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A cross sectional study to evaluate the relationship between platelet indices with pre-eclampsia in pregnancy

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Abstract

Background: Thrombocytopenia is considered a sign of **m**aternal organ damage of pre-eclampsia. The aim of this study is to find out the relationship between platelet indices with pre-eclampsia in pregnancy.

Methods: Hospital based comparative study conducted at department of Obstetrics and Gynaecology, Vardhman Mahaveer medical College & Safdarjung hospital, New Delhi.

Results: That mean Platelet (10^3/ul) count in group A (mild preeclampsia) 2.08±0.16, that was significantly as compared to group B (severe preeclampsia) 2.44±0.48 with p value<0.001.

Conclusion: The mean platelet count was significantly decrease in severe preeclampsia group than mild preeclampsia group and associated with adverse outcome of pre-eclampsia in women with thrombocytopenia.

Keywords: Platelet count, Preeclampsia, Severe pre-eclampsia

Introduction

Failure of trophoblast invasion and remodeling of spiral arteries followed by imbalance of angiogenic and anti-angiogenic factors cause systemic endo the lial damage, which results in preeclampsia [1, 2].

Preeclampsia is a syndrome characterized by hyper tension and proteinuria developing after 20 weeks of gestation. It affects approximately 6–8% of all pregnancies, most often the primigravidas [3]. It is one of the most important causes of maternal and fetal morbidity and mortality.

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. [4] The contact of platelet (PLT) with the Injured endothelium activates the coagulation system which leads to an increase in PLT consumption and production [5]. Activation of the coagulation system with increased PLTs aggregation leads to multisystem dysfunction in PE [6, 7]. The elevated consumption of PLTs due to the abnormal coagulation system and PLT activation leads to thrombocytopenia which can be used important sign of PE [5, 8].

Material and Methods

Type of Study: Hospital based comparative study.

Study Design: Cross sectional study.

Place of Study

Department of Obstetrics and Gynaecology, Vardhman Mahaveer medical College & Safdarjung hospital, New Delhi

Study Participants

Pregnant women over 20 weeks of gestation with mild preeclampsia, and severe preeclampsia.

Sample Size

Sample size was calculated at 95% confidence level assuming standard deviation of 3.1 in neutrophil lymphocyte ratio as per results of seed article.

At the precision of 1, minimum 38 preeclampsia patients were required as sample size, which was further enhanced to 40 preeclampsia patients in each group as final sample size, expecting 10% attrition.

Sampling Procedure

40 pregnant (>20 weeks) women having mild pre-eclampsia and 40 pregnant (>20 weeks) women having severe pre-eclampsia were included on first cum first basis after beginning the study assuming 10% drop outs.

Inclusion Criteria

A singleton pregnancy over 20 weeks of gestation with mild preeclampsia and with severe preeclampsia.

PE cases are divided into two categories based on the severity of the condition: mild PE and severe PE. Preeclamptic patients can be considered with mild PE when the BP ranged from 140/90-160/110 mmHg, and proteinuria ≥ 1 on a urine dipstick while severe PE when BP is ≥ 160/110 mmHg with proteinuria >3+ on a urine dipstick and edema and other major symptoms [

Exclusion Criteria

1. Patients with history of chronic renal disease.
2. Chronic Hypertension.
3. History of pre-existing diabetes or gestational diabetes.
4. Chronic medical disorders.
5. History of smoking.

Methodology

- All eligible pregnant women fulfilling inclusion criteria were explained about nature and purpose of the study.
- After taking their informed written consent, detail history, general and systemic examination was done. Blood samples was collected in tubes containing EDTA vial. All information and reports was recorded on a pre designed Proforma and was entered in Microsoft excel sheet to prepare master chart.

Statistical Analysis

- Appropriate parametric test was used for linear variables and non-parametric tests was used for categorical variables as per natural and yield of data.
- P value <0.05 was considered as significant data was analysed using medical 16.4 version statistical software.

Results

Table 1: Comparison of mean Platelet (10^3/ul) count between mild and severe cases

		Group Mild	Group B Severe	p value

		preeclampsia	preeclampsia	
	Sample Size	n = 40	n = 40	
Platelet (10^3/ul)	Mean ± SD	2.44±0.48	2.08±0.16	p<0.001
	Median	2	2	

Above table shows that mean Platelet (10^3/ul) count in group B (severe preeclampsia) 2.08 ± 0.16, that was significantly as compared to group.

A (severe preeclampsia) 2.44±0.48 with p value <0.001.

Table 2: Comparison of mean PDW and RDW between 2 Groups

		Group A Mild preeclampsia	Group B Severe preeclampsia	p value
	Sample size	n = 40	n = 40	
PDW (Fl)	Mean ± SD	12.10±1.60	13.12±3.08	0.0007
	Median	12	14	
RDW SD	Mean ± SD	41.25±8.36	48.07±6.05	0.0006
	Median	38	47	
RDW CV	Mean ± SD	17.22±3.51	18.04±4.05	0.381
	Median	17	18	

Table No 2 shows mean PDW, RDW-SD level in group B severe preeclampsia 13.12 ± 3.08, 48.07 ± 6.05 respectively was highly significant as compared to group A mild preeclampsia 12.10 ± 1.60, 41.25 ± 8.36 respectively with (p<0.05).

The mean RDW-CV value of severe PE group was also higher i.e., 18.04±4.05 than mild PE group 17.22±3.51, but is not significant (p value 0.381)

Discussion

Mean platelet count(10^3/L) in severe preeclampsia group was 2.10 ±0.14, which was significantly decreased (p <0.001) than mild preeclampsia group i.e., 2.46±0.51 and mean hemoglobin (gm/dl) level in severe preeclampsia group was group 9.78 ±0.38 which was significantly decreased (p <0.001) than mild preeclampsia group i.e., 10.56±0.68. similar results were reported by Kholief [9] (2019).

Al Sheeha MA et al demonstrated significantly lower Platelet count and platelet count to MPV ratio in patients With preeclampsia compared with the normal controls but Failed to show similar trend when MPV and PDW were evaluated in the same study group[10] 2016.

In our study the mean RDW-SD values of severe PE group were higher 48.27±6.85 than mild PE group values 42.25±8.36. The mean RDW-CV value of severe PE group was also higher i.e., 19.04±5.05 than mild PE group 18.22±3.51.

but is not significant (p value 0.394). We observed an increase in RDW values in severe PE group so these values indicate the severity of PE. Similar results found in study of Raziye Keskin Kurt et al [11] (2013). PDW (FL) level in mild PE was 12.17±1.70 and in severe group was 14.12±3.11.

The difference was statistically significant (as p value 0.0007). Wael Ahmed Ezzat kamel Ammar et al [12] (2014) had similar results in his study.

This study has several limitations. First, this is a cross sectional study and thrombocytopenia is a sign of Maternal organ damage.

Thus, the incidence of preterm delivery can be biased. However, the association Between adverse outcomes of

preeclampsia and overall reduction of PC was also detected in women Without thrombocytopenia.

Second, PC in the first trimester may be affected by hemoconcentration Because of hyperemesis gravidarum, and the severity of hyperemesis gravidarum could not be assessed From the medical records in this study. However, PC in the first trimester was not different based on the Overall reduction of PC. Thus, hyperemesis gravidarum would not affect the results of this study. Finally, sFlt-1 and PlGF were not widely available in Japan during the study period. Therefore, the relationship between the overall reduction of PC and these biomarkers could not be analysed.

Conclusion

Platelet indices, including platelet count, mean platelet volume, platelet distribution width, and Platelet count, have been identified as promising candidate markers for predicting preeclampsia in pregnant women. In the future, a serial examination of these indicators during several trimesters of pregnancy should be conducted.

The mean platelet count was significantly decrease in severe preeclampsia group than mild preeclampsia group.

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