Original Article

Platelet count and platelet indices in patients of pregnancy-induced hypertension at a rural tertiary care hospital in western India

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ABSTRACT

Background: Pregnancy-induced hypertension is a serious complication during pregnancy causing maternal and fetal morbidity and mortality. Pregnancy-induced hypertension associated with thrombocytopenia can help in predicting the severity of the disease. The study aimed to study the platelet count, and platelet indices in Pregnancy induced hypertension patients and compare them with normotensive pregnant women.

Materials and methods: This was a case-control study, was conducted on patients visiting antenatal care at a Tertiary care rural hospital in western India. The study population included a total of 82 patients, which were divided into 2 groups with 41 patients in each control (healthy pregnant women) and study group (pregnant women with Pregnancy induced hypertension). Patients with chronic hypertension and known case of thrombocytopenia were excluded from the study. The blood samples collected were processed on a fully automated cell counter for the estimation of platelet count and indices.

Results: The platelet count in the study group ranged from 186434.1±81086.9 whereas in the control group, it was 268659±72206.9, showing that the platelet count was significantly lower in women with Pregnancy induced hypertension than in the control group. The MPV, PDW, systolic BP, and diastolic BP were found to be significantly elevated in the study group as compared to the control group.

Conclusions: The present study concludes that blood parameters such as platelet count and platelet indices can be considered as an early, economical, and easily available parameter for the assessment of the severity of PIH cases.

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INTRODUCTION

Pregnancy Induced Hypertension (PIH) is one serious complication during pregnancy causing maternal and fetal morbidity and mortality which is responsible for 14% of maternal deaths in the world.[1-6] In India it contributes to 5% to 15% in the state of Maharashtra and 2% to 26% maternal morbidity.[7,8] PIH is defined as hypertension that occurs in pregnancy for the first time after 20 weeks of gestation and disappears following delivery.[1-2,9-10] Thrombocytopenia which is defined as platelet count less than 150000/cumm is an associated phenomenon of PIH that complicates 7-8% of all pregnancies.[4-5,11]

Among the hematological parameters, platelet count and platelet indices are considered simple, cheap, rapid, and easily available parameters. It can have a significant role in reducing the morbidity and mortality of the mother & fetus outcome by early prediction of the severity of the diseases.[12] Hence, this study was undertaken to see if there is any association between platelet count, platelet indices [Mean platelet volume (MPV), platelet distribution width (PDW)] and blood pressure (BP) in pregnant women and to compare them with normotensive pregnant women.

MATERIALS AND METHODS

This was a case-control study. The study was conducted on pregnant women attending antenatal care services in the Outpatient department (OPD) / In-Patient department (IPD) of the Obstetrics & Gynecology (OBGY) department at a Tertiary care rural hospital in Western India, after approval from the institutional review board and ethical committee.

Written consent from the pregnant women was obtained prior to the collection of blood samples. The data was collected using a proforma and a master chart was created in the Excel spreadsheet. A total of 41 patients who had already been diagnosed with pregnancy-induced hypertension by the OBGY department and were in 2nd or 3rd trimester were selected for the study group and a total of 41 healthy pregnant normotensive patients were considered as a control group. Patients with known chronic hypertension, pre-existing renal or vascular diseases, seizure disorders, severe anemia, liver diseases, or if they were known case of thrombocytopenia with underlying conditions such as ITP, TTP, Malaria, and Dengue were excluded from the study.

Peripheral venous blood collected in an EDTA vacutainer was processed on a fully automated cell counter for the estimation of platelet count and indices. A peripheral blood smear was prepared and stained with Leishman stain and the result of the platelet count was cross-checked by examining platelets on the peripheral smear.

Data was entered on Microsoft Excel and the statistical analysis was performed on SPSS software version 26. A correlation between the Platelets, MPV, and PDW with systolic BP and diastolic BP was made and the correlation coefficient (r) and the p-value were calculated. The value of $p < 0.05$ was considered significant.

RESULTS

A total of 82 samples were studied, 41 samples each from control and study groups. The mean age of the study & control group was 25.80±4.5 years. The platelet count in the study group ranged from 186434.1±81086.9/cumm whereas in the control group was 268659±72206.9/ cumm, which was seen to be significantly low in PIH patients than the control group. The MPV in the study group was 10.83±1.39 fl which was significantly higher than the control group with a p-value < 0.05. Similarly, PDW (17.11±0.8 %) in the study group was significantly elevated as compared to the control group with a p-value < 0.05 as shown in Table 1.

Table 1: Comparison of platelet Count, MPV, and PDW in PIH patients and control groups

Study variables	MEAN±SD		
	Study Group	Control Group	p-value
Age mean±SD	25.80±4.5	25.97±4.150	NA
Hb±SD	11.4±2.178	12.43±1.233	NA
Platelet count ±SD (Lakhs/ Cumm)	186434.1±81086.9	268659±72206.9	<0.00001
Platelet distribution width ±SD (%)	17.11±0.801	16.37±0.597	<0.00001
MPV (fL)±SD	10.83±1.39115	6.19±0.9694	<0.00001
Systolic BP ±SD	147.04±12.15	123.17±5.8133	<0.00002
Diastolic BP±SD	96.097±8.3300	80.97±2.90	<0.00006

Distribution of thrombocytopenia showed that 34.1% of patients had thrombocytopenia out of which 9.76% & 4.87% had moderate and severe thrombocytopenia respectively as shown in Table 2.

Table 2: Distribution of thrombocytopenia in PIH patients in the present study

Degree of thrombocytopenia in PIH patients	n (%)
Mild(1-1.5L/cumm)	8 (19.51)
Moderate(50,000-1lakh/cumm)	4 (9.76)
Severe(<50,000L/cumm)	2 (4.87)

There was a positive correlation between platelet counts and systolic/diastolic blood pressure, although it was not statistically significant. However, there was a negative correlation between MPV, PDW, and systolic/diastolic blood pressure, and was not statistically significant, as shown in Table 3.

Table 3: Correlation of systolic & diastolic BP with platelet count, MPV, PDW.

Parameter	Statistical value	Systolic BP	Diastolic BP
Platelets	Pearson Correlation (r)	0.298	0.043
	Sig. 2-tailed (p-value)	0.059	0.791
MPV	Pearson Correlation (r)	-0.16	0.044
	Sig. 2-tailed (p-value)	0.317	0.784
PDW	Pearson Correlation (r)	-0.102	0.129
	Sig. 2-tailed (p-value)	0.524	0.421
Total		41	41

DISCUSSION

PIH is defined as systolic blood pressure >140 mmHg and diastolic blood pressure >90 mmHg in ANC patients which generally returns to normal by 12 weeks postpartum. In the present study, the mean systolic blood pressure was 147.04±12.15mm of Hg in PIH patients as compared to 123.17±5.8133mm of Hg in the control group. The diastolic blood pressure in the study group was 96.097±8.3300mm of Hg as compared to 80.97±2.90mm of Hg in healthy pregnant women. In another study like Lopez-Llera et al found systolic BP of 175 ±33.4mm of Hg in PIH and Diastolic BP of 120±20 mm of Hg.[13]

Thrombocytopenia is the second most common cause of hematological abnormality in pregnancy after anemia. It is seen in 7% to 8% of all pregnancies.[14] It can be caused by a variety of conditions ranging from benign disorders such as gestational thrombocytopenia to severe complicated life-threatening conditions such as HELLP syndrome.[9,11,15]

Thrombocytopenia during pregnancy may be caused by the following mechanisms:

- Hemodilution is due to fluid retention which occurs because of sodium and water retention under hormone effects.
- Increased platelet use at placental circulation and increased platelet aggregation due to increased levels of thromboxane A_2.[16]

In the present study, 34.1% of PIH patients had thrombocytopenia out of which 4.87% had severe thrombocytopenia. In platelet indices, MPV and PDW play important roles as a marker or predictors of coagulation cascade disease and give an idea about platelet activation.[17] MPV measures the average size of the platelets and PDW is the width of the platelets distribution curve, which indicates variation in platelets sizes.[18] In the present study MPV and PDW were found to be significantly elevated in the study group as compared to the control group with the p-value <0.00001. Another study like Dadhich S et al also had similar findings.[19]

In Table 4, a comparison of platelet count, MPV & PDW values with other studies is shown.

All three values (platelet count, MPV, PDW) in the present study are comparable with the study by Maconi M et al.[20] Whereas all three values are higher compared to the study by Amita K.et al.[21]

Table 4: Comparison of mean platelet count, MPV, and PDW with other studies in PIH

Parameters	Maconi M. et al[22]	Amita K. et al[23]	Present study
Platelet count	192±56.3	166±71	186.1±81
MPV	11.95±1.2	9.30±1.2	10.83±1.3
PDW	15.13±2.7	15.4±2.4	16.37±0.5

Limitations of the study are 1. Small sample size and short study duration because of which follow-up of patients couldn't be done. 2. The present study has not categorized the patients into various subgroups of PIH.

CONCLUSIONS

The present study showed that platelet count was significantly low in PIH patients as compared to normotensive pregnant women. MPV and PDW were significantly higher in PIH patients than in the control group. Thus considering the resource-constrained Indian population, cheap and easily available blood parameters such as platelet count and platelet indices can be considered as an early, economical, and rapid parameter of assessment of the severity of PIH cases. This will help in early identification of high-risk patients and timely treatment and thus will reduce maternal and fetal morbidity and mortality in rural areas.

Conflict of Interest: None.

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