Correlation of Preeclampsia with Platelet Indices

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Abstract

Introduction: Pre-eclampsia is a pregnancy disorder that reasons important mother and foetal illness and transience. If the foetus and placenta are not distributed, the complaint establishes him in the mother as new-onset hypertension and proteinuria, which can develop to multi-organ disappointment, containing hepatic, renal, and brain disease. Pre-eclampsia is characterised by maternal endothelial dysfunction caused by circulating fetal-derived substances from the placenta. Platelet count (PC), platelet distribution width (PDW), mean platelet volume (MPV), and platelet crit are all indicators of platelet movement (PCT). Because these indicators are derived from routine blood tests, they are both cost-effective and readily available. Platelet guides could be employed as early diagnostic markers for thromboembolic disorders. These measurements can be used to predict Pregnancy Induced Hypertension (PIH) before a change in prothrombin time (PT), activated partial thrombin time (ApTT), or thrombin time (TT) occurs.

Material: Total 30 subjects were involved in the study and are distributed in 2 groups. Group 1 include 30 Preeclampsia patients while group 2 include 30 normotensive control subjects.

Result: Platelet count is nonsignificantly low in preeclampsia patient, while MPV and Plateletcrit were significantly increased $(p > 0.05)$ and decreased $(p > 0.05)$ individually in preeclampsia patient as compared to normotensive controls.

Conclusion: Higher BP was found to be associated with increased MPV and PDW. In our study, however, there was no significant link between platelet count and PCT and preeclampsia. Thus, platelet indices, primarily MPV and PDW, which are readily available and inexpensive, can be utilised in the prediction and early diagnosis of preeclampsia, as well as as markers for the severity of preeclampsia; however, more research with larger patient populations is needed.

Keywords: Preeclampsia, Platelet Indices, Mean Platelet volume, Pregnancy and Prothrombin time

Introduction

Pre-eclampsia is a pregnancy disorder that reasons important mother and foetal illness and death. If the foetus and placenta are not brought, the disorder displays him in the mother as new-onset hypertension and proteinuria, which can progress to multi-

organ disappointment, counting hepatic, renal, and brain disease. Pre-eclampsia is categorized by maternal endothelial dysfunction caused by circulating fetal-derived substances from the placenta. Comorbidities in the mother, including as chronic renal disease, hypertension, and obesity; a family history of pre-eclampsia, nulliparity, or multiple pregnancies; and past pre-eclampsia or intrauterine foetal development limit are also risk factors for the disease [1].

Preeclampsia is one of the important reasons of maternal sickness and death, affecting 3–8% of all pregnancies. It's a multisystem condition with an unknown cause. PE is defined by the International Society for the Study of Hypertension in Pregnancy (ISSHP) as de novo hypertension with proteinuria that occurs after 20 weeks of pregnancy [2].

Alterations in coagulation and fibrinolysis have also been hypothesised to have a role in the pathophysiology of preeclampsia. Platelet count (PC), platelet distribution width (PDW), mean platelet volume (MPV), and plateletcrit are all indicators of platelet activity (PCT) [3].

Because these indicators are derived from routine blood tests, they are both cost-effective and readily available. Platelet indices could be employed as early diagnostic markers for thromboembolic disorders. These measurements can be used to predict Pregnancy Induced Hypertension (PIH) before a change in prothrombin time (PT), activated partial thrombin time (ApTT), or thrombin time (TT) occurs [4].

Underperfusion of the placenta causes broad systemic endothelial dysfunction and increased vascular permeability in the mother. The coagulation system is activated when platelets come into contact with a damaged endothelium, causing an increase in platelet consumption and production in the bone marrow [5]. Platelet functions are measured using a variety of indicators, including the platelet count (PC), mean platelet volume (MPV), PC to MPV ratio, and platelet distribution width (PDW); PDW assesses platelet size distribution. The efficacy of various platelet indicators as predictors of preeclampsia has been investigated in the past, but results have been mixed. The goal of this study was to look at platelet indices in women who had preeclampsia [6].

Objective

To compare platelet directories in women with preeclampsia to healthy controls, including platelet count (PC), mean platelet volume (MPV), platelet distribution width (PDW), and PC to MPV ratio.

Material and Methods

A surveying situation–regulator study was directed in the Department of Pathology. Cases (30 women) were women with preeclampsia, which was distinct as "occurrence of hypertension (systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg) in the second half of pregnancy (after 20 weeks of gestation) and proteinuria (presence of 300 mg or more of protein in 24 h urine sample or $\geq 2+$ on dipstick)" [7].

Pre-eclampsia cases were measured mild or severe according to the diastolic blood pressure of <110 or ≥ 110 mmHg, respectively [8]. Controls were healthy pregnant women who went to prenatal care. Thyroid illness, hypertension, renal disease, diabetes mellitus, and liver disease were all ruled out of the research.

The sample (2 ml) was collected in (EDTA) vials under aseptic conditions. The platelet indices, which comprise platelet count (PC), mean platelet volume (MPV), platelet distribution width (PDW), and plateletcrit (PCT), were examined using the Automated Counter Sysmex XN1000. Between patients

and controls, a comparison of the above-mentioned platelet indices was done.

Statistics

The data was analysed using SPSS for Windows (version 20.0). When the data were regularly and abnormally distributed, respectively, the Student's t-test and Mann–Whitney U-test were used to measure for regularity and relate alterations among the cases and controls. Pre-eclampsia was the dependent variable, and medical, obstetrics, and platelet indices were the autonomous variables in a binary regression. The diagnostic cut-offs of various parameters (based on test sensitivity and specificity) were determined using diagnostic screening tests and the receiver operating characteristic (ROC) curve. It was determined that P0.05 was statistically significant.

Results

Table 1: Age wise distribution of Preeclampsia patient

	No. of patient	Percentage %
20-24	9	30
25-29	13	43
30-34	8	27

Table 1 shows the age group distribution of preeclampsia patients. 13 patients out of 30 were from 25-29 age group while 30% of patients belongs to 20-24 age groups. There were 8 patients who belonged to 30-34 age group.

Table 2: Platelet indices in Preeclampsia and normotensive controls

Parameters	Case (Preeclampsia)	Normotensive Controls	P-Value
Platelet Count (1.5-$4*10^9$/L)	2.21 ± 0.73	2.44 ± 0.74	0.230 ($P<0.05$)
Mean Platelet volume (7.4-10.4 fl)	11.6 ± 1.3	9.98 ± 1.93	0.0003 ($p > 0.05$)
Platelet distribution width (10-17.9 fl)	15.4 ± 3.62	13.6 ± 4.28	0.0839 ($P<0.05$)
Plateletcrit (0.15-0.30 %)	0.22 ± 0.08	0.27 ± 0.10	0.0367 ($p > 0.05$)

Platelet count is non-significantly low in preeclampsia patient, while MPV and PCT were significantly increased ($p > 0.05$) and decreased ($p > 0.05$) respectively in preeclampsia patient as compared to normotensive controls.

Discussion

In underdeveloped nations, pregnancy-induced hypertension is a leading cause of maternal and foetal morbidity and mortality [9]. The goal of this study was to see if there was a link between platelet indices and blood pressure in preeclampsia. While thrombocytopenia and low PCT values were not significantly different between preeclampsia patients and normotensive pregnant women, other metrics, such as MPV and PDW, were significantly different.

When MPV and PDW were assessed in the same study groups, the current study found significantly lower PC and PC to MPV ratio in preeclampsia patients compared to normal controls. However, when MPV and PDW were tested in the same study groups, no such pattern was seen. Doan *et al* [10]. recently discovered that preeclamptic women have

considerably lower PC and PC/MPV than controls. In the same study, preeclamptic women had considerably higher MPV than the control group. Similarly, Freitas *et al*. [11] found that women with preeclampsia had reduced PC.

Although there was no difference in MPV between the patients and controls in the current investigation, MPV has been demonstrated to be useful in predicting preeclampsia in other studies [12,13]. Yavuzcan *et al* [14] found no statistically important difference in MPV between women with simple preeclampsia, healthy pregnant women, and healthy non-pregnant women.

Some researchers [15,16] were impotent to confirm PC and MPV as preeclampsia predictors, most likely due to differences in the measures and/or equipment utilised to collect hemograms. Thalor N *et al*. showed a significant difference ($p > 0.05$) between the two groups, with a significant positive correlation with increasing blood pressure (MPV – $r = +0.6126, p < 0.05$ and PDW – $r = +0.6441, p < 0.05$). Preeclampsia patients showed lower PC and PCT values, though the change among the two collections was not statistically important [4].

Conclusion

Preeclampsia is a severe disorder which indications to maternal illness and death. The rise in the MPV and PDW was experiential in preeclampsia. The MPV and PDW presented a important association with improved BP. Though, the platelet count and PCT in our study did not show a important connection with preeclampsia.

Thus, the platelet guides, mostly MPV and PDW, which are simply accessible, as well as inexpensive, can also be used in the forecast and early diagnosis of preeclampsia and as markers for the harshness of preeclampsia, though additional studies with larger statistics of patients are mandatory.

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