

## Study of Evaluation of Low Plateletcount as a Prognostic Indicator of Gestational Hypertension

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### ABSTACT

The aim of the study is to evaluate low platelet count as a prognostic factor in predicting the severity of the disease in pregnancy induced hypertension. The incidence of maternal and fetal complications was high among the platelet 1.0 -1.5 lakhs group. This study is to evaluate if the platelet count can be used as an indicator in predicting the severity of pregnancy induced hypertension and thereby reducing the maternal and fetal morbidity associated with it. The incidence of lateral placenta among cases was 53% and central placenta was 47%.Primary health centers play a pivotal role in providing health care services to majority of antenatal mothers in a country like India, hence simple and effective tests like platelet estimation will aid in early assessment of severity of the disease and referral to tertiary center for prompt management and hence improving the maternal and fetal outcome.

**Keywords:**proteinuria, hypertension, thrombocytopenia and platelet.

### 1. INTRODUCTION

Hypertensive disorders are one of the common medical conditions complicating pregnancy. According to WHO systemic review on maternal mortality worldwide, hypertensive disorders remains the leading direct cause of maternal mortality. Together with haemorrhage and infections hypertension forms a deadly triad contributing to maternal mortality and morbidity affecting 7 -15% and accounting for a quarter of antenatal admissions. 1

The incidence of preeclampsia has risen due to increased prevalence of risk factors such as chronic hypertension, diabetes and obesity. About 16% of maternal death was attributed to hypertensive disorders in developed countries and over half of these hypertensive related deaths are preventable .2 Hypertensive disorders are responsible not only for maternal mortality but also to a significant proportion of morbidity. Long term impact of hypertension in pregnancy in the form of chronic hypertension and cardiovascular risk is also present. Without intervention, pregnancy-induced hypertension can progress to eclampsia, characterized

by hypertension, proteinuria, edema and epileptiform convulsions requiring emergency termination of pregnancy and intensive care.<sup>3</sup>

Preeclampsia is the leading single identifiable risk factor in pregnancy associated with stillbirth. Preeclampsia is strongly associated with fetal growth restriction, low birth weight, spontaneous or iatrogenic preterm delivery, respiratory distress syndrome and admission to neonatal intensive care.<sup>4</sup> Thrombocytopenia is an associated phenomenon of pregnancy induced hypertension complicating 7 -8 % of all pregnancies<sup>5</sup>. Thrombocytopenia is defined as the subnormal number of platelets<sup>6</sup> resulting from a variety of causes ranging from benign disorders such as gestational thrombocytopenia to severe complicated conditions like HELLP syndrome.

In preeclampsia, thrombocytopenia is usually mild to moderate, it can be severe in eclampsia and are more likely to have HELLP syndrome. The mechanism of thrombocytopenia is from 4 processes— deficient platelet production, accelerated destruction, pooling of platelets and artifactual thrombocytopenia. Pregnancy is also associated with qualitative changes suggesting increased production and destruction of platelets.<sup>6</sup> Thrombocytopenia carries a risk for the mother and the foetus associated with neonatal and maternal morbidity and mortality. The intensity of disease process and duration of PIH syndrome depends on the intensity of maternal thrombocytopenia. Lower platelet counts are associated with higher maternal and fetal mortality and morbidity. Hence simple tests like platelet count will help predict the course of disease and to plan prompt management so as to reduce the maternal and fetal mortality and morbidity.<sup>7-9</sup>

## **2.MATERIALS AND METHODS**

### **INCLUSION CRITERIA:**

Pregnant woman of gestational age more than 20 weeks, diagnosed with pregnancy induced hypertension, who were admitted in the department of Obstetrics and Gynaecology at Sree Balaji Medical College and Hospital and, also attending the outpatient department.

### **EXCLUSION CRITERIA:**

1. Established coagulation and haematological disorders
2. Pre-existing renal or vascular diseases, seizure disorders, severe anaemia, liver disorders, endocrine disorders.

3. Patients taking medications which can cause thrombocytopenia.
4. Patients with ITP, TTP, APLA, SLE.
5. Patients with chronic hypertension, pre-existing diabetes mellitus, GDM, multiple pregnancy.

### **METHOD:**

This is a prospective observational study done over a period of one and a half years from August 2017 to February 2019 at Sree Balaji Medical and Hospital in the Department of Obstetrics and Gynaecology. The study group had 100 patients attending the outpatient department and admitted to the hospital. These patients were divided into gestational hypertension, mild and severe preeclampsia, according to the blood pressure and proteinuria. Gestational hypertension is patient with BP > 140/90 mmHg without evidence of proteinuria. Mild preeclampsia is BP systolic >140 -160 mmHg and diastolic >90-110 mm Hg with evidence of proteinuria. Severe preeclampsia is BP > 160/110 mmHg with multi - organ involvement. Thrombocytopenia is defined as subnormal number of platelets <1,50,000/cu mm. The data collection technique adopted in this study is detailed history, clinical findings and investigations as mentioned in the proforma. Blood will be collected by venepuncture from the antecubital vein, and will be sent in the EDTA tube and analyzed in an automated cell counter. If there is thrombocytopenia, the counts will be rechecked manually. The details were then recorded in the proforma and then analyzed to fulfill the aims and objectives of the study.

The patients were followed till delivery and the early postpartum period for maternal complications. The maternal outcome was studied in terms of:

- Mode of delivery
- Time of delivery
- Progression of disease
- Complications like abruption, eclampsia, imminent eclampsia, HELLP Syndrome, DIC, pulmonary oedema, maternal mortality.

Fetal outcome was noted in terms of IUGR, preterm, IUD, NICU admission in view of RDS, MAS, Birth asphyxia. Woman with low platelet counts were monitored and treated according to the standard

guidelines for the treatment of hypertension complicating pregnancy. This data was then tabulated, and correlation tests like chi square were applied to the relevant data and same was analyzed.

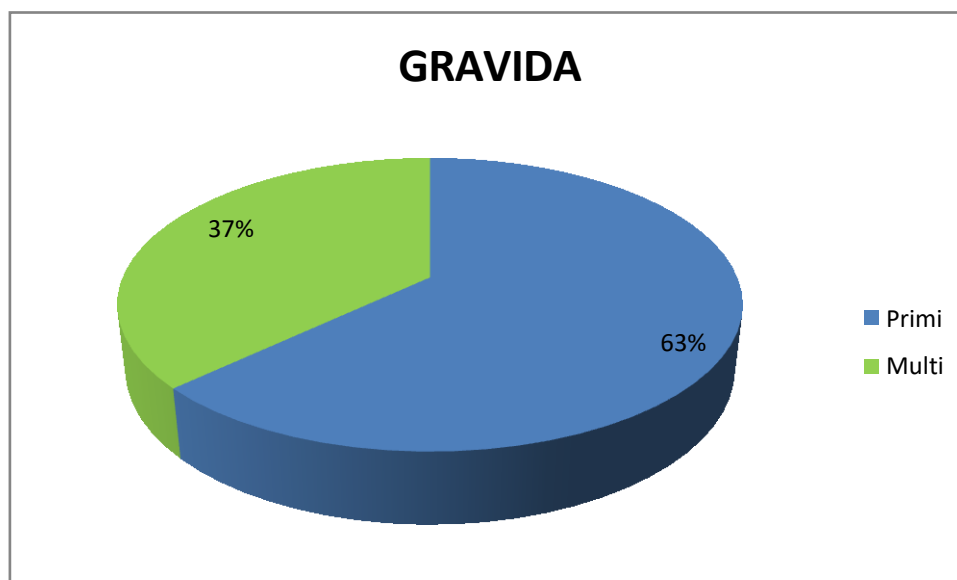
### 3.RESULTS

**Table 1: Age Distribution**

Age	Frequency	Percent
<19 years	8	8
20-35 years	83	83
>35 years	9	9
<b>Total</b>	<b>100</b>	<b>100</b>

Among 100 cases of PIH, there were 83 cases in the age group 20-35 years, eight cases in the age group of <19 years and nine cases above >35 years of age.

**Figure 1: Parity Distribution**



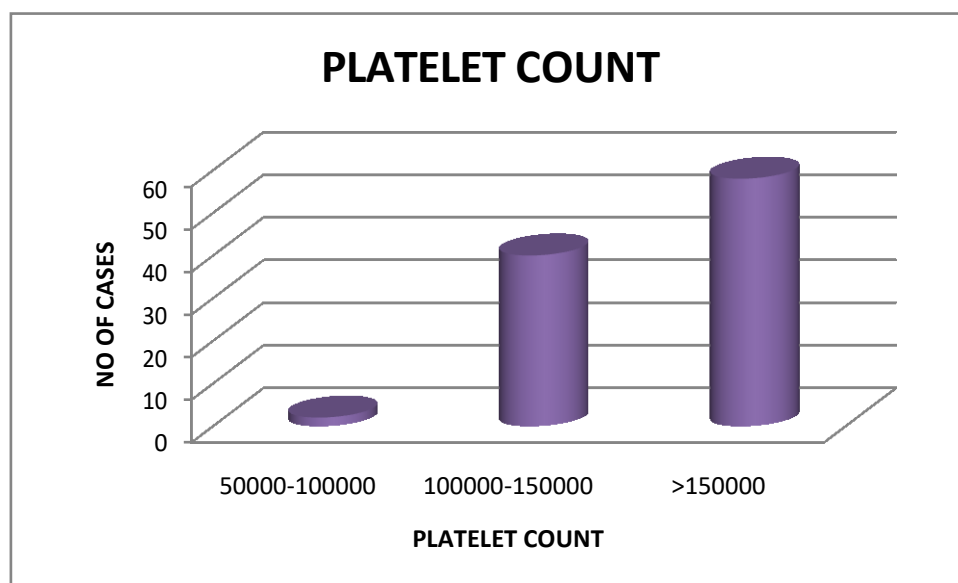
The incidence of preeclampsia was highest among primigravida with 63 cases. There were 37 cases of multigravida in our study.

**Table 2: Distribution of gestational age at the time of diagnosis**

Gestational Age	Frequency	Percent
20 - 34 weeks	13	13.0
34 <sup>+1</sup> -37 weeks	42	42.0
> 37 weeks	45	45.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

In the gestational age 20 -34 weeks, there were 13 cases, 42 cases among 34+1-37 weeks and 45 cases above 37 weeks of gestation. This shows the lower incidence of early onset preeclampsia among our study group.

**Figure 2: Platelet Count Distribution**



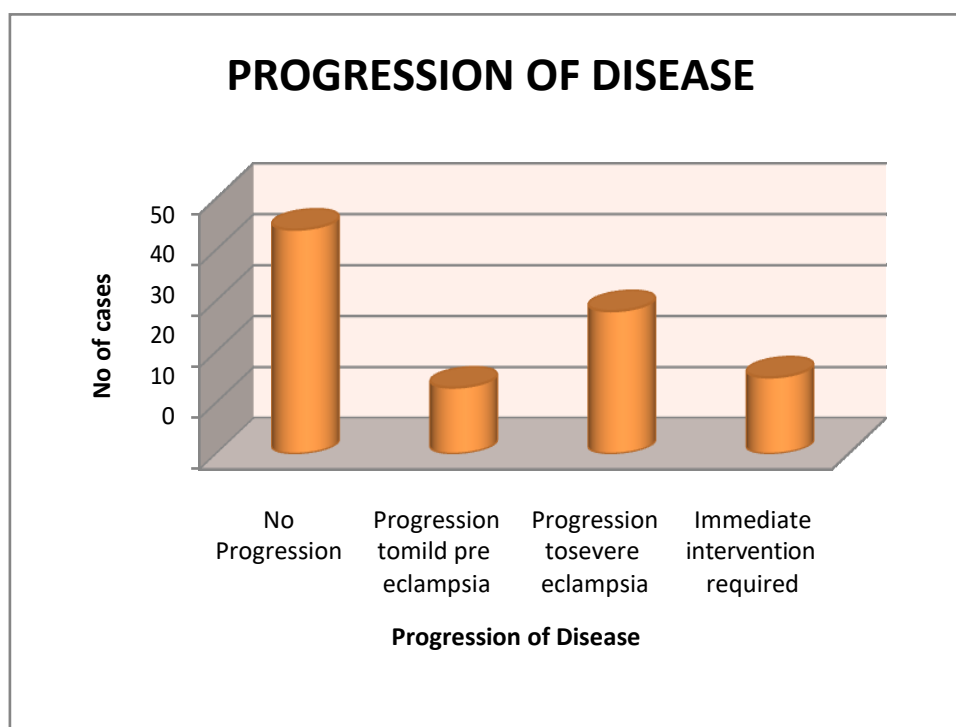
There were 58 cases with the platelet count >150000. There were 42 cases of thrombocytopenia with 2 cases in the category of 50000-100000 and 40 cases among 100000 - 150000. There was no case with severe thrombocytopenia in our study.

**Table 3: Distribution of classification of disease at the time of diagnosis**

Classification of disease at the time of diagnosis	Frequency	Percent
Gestational Hypertension	30	30
Mild Preeclampsia	55	55
Severe Preeclampsia	15	15
<b>Total</b>	<b>100</b>	<b>100</b>

Among 100 PIH cases, there were 55 cases of mild preeclampsia, 30 cases of gestational hypertension and 15 cases of severe preeclampsia.

**Figure3: Distribution of progression of Disease**



In our study, there were 13 cases of gestational hypertension, which progressed to mild preeclampsia, 28 cases which progressed to severe preeclampsia, and 15 cases of severe preeclampsia which required immediate intervention, and hence no progress was monitored in them.

**Table 4: Comparison of classification of disease at diagnosis and time of delivery**

		TIME OF DELIVERY			Total
		28-32 weeks	33-36 weeks	>37 weeks	
Classification of disease at the time of diagnosis	Gestational Hypertension	0	5	25	30
	Mild Preeclampsia	1	18	36	55
	Severe Preeclampsia	4	11	0	15
Total		5	34	61	100

**Table 5 : Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	62.204 <sup>a</sup>	6	.000
Likelihood Ratio	62.455	6	.000
Linear-by-Linear Association	22.250	1	.000
N of Valid Cases	42		

This table shows cases in various class of PIH with thrombocytopenia and their progression. Out of 4 cases in gestational hypertension with thrombocytopenia 2 cases progressed to mild preeclampsia and 2 cases to severe preeclampsia. Out of 25 cases in mild preeclampsia 17 cases progressed to severe preeclampsia and 8 cases showed no progression. 13 cases diagnosed as severe preeclampsia required immediate termination and no progress was monitored. There is statistical significance with classification of disease with thrombocytopenia and progression of disease.

#### 4. DISCUSSION

Thrombocytopenia is frequently reported with severe preeclampsia. This has been reported in various studies. Thrombocytopenia is the most common haematological abnormality occurring in PIH 73. As the severity of the disease increases, there is a progressive fall in the platelet count. This study was done to assess the prognostic significance of platelet estimation in evaluating the severity of preeclampsia. In our study, the age group in which the maximum number of cases was seen is 20 – 35 years, 83 cases. There were 8 cases below 19 years and 9 cases above 35 years of age. The majority of the patients were in the age group 20 – 25 years in accordance with the studies done. 10,11 However, in the study done. 12 Most of the cases were in the age group 25-29 years. The younger age group can be due to the early age of marriage and the early age of first pregnancy observed in our country. The commonest age group in which thrombocytopenia was seen is 20 – 35 years with 34 cases (80.9 %). There were 3 cases of thrombocytopenia out of 8 cases in the age group of < 19 years (7.14%). Five cases of thrombocytopenia among 9 cases were seen among > 35 years of age group (11.9%). The incidence of complications was higher among the extremes of age group. 13 Preeclampsia is primarily a disease of first pregnancy. In our study among 100 PIH cases, the number of primigravida (63%) was more than multigravida (37%). This is similar to other studies. 14 which, showed most of PIH cases in nulligravida 62%, Gupta et al. 56 showed 58.6 % were primiparous and 41.1% were multiparous. This also goes in agreement with the studies conducted by Sajith M et al. 65 and Kumar P et al. 66 where 53.8% and 61% cases were primigravida and 46.1%, 39% were among multigravida. The association of parity with different categories of PIH was not significant. This was in accordance with the study. 15 Early-onset preeclampsia (EOPE) is preeclampsia before 34 weeks and mostly affects the fetus typically with placental dysfunction, abnormal umbilical and uterine artery Doppler, low birth weight, growth restriction, poor neonatal and maternal outcomes, multiorgan dysfunction. Late-onset preeclampsia (LOPE) is defined as preeclampsia developing after 34 weeks and is considered a maternal disorder, as a result of underlying constitutional disorder and is associated with the normal placenta, increased placental volume, normal fetal growth, better maternal and fetal outcomes 16. In our study incidence of LOPE was higher 87% in comparison with EOPE which was 13%.

In our study of 100 PIH cases, there were 30% cases with gestational hypertension, 55% cases with mild preeclampsia and 15% cases with severe preeclampsia. The incidence of preeclampsia is more common in our study, 17 which showed 56% cases with mild preeclampsia. The incidence of various categories of PIH was the same among primigravida and multigravida, and was not statistically significant. Among 30 cases of gestational hypertension, 15 cases showed no progression, 13 cases progressed to mild preeclampsia, and 2 cases progressed to severe preeclampsia. Out of 55 cases of mild preeclampsia, 29 cases showed no progression, and 26 cases progressed to severe preeclampsia. Out of these 26 cases, 17 cases had



thrombocytopenia. Among 15 cases of severe preeclampsia, no progression was observed as they warranted immediate termination in view of maternal condition or fetal condition. In our study, among 30 cases of gestational hypertension, 4 cases had thrombocytopenia (13.3%). Among these 4 cases, 2 patients progressed to mild preeclampsia, and 2 cases progressed to severe preeclampsia.<sup>16</sup> The progression of gestational hypertension to preeclampsia can be attributed to the early onset of gestational hypertension in these patients as shown by Romero-Arauz et al.<sup>71</sup> Among 55 cases of mild preeclampsia, 25 cases had thrombocytopenia (45.4%), out of which 17 cases progressed to severe preeclampsia. The association of thrombocytopenia with the progression of the disease was significant in our study with  $p$  value  $<0.05$ . The incidence of thrombocytopenia was 13.3 % with gestational hypertension, 45.4% with mild preeclampsia, and % with severe preeclampsia. The incidence of thrombocytopenia in severe preeclampsia and mild preeclampsia is in accordance with the study by Poluri et al.<sup>50</sup> with 75% and 47%, respectively. This is also comparable to the study done.<sup>17</sup>

Out of 100 cases of PIH, 42 cases presented with thrombocytopenia with an overall incidence of 42% of thrombocytopenia in our study. The overall incidence of thrombocytopenia in our study was statistically significant, with the  $p$  value of  $<0.05$ . This association is in comparison with a study done by Gupta et al. <sup>56</sup> in which the overall incidence of thrombocytopenia was 42.85%. This is also similar to study with 47% incidence of thrombocytopenia. <sup>18</sup> The pathogenesis of thrombocytopenia in preeclampsia may be due to endothelial damage and peripheral utilization. Further, the lifespan of platelets is reduced, and the altered platelet membrane leads to aggregation and destruction. Among the fetal complications, the most common was preterm with 34 cases, FGR with 17 cases and NICU admission in view of birth asphyxia, RDS (respiratory distress syndrome) and MAS (meconium aspiration syndrome) with 28 cases. The overall incidence of FGR in our study was 17%, which is comparable to Sibai et al. and khonget al. with 9% and 10% respectively.<sup>73</sup> The incidence of FGR was high in severe preeclampsia with thrombocytopenia. 6 cases out of 13 cases of severe preeclampsia with thrombocytopenia were affected but were not statistically significant (  $p$  value  $>0.05$ ). Overall, the association between PIH and FGR was not statistically significant in our study (  $p$  value  $>0.05$ ). Among 5 cases delivered before 32 weeks, 1 was IUD emergency caesarean was done in view of the maternal condition. <sup>19</sup> The other 4 cases were admitted in NICU in view of prematurity and managed accordingly. The average birth weight of babies delivered before 32 weeks was 1250 g. The incidence of NICU admission among severe preeclampsia was high, and the association between severity of disease and NICU admission was statistically significant (  $p$  value  $<0.05$ ). There were 2 cases of IUD in our study, but there was no perinatal mortality. The association between severity of disease and IUD was not statistically significant in our study (  $p$  value  $>0.05$ ).<sup>19</sup>

There were 53 cases with the laterally located placenta (53%) and 47 cases with the central placenta

(47%). This association is in accordance with the study done by Shailesh Janardhan kore et al. in 2016, in which 59.4% had lateral placenta and, 41.6% had a central placenta. In humans with the centrally located placenta, both the uterine arteries showed similar resistance and uteroplacental flow is met by both side arteries with equal distribution. However, in the lateral placenta, in the majority the uteroplacental blood flow needs are primarily met by unilateral uterine artery with some contribution through the collateral from the other side uterine artery. The degree of collateral circulation varies with each subject, and hence, when it is not adequate it can lead to the development of preeclampsia.<sup>20</sup>

## 5.CONCLUSION

Platelet estimation is an important investigation for women with PIH. It is directly proportional to the severity of the disease and hence, the maternal and fetal outcome. In this study, it was noted that the low platelet count correlated well with the progression of the disease and causing maternal and fetal morbidity and mortality. Prematurity has been the most common complication with the study, which with the timely administration of corticosteroid, can enhance lung maturity, thereby reducing Respiratory Distress Syndrome, intraventricular haemorrhage and reducing perinatal mortality. Incidence of maternal complications like abruption, DIC and eclampsia were high in women with thrombocytopenia. Hence frequent monitoring, early admission and termination of pregnancy if indicated could avoid these complications.

Hypertensive disorders remain the most significant and intriguing unsolved problem in obstetrics which contributes greatly to the maternal morbidity and mortality. Platelet estimation is a simple, effective and economical method which will help reduce the impact of the disease in the maternal and fetal health by its early detection of severity of the disease. Primary health centers play a pivotal role in providing health care services to majority of antenatal mothers in a country like India, hence simple and effective tests like platelet estimation will aid in early assessment of severity of the disease and referral to tertiary center for prompt management and hence improving the maternal and fetal outcome.

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**Ethical approval:** The study was approved by the Institutional Ethics Committee

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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