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A STUDY ON PLATELET INDICES AND PLATELET COUNTS AND THEIR IMPORTANCE IN PREECLAMPSIA AND ECLAMPSIA.

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ABSTRACT

Background: Although it is generally accepted that the hemoglobin concentration decreases and white cell count increases during normal pregnancy, there is less accord regarding changes in platelet indices. The aim of this study is to find out the relationship between platelet indices and platelet counts with pre-eclampsia and eclampsia. Material and Methods: 82 cases of preeclampsia and 63 cases of eclampsia diagnosed for a period of 2 years were evaluated prospectively. One hundred healthy pregnant women with similar demographic features and gestational age and without the diagnosis of preeclampsia, gestational or chronic hypertension and proteinuria were included in the study as the control group. Blood samples were analyzed by automated hematology analyzer. The platelet count, mean platelet volume, platelet distribution width and platelet large cell ratio were compared. Results: The platelet counts were lower while the mean platelet volume, platelet distribution width and platelet large cell ratio were increased in pre-eclampsia and eclampsia as compared to control group. Conclusion: We found a relationship between platelet indices and severity of pre-eclampsia. The estimation of platelet indices can be considered as an early, simple and rapid procedure in the assessment of severity of pre-eclampsia

INTRODUCTION

Preeclampsia is a syndrome characterized by hypertension and proteinuria developing after 20 weeks of gestation. It affects approximately 6–8% of all pregnancies, most often the primigravidas [1]. It is one of the most important causes of maternal and fetal Morbidity and Mortality. Many theories are proposed for the pathophysiology of preeclampsia. The formation of a uteroplacental vasculature insufficient to supply adequate blood to the developing fetus results in fetoplacental hypoxia, leading to imbalances in the release and metabolism of prostaglandins, endothelin, and nitric oxide by placental and extraplacental tissues. These as well as enhanced lipid peroxidation and other undefined factors contribute to the hypertension, platelet activation and systemic endothelial dysfunction characteristics of preeclampsia [2]. Activation of coagulation system in small vessels and increased platelet aggregation is present in preeclampsia. It is clear that preeclampsia is one of the causes of maternal thrombocytopenia and the platelet count increases rapidly after the delivery. There are studies suggesting the

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storage of platelet in the areas with endothelial damage, as the cause of thrombocytopenia [3]. The aim of this study is to evaluate the relationship between the severity of preeclampsia and platelet indices.

MATERIALS AND METHODS

The cases with systolic blood pressure between 140 and 160 mmHg, diastolic blood pressure between 90 and 110 mmHg on two measurements taken 6 hours apart, or the cases with 30 mmHg increase in systolic blood pressure, 15 mmHg increase in diastolic blood pressure compared with the pre-pregnancy values, in association with proteinuria more than 300 mg in 24 hours urine were included in the preeclampsia group. The cases with the following criteria are included in the eclampsia group: Blood pressure greater than 160/110 mmHg, Oliguria (<400 ml in 24 hours urine), Headache, blurred vision, right epigastric- right upper quadrant pain, Pulmonary edema and cyanosis, >5 gm proteinuria in 24 hours urine or > +++ proteinuria in spot urine sample, Thrombocytopenia (<100.000/mm3), Abnormal liver function tests.

Blood samples were analyzed by automated hematology analyzer (Sysmex KX-21, Sysmex Corporation, Kobe, Japan) for
platelet indices (Platelet distribution width (PDW), Mean platelet volume (MPV) and Platelet-large cell ratio (P-lcr)) including platelet count. The statistical analysis performed on the entire sample used was mean, standard deviation, one-way ANOVA and Fischer F value. The p value < 0.05 was accepted as significant. The Line diagram was used for graphical representation. The study has been approved by Institutional ethical committee.

RESULTS

The mean age range of the pregnant women in the present study was 24.57 + 3.46 years. The platelet count in pre-eclampsia group and eclampsia group had significantly decreased when compared with the control group (Table.1).

The MPV, PDW and P-lcr values were elevated proportionally with the severity of pre-eclampsia when compared with the control group. (Table.1).

Table 1: Comparison of Platelet Indices between control group and Eclampsia

Parameters	Control group	Pre-eclampsia	Eclampsia	Fischer F-value	P value
Platelet count (lacs/mm ^{3})	2,18,440 ± 28,230	1,55,500 ± 31,290	1,31,000 ± 33,279	170.58	<0.0001
Mean Platelet Volume (fl)	8.63 ±1.32	10.38 ± 1.65	11.03 ± 2.23	42.67	<0.0001
Platelet Distribution Width (fl)	11.07 ± 2.41	15.51 ± 2.67	16.78 ± 3.12	42.01	<0.0001
Platelet large cell ratio (%)	16.56 ± 4.12	27.91 ± 5.23	30.75 ± 6.41	159.71	<0.0001

DISCUSSION

Hypertension is one of the most common obstetric problems seen in pregnant women [4]. The obstetrician relies increasingly upon laboratory tests for the management of pregnant women. It has become an accepted practice to undertake various laboratory tests on groups of patients

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and express the values in terms of a mean and standard deviation or express limits as multiples of median with the implication that individuals will follow these mean changes. While this is broadly true for some trends such as
decrease in hemoglobin or the increase in total white cell count the variation between individual is such that even for these particular indices the mean values are poor predictors of how individuals will respond [5].
The estimation of platelet indices is a reliable method [3]. In this study an attempt has been made to assess the role of platelet indices in normotensive pregnant women, pre-eclampsia and eclampsia.
Severity of PIH and thrombocytopenia observed are closely co-related which indicates that thrombocytopenia is directly proportional to the severity of PIH. The platelet values in our series were: Normotensive pregnant women – 2,18,440 lacs/mm3, pre-eclampsia – 1 , 55 , 500 l acs/ mm 3 and eclampsia -131000lacs/mm3. When value of platelet number estimation was compared between the normotensive pregnant women with pre-eclampsia and eclampsia, a significant decrease in platelet number was observed as the mean blood pressure increased. The value in our series was compared with other series by other methods. The values correlated well with the values of other series (Table.2).

Table 2: Comparison of Platelet counts (in lacs/mm^3) reported by various authors and present study in relation to severity of PIH.

Vrunda *et al.*		**Dube *et al.[6]***	**Mohapathra *et al.[7]***	**Present study[3]**
Normotensive	2,20,000	2,30,000	2,30,000	2,18,440
Pre-eclampsia	1,40,000	1,90,000	1,80,000	1,55,500
Eclampsia	1,30,000	1,80,000	1,20,000	1,31,000

There is a gradual increase in MPV from normotensive pregnant women to pre-eclampsia and eclampsia in the present study which correlated with other studies (Table.3). This increase in MPV in pre-eclampsia and eclampsia probably indicate hyperdestruction of platelets due to shorter platelet half-life.

Table 3: Comparison of Mean Platelet Volume reported by various authors and present study in relation to severity of PIH.

Investigation	**Giles *et al.* [8]**	**Ahmed *et al.* [9]**	**Present study**
Normotensive	8.7	9.6	8.6
Pre-eclampsia	9.9	10.7	10.3
Eclampsia	NA	12	11

There was an increase in PDW from normotensive pregnant women to pre-eclampsia and eclampsia in the present study which correlated with the study conducted by Tygart *et al.* [10]. This probability reflects increased platelet turnover which would support the idea that platelet survival time is decreased resulting in increased destruction of platelets.

Table 4: Comparison of Platelet Distribution Width reported by various authors and present study in relation to severity of PIH.

Investigation	**Giles et al [8]**	**Present study**
Normotensive	12	11.07

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Pre-eclampsia	16	15.51
Eclampsia	19	16.78

The most striking change in the present study was an increase in P-lcr from normotensive pregnant women to pre-eclampsia and eclampsia in the present study. The unexpected rise of P-lcr in patients with pre-eclampsia and eclampsia suggests increased bone marrow activity. The stimulus is unknown, but as P-lcr changes are highly significant they may be useful indicator of impending parturation.

Thus increase in MPV, PDW and P-lcr may form basis for prediction of pre-eclampsia and eclampsia in pregnancy.

Table 5: Platelet large cell ratio observed in the present study in relation to severity of PIH.

Present study	
Normotensive	16.56
Pre-eclampsia	27.91
Eclampsia	30.75

CONCLUSION

Finally to conclude, the estimation of platelet indices method can be considered as an early, economical and rapid procedure of assessment of severity of PIH cases. Clinically, platelet indices can be a useful screening test for early identification of pre-eclampsia and eclampsia. Also platelet indices can assess the prognosis of this disease in pregnant women. P-lcr can be routinely used in assessing platelet status in pre-eclampsia and eclampsia. Thus platelet indices can have a significant impact on maternal and perinatal outcome.

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