



A STUDY ON PLATELET COUNT AND HYPERTENSIVE DISORDERS OF PREGNANCY

Obstetrics & Gynaecology

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ABSTRACT

Background: Hypertensive disorders of pregnancy are one of the most common medical disorders seen during pregnancy. Out of all haematological changes that occur in preeclampsia, thrombocytopenia is the most familiar. The frequency and intensity of thrombocytopenia vary and are dependent on the severity and duration of the preeclampsia syndrome. The objective of this study was to compare platelet count at 12-16 weeks of gestation and time of termination of pregnancy in women with hypertensive disorders of pregnancy and normotensive women. **Methods:** A study was conducted in the Department of Obstetrics and Gynaecology at JJ Group of hospitals, Mumbai, India for a duration of 18 months from January 2020 to June 2021. This study has a sample size of 500 antenatal patients. Necessary information such as their detailed clinical, and obstetric history, clinical examination, investigations was noted. **Results:** In our study, the incidence of hypertensive disorders of pregnancy was 10.2%. There is no association of low platelet count at 12-16 weeks of gestation and development of hypertensive disorders in our study. There is association of low platelet count at time of delivery and hypertension in our study. The change in platelet count is significantly more in cases of subjects who developed hypertensive disorders of pregnancy as compared to those who did not develop hypertensive disorders of pregnancy. **Conclusion:** Hypertensive disorders of pregnancy are one of the medical conditions affecting pregnancy. Low platelet count at 12-16 weeks is not predictor of Hypertensive disorders of pregnancy. Lower platelet count at time of delivery is associated with Hypertensive disorders of pregnancy and thrombocytopenia is found in complicated cases of Hypertensive disorders of pregnancy, affecting maternal and fetal outcomes

KEYWORDS

Hypertensive disorders, thrombocytopenia, platelets.

INTRODUCTION

Pregnancy is a physiological state associated with varied biochemical and maternal adaptation in response to physical stimuli provided by foetus and placenta.¹ The World Health Organization systematically reviews maternal mortality worldwide, and in developed countries, 16 percent of maternal deaths were attributed to hypertensive disorders.²

Pre eclampsia is described as a pregnancy - specific syndrome that can affect every organ system. Evidence of multiorgan involvement may include thrombocytopenia, renal dysfunction, hepatocellular necrosis, central nervous system perturbations, or pulmonary edema.³

Out of all haematological changes that occur in hypertensive disorders of pregnancy, thrombocytopenia is the most familiar. Decreased platelet concentrations with eclampsia were described more than 100 years ago.⁴ The frequency and intensity of thrombocytopenia vary and are dependent on the severity and duration of the preeclampsia syndrome.^{5,6}

In general, the lower the platelet count, the higher the rates of maternal and fetal morbidity and mortality.⁷ Severe form of pre-eclampsia characterised by haemolysis (abnormal peripheral blood smear, bilirubin 21.2 mg/dL), elevated liver enzymes twice the upper limit of normal (AST [aspartate aminotransferase] >70 U/L, LDH [lactate dehydrogenase] >600 IU/L) and thrombocytopenia (<100,000/mm³). Development of this severe form of pre-eclampsia is associated with increased maternal morbidity and mortality.

Endothelial activation and inflammation are major participants in the pathophysiology of the preeclampsia syndrome.

Thrombocytopenia and platelet dysfunction are integral features of preeclampsia. Platelet activation causes augmented destruction and lower concentrations. Mean platelet volume rises because of platelet immaturity.⁸

METHODS

An observational study was conducted in the Department of Obstetrics and Gynaecology at JJ Group of hospitals, Mumbai, India for a duration of 18 months from January 2020 to June 2021. 500 Antenatal patients who were registered in first trimester and were meeting the inclusion and exclusion criteria, were enrolled for the study after obtaining consent.

Pregnant women were screened and monitor properly for development of hypertensive disorders using criteria that Hypertension is diagnosed empirically when appropriately taken blood pressure exceeds 140 mm Hg systolic or 90 mm Hg diastolic on two occasions taken 4-6 hours apart.

From each patient 2ml of venous blood will collected with disposable sterile syringe and needle after all aseptic precautions. The blood will collected from the antecubital vein and delivered into a siliconised tube containing dried EDTA.

Automated method using automated hematology analyzer will used for counting platelets. Calibration of instrument will done as recommended by International Committee for Standardization in Hematology and biochemistry.

Inclusion Criteria

- Pregnant women from 12 to 16 weeks gestation
- Pregnant women willing to take part in study

Exclusion Criteria

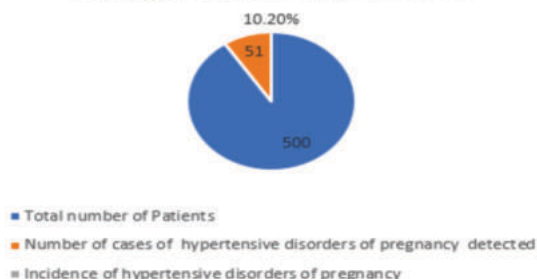
1. Pregnant women with chronic hypertension
2. Pregnant women with preexisting diabetes mellitus type 1 or 2, epilepsy, renal or liver disease
3. Pregnant women who develop gestational diabetes mellitus during the pregnancy
4. Pregnant women who develop acute febrile illness
5. Cases with chronic disorders and those on drugs and all other factors that could affect the platelet were excluded from study
6. Patient not willing to participate in the study

Target sample size – minimum 500 cases

Study participants or their family members gave consent to be part of this study. Approval of ethical committee was taken. A detailed history was taken, vitals of patients were noted, clinical examination and relevant laboratory investigation were performed on admission. Information was noted. Microsoft Office Excel software was used to analyse the data.

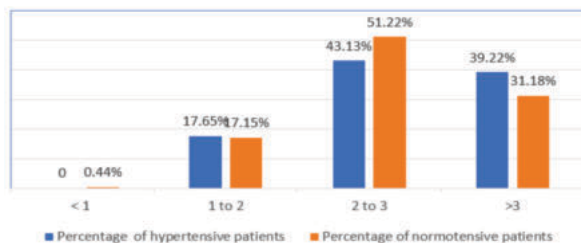
RESULTS

According to our study, the incidence of hypertensive disorders of pregnancy in patients during 18 months duration from January 2020 to June 2021 at a tertiary care centre is 10.2% which included Gestational hypertension, Preeclampsia and Eclampsia. (Figure 01)

Figure 01: Incidence of hypertensive disorders of pregnancy in study population**Table 01 -Platelets Count at 12-16 weeks of gestation**

Platelets (lacs/mm ³)	No of hypertensive patients	Percentage of hypertensive patients	No of normotensive patients	Percentage of normotensive patients	p value
< 1	0	0	2	0.44 %	The chi-square statistic is 1.5187. The p-value is .467965. The result is not significant at p < .05.
1-2	9	17.65%	77	17.15%	
2-3	22	43.13%	230	51.22%	
>3	20	39.22%	140	31.18%	
Median	1.59-4		0.90-5.54		
Mean	274		269		

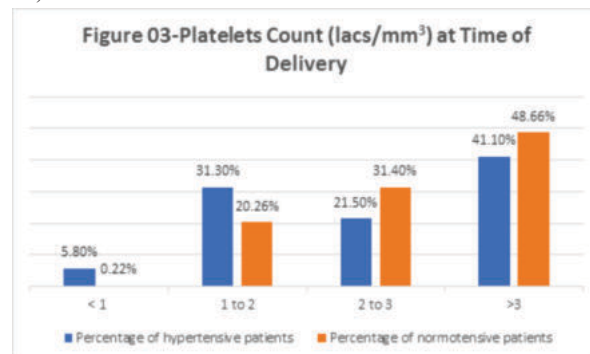
In hypertensive group, patients with platelet count at 12-16 weeks of gestation - between 1 to 2 lacs/mm³ was 17.65%, between 2 to 3 lacs/mm³ was 43.13% and more than 3 lacs/mm³ was 39.22% with mean platelet count of 274x10³/L. In normotensive group, patients with platelet count at 12-16 week of gestation less than 1 lac/mm³ was 0.44%, between 1 to 2 lacs/mm³ was 17.15%, between 2 to 3 lacs/mm³ was 51.22% and more than 3 lacs/mm³ was 31.18% with mean platelet count of 269x10³/L. There is no association of low platelet count at 12-16 weeks of gestation and hypertensive disorders in our study (p value- 0.467965). (Table 01 and Figure 02)

Figure 02 -Platelets Count (lacs/mm³) at 12-16 weeks of gestation**Table 02-Platelets Count at Time of Delivery**

Platelets (lacs/mm ³)	No of hypertensive patients	Percentage of hypertensive patients	No of normotensive patients	Percentage of normotensive patients	p value
< 1	3	5.8%	1	0.22%	The chi-square statistic is 23.0353. The p-value is .00004. The result is significant at p < .05.
1-2	16	31.3%	91	20.26%	
2-3	11	21.5%	141	31.40%	
>3	21	41.1%	218	48.66%	
Median	0.89-4.41		0.90-6.85		
Mean	240		268		

In hypertensive group, patients with platelet count at time of delivery, less than 1 lac/mm³ was 5.8%, between 1 to 2 lacs/mm³ was 31.3%, between 2 to 3 lacs/mm³ was 21.5% and more than 3 lacs/mm³ was 41.1% with mean platelet count of 240x10³/L. In normotensive group, patients with platelet count at time of delivery, less than 1 lac/mm³ was

0.22%, between 1 to 2 lacs/mm³ was 20.26%, between 2 to 3 lacs/mm³ was 31.40% and more than 3 lacs/mm³ was 48.66% with mean platelet count of 268x10³/L. There is association of low platelet count at time of delivery and hypertension in our study (p value= 0.00004). The incidence of thrombocytopenia in hypertensive group was 5.8% and normotensive patients was 0.22% (Table 02 and Figure 03)

**Table 03 – mean difference in platelet count at 12-16 weeks of gestation and time of delivery**

Study group	Mean difference in platelets (pre and post)	Significance
Hypertensive group	27.09	The t-value is 1.92989. The p-value is .027095. The result is significant at p < .05.
Normotensive group	3.35	

The mean difference in platelets count at 12-16 weeks of gestation and time of delivery was 27.07 in hypertensive group and 3.35 in normotensive group. The change in platelet count is significantly more in cases of subjects who developed hypertensive disorders of pregnancy as compared to those who did not develop hypertensive disorders of pregnancy. (p value= 0.027095). (table-03)

DISCUSSION

Out of 500 patients, 51 were detected to have hypertensive disorders of pregnancy. Incidence of hypertensive disorders of pregnancy was found to be 10.2% which included Gestational hypertension, Preeclampsia and Eclampsia. About 10% of pregnancies globally are complicated by hypertensive diseases.⁹ In a study by Sengodan SS and Sreepathi N, the prevalence of hypertensive disorders in pregnancy is 10.4%.¹⁰

In hypertensive group, patients with platelet count at 12-16 weeks of gestation - between 1 to 2 lacs/mm³ were 17.65%, between 2 to 3 lacs/mm³ were 43.13% and more than 3 lacs/mm³ were 39.22% with mean platelet count of 274x10³/L. In normotensive group, patients with platelet count at 12-16 week of gestation less than 1 lac/mm³ were 0.44%, between 1 to 2 lacs/mm³ were 17.15%, between 2 to 3 lacs/mm³ were 51.22% and more than 3 lacs/mm³ were 31.18% with mean platelet count of 269x10³/L. There is no association of low platelet count at 12-16 weeks of gestation and development of hypertensive disorders of pregnancy in our study (p value- 0.467965). In our study there is no significant difference between platelet count at 12-16 week of gestation in hypertensive group and normotensive group. In our study all patients in hypertensive group had platelet count similar to those in normotensive group. Hence low platelets at 12-16 weeks of gestation cannot be used as predictor of hypertensive disorders of pregnancy as there are no statistically significant results in our study and no such similar studies has been done before to know the whether low platelet count at 12-16 week of gestation can be used as predictor of hypertensive disorders of pregnancy.

In hypertensive group, patients with platelet count at time of delivery, less than 1 lac/mm³ were 5.8%, between 1 to 2 lacs/mm³ were 31.3%, between 2 to 3 lacs/mm³ were 21.5% and more than 3 lacs/mm³ were 41.1% with mean platelet count of 240x10³/L. In normotensive group, patients with platelet count at time of delivery, less than 1 lac/mm³ were 0.22%, between 1 to 2 lacs/mm³ were 20.26%, between 2 to 3 lacs/mm³ were 31.40% and more than 3 lacs/mm³ were 48.66% with mean platelet count of 268x10³/L. There is association of low platelet count at time of delivery and in hypertensive disorders of pregnancy

in our study (p value= 0.00004). In our study, patients in hypertensive group had lower platelet count at time of delivery as compared to those in normotensive group. In a study by Doğan et al, he observed significantly lower Platelet count in preeclamptic women compared with the controls.¹¹ Lower Platelet count was observed in preeclampsia as compared to normal pregnant (P = 0.031).¹¹ In a study by Freitas et al, it reported lower Platelet count in women with preeclampsia.¹² The platelet count (PC), mean platelet volume (MPV) and PC/MPV ratios differed significantly between preeclamptic and normotensive females in this study.¹² Redman et al reported decreased platelet count in women who developed pre-eclampsia and stated that increased platelet consumption is an early feature of this disorder.¹³ Galton et al claimed that the severity of thrombocytopenia correlates with severity of hypertension.¹⁴ Romero et al reported that women with pre eclampsia and thrombocytopenia have higher incidence of maternal and neonatal complications.¹⁵ Hence it is concluded that hypertensive disorders in pregnancy affect platelets, resulting in platelet counts in lower range as compared to normotensive patients. The incidence of thrombocytopenia in hypertensive group was 5.8% and normotensive patients was 0.22%. The thrombocytopenia cases were associated with complications of hypertensive disorders like HELLP syndrome, placenta abruption and intrauterine fetal distress. Hence lower platelet count at time of delivery is associated with hypertensive disorders of pregnancy and thrombocytopenia is found in complicated cases of hypertensive disorders of pregnancy, affecting maternal and fetal outcomes. Hence low platelet count can be used as predictor of hypertensive disorders of pregnancy. Platelet count act as prognostic factor in cases of preeclampsia. This indicated that there is an inverse relationship between the severity of hypertensive disorders of pregnancy and platelet numbers. So this method of platelet estimation is useful as a rapid method of assessment in hypertensive disorders of pregnancy. This method is not only rapid and cheap but can be done even in rural hospital settings. The mean difference in platelets at 12-16 weeks of gestation and time of delivery was 27.07 in PIH and 3.35 in normotensive group. The change in platelets is significantly more in cases of subjects who developed hypertensive disorders of pregnancy as compared to those who did not develop hypertensive disorders of pregnancy (p value= 0.027095). Hence the pathogenesis of hypertensive disorders of pregnancy affects platelets in the subject resulting in significant changes in platelets.

CONCLUSION

Hypertensive disorders of pregnancy are one of the medical conditions affecting pregnancy. Low platelet count at 12-16 weeks is not predictor of Hypertensive disorders of pregnancy. Lower platelet count at time of delivery is associated with Hypertensive disorders of pregnancy and thrombocytopenia is found in complicated cases of Hypertensive disorders of pregnancy, affecting maternal and fetal outcomes. Hence Low platelet count at term helps in prediction of Hypertensive disorders of pregnancy and can be used as prognostic markers for Hypertensive disorders of pregnancy. Early diagnosis and appropriate timely management of hypertensive disorders in pregnant women can prevent the maternal and fetal complications and improve the outcome of pregnancy.

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