6
BMI	25.4 \pm 2.2	26.7 \pm 1.8
Socio-economic status low	19	9
Socio-economic status med	16	5
Socio-economic status high	15	3
Smoking	12	11
Gravidaprimi	26	29
multi	25	27

Table 1 shows demographic and baseline characteristic differences in normotensive and pregnancy induced hypertensive groups.

The mean age group in Normotensive pregnancy group is 22.6 \pm 3 wheres in pregnancy induced hypertensive group is 23.1 \pm 4.6. The BMI in both the groups is 25 to 27.

Table 2 shows comparison between both the groups in term of their platelet counts. It was observed that in the Pregnancy induced hypertensive group, platelet counts of less than 1 lacs/mm³ were seen in 14 out of 50 studied patients whereas there were 8 patients from PIH group who had platelet counts more than 2 lacs/mm³. While in the normotensive group, 20 out of 50 patients in the group had more than 2 lacs/mm³ platelet count.

Table 2: Distribution of platelet count in normotensive patients and pregnancy induced hypertensive patients.

Platelet count (cells/ mm ³)	Normotensive patients	Pregnancy induced hypertensive group
< 1	5	14
1-1.5	12	11
1.5-2.9	13	18
>2	20	8
Total	50	12

Table 3: Platelet indices of normal pregnant women control group and Pregnancy induced hypertensive group.

	Normal pregnant women group (n=50)	Pregnancy induced hypertensive group (n=50)	p value
Mean platelet diameter (fl)	11.01±1.77	14.01±3.10	<0.001*
Mean platelet volume (fl)	8.50±0.75	10.51 ±4.12	<0.001*

Significant (produced by ANOVA test)*

DISCUSSION

The physiological changes in pregnancy normally show decreasing platelet counts with increasing gestational age. However in patients with pregnancy induced hypertension the effect on platelets is increased significantly leading to many complications in mother and foetus. And PIH continues to be a major cause of maternal mortality and morbidity with its association with IUGR, preterm deliveries, abruption.⁴

In present study mean age of patients in the PIH group was 23.1±4.6 years as shown in Table 1, which is comparable with the studies done by Prakash et al reported mean age of 24.75±3.360 years respectively, however study done by Onisai et al observed higher mean age compared to present study.^{5,6} This study also showed more prevalence of PIH in primigravidas.

However, this study was done to prove prognostic significance of platelet indices estimation in pregnant patients. It was seen that there was significant decrease in platelet count in pregnancy induced hypertensive patients when compared to control group i.e. normotensive pregnant patients in their third trimester of pregnancy. As shown in Table 2 platelet counts were less than 1 lacs/mm³ in 14 out of 50 PIH patients which was similar to the results obtained by Vrunda et al. They reported platelet count of 1-1.5 lacs/mm³ in PIH group and 2.5-3 lacs/mm³ in normotensive patients.⁷

In this study, Table 3 shows comparison of mean platelet diameter and mean platelet volume in cases and controls. In normotensive patients the range of MPD was found between 11.01±1.77 and the ones with PIH it was in the range between 14.01±3.10 which is comparable with Giles et al who observed PDW of 16.¹⁰ Similar results were revealed in a study done by Siddiqui et al on 125 cases.⁹ So in our study we found that MPD increased with

increasing severity of PIH. Mean platelet distribution increases in normal pregnancy but non-significantly till 32 weeks while in PIH patients MPD values were higher with increasing severity of hypertension.

Whereas the MPV in normotensive patients was found 8.50±0.75 and in PIH group it was 10.51±4.12. MPV showed gradual increase in preeclampsia patients as compared to normotensive subjects. Inter group analysis done by Nooh et al revealed that changes in MPV values in PE-developing women (with and without severe features) were statistically more significant than normotensive pregnant women and this change was noted to start from the 24th gestational week up to time of delivery (p = 0.003).⁸

CONCLUSION

Platelet indices are tests done in all antenatal mother irrespective of her having PIH, as it is directly related to maternal and perinatal outcome. Routine and regular monitoring of platelet count can be included in the routine antenatal checkup among the pregnant women with PIH. Patients with low platelet count should be under the management of a qualified obstetrician to avoid the further risks. Thrombocytopenia is directly proportional to the severity of PIH.

Platelet count less than 1 lakh/cumm indicate increasing risk of DIC and HELLP syndrome. In this study we noted significant association was established when the platelet counts of PIH cases were compared with the normotensive control patients. Strong association was made out between the platelet count and MPD and MPV and the severity of PIH.

Hence, platelet indices are the important and quintessential investigation for further management of pregnancy induced hypertensive patients.

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