Comparison of Platelet Indices in Women with Preeclampsia Versus Women Without Preeclampsia

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ABSTRACT

Objective: To determine difference in platelet indices among pregnant ladies with preeclampsia as compared to those pregnant ladies without preeclampsia using platelet indices as biomarkers for predicting the disease and its severity.

Study Design: Comparative cross sectional study.

Place and Duration of Study: Department of Pathology and The Department of Obstetrics and Gynecology, Rashid Latif Khan University Medical and Dental College Lahore, Pakistan from Jan-Jun 2023.

Methodology: Pregnant women falling on inclusion criteria were included in this study using nonprobability consecutive sampling technique. Complete blood count with platelet indices, and serum sugar were determined. Study sample was divided into two groups. Patients without preeclampsia were placed in Group-A (n=60), those with preeclampsia were put into Group-B (n=60). Platelet indices were compared between two groups including platelet count, mean platelet volume (MPV), Plateletcrit and platelet distribution width (PDW).

Results: Total 120 cases with preeclampsia were studied. Mean hemoglobin level was 13.24±2.10 g/dl in Group-A, 12.73±1.80 g/dl in Group-B. Mean platelet count was 277±88 x109/L in Group-A, 301±84 x109/L in Group-B. MPV was 12.07±1.03fL in Group-A and 11.21±1.31fL in Group-B.

Conclusion: Platelet indices are altered among the patients with preeclampsia as compared to normal individuals, hence indicating as important biomarker for assessing the disease.

Keywords: Complications, Hypertension, Preeclampsia, Platelet Indices,

INTRODUCTION

Platelets function is important in producing complications among the patients with preeclempsia.[1] Increased platelets activity causes complications of vascular system.[2] Platelet count and mean platelet volume are cost effective and easily performed tests which can predict vascular complications in such patients.[3] Preeclampsia is a common abnormality happening after 20 weeks of pregnancy with increasing prevalence with the passage of time associated with increased perinatal morbidity and mortality rate.[4] It causes complications in 3-8% pregnancies annually. According to the existing literature its prevalence is more in underdeveloped and developing countries.[5] Deranged platelet indices cause vascular complications. Platelets play important role in vascular pathologies. Though proper pathology of preeclampsia has not been found yet but according to some literature placenta blood supply is reduced due to insufficient trophoblastic invasion in maternal vascular bed.[6] Reduced perfusion of placenta causes endothelial dysfunction in maternal vascular system causing increased permeability of the blood vessels. Platelets come in contact to the injured endothelium, hence producing coagulation. Large size platelets with dense multiple granules are more metabolically active. MPV is altered in preeclampsia usually due to increased production rate and its stimulation. Heterogeneity of platelets is measured by PDW that is because of differentiation of megakaryocytes.[7] Mean platelet volume (MPV) has been seen abnormal in stroke, metabolic disorders and diabetes mellitus. Recent studies have revealed that increased MPV is associated with ocular complications.[8] Platelet parameters can be tested routinely in laboratories easily using automated blood cells counters. These parameters include platelet count, MPV, PCR, PDW.[9,10]

This study has been conducted to explore the significance of platelet parameters in predicting preeclampsia among pregnant ladies and assessing early thrombotic conditions among the patients. The findings of this study will help the clinicians to diagnose thrombotic conditions in early stages and to minimize morbidity and mortality associated with it.

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METHODOLOGY

This was Comparative cross sectional study conducted with the collaboration of the Department of Pathology and the Department of Obstetrics and Gynecology at Rahid Latif Khan University Medical and Dental college Lahore, Pakistan. Study was conducted from January 2023 to June 2023. Sample size was calculated using WHO online sample size calculator.[11] Nonprobability consecutive sampling technique was used for sample selection. Ethical consent was taken from the institutional review board (IRLKU.IRB-28/2-1/23). Consent was also taken from the patients for including their data in this study.

Inclusion Criteria: Pregnant ladies presenting in outpatient department with age ≥18 years, gestational age >20 weeks, systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥90mmHg and having proteinuria were included in this study. Pregnant ladies with normal blood pressure were also included.

Exclusion Criteria: Patients with renal disease, preexisting hypertension, diabetes mellitus, liver disease or thyroid disease, age <18 years, gestational age <20 weeks and hypertension before 20 weeks of gestation were excluded from this study.

Proteinuria was defined as protein content ≥300mg in 24 hours collected urine sample or ≥2+ on dipstick method. Preeclampsia patients having diastolic Blood pressure <100 mmHg were considered having mild disease while those with diastolic blood pressure ≥110mmHg were considered having severe disease. A proforma was designed on which all necessary data was documented related to the patients as well as their brief history and general physical examination. Venous blood sample was taken and sent to the hospital laboratory for determining hemoglobin level, complete blood count including platelet indices like platelet count, PDW, plateletcrit and MPV, Fasting and random blood sugar were also determined. Maternal weight, height and body mass index were calculated. After data collection the normal patients were placed in Group-A while patients with preeclampsia were placed in Group-B.

Data was analyzed by using Statistical Package for Social Sciences (SPSS) 22.00. Mean and standard deviation were calculated for the quantitative variables like age, BMI, random and fasting blood sugar. Percentages were determined for the qualitative variables like gender and presence of preeclampsia. Student-t test was applied on the data. p-value <0.05 was considered statistically significant and $p \geq 0.05$ was considered non-significant.

RESULTS

In this study 60 pregnant women with preeclampsia were placed in Group-A while 60 pregnant women without preeclampsia were placed in Group-B. In Group-A mean hemoglobin level was 13.24±2.1 g/dl, mean platelet count was 277±88 x109/L and mean platelet volume (MPV) was 12.07±1.03 fL. In Group-B mean hemoglobin level was 12.73±1.8 g/dl, mean platelet count was 301±84 x109/L and MPV was 11.21±1.31fL. Severe preeclampsia was found in 65% cases while mild disease was found in 35% cases in study group (Figure).

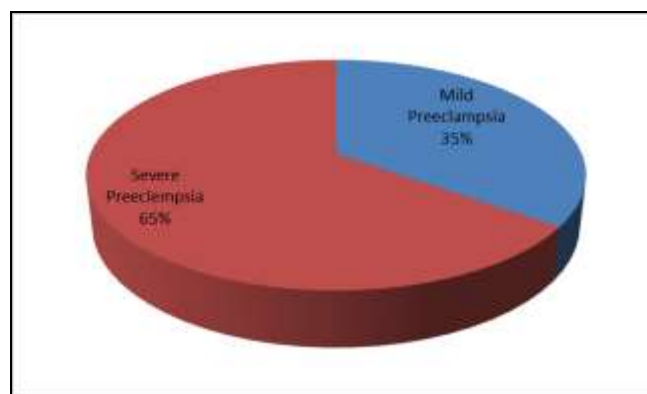**Figure: Severity Of Preeclampsia In Group-B**

DISCUSSION

In this study it was found that the platelet indices are altered among the patients with preeclampsia as compared to normal individuals indicating it to be an important biomarker for assessing the disease.

Preeclampsia is a common abnormality among pregnant women. It leads to many complications.[11] Platelets play main role in atherosclerosis. Preeclampsia causes deranged platelet indices like large size of platelets with abundant granules.[12] These altered platelets produce excessive thromboxane A2, serotonin and B thromboglobulin which cause platelets aggregation. In this study patients with preeclampsia were compared with normal patients.[13] It has been reported that platelets indices were more altered in patients with severe preeclampsia and having complications than those patients with mild disease.[14] Previously studies have been conducted to determine association of platelet indices with hypertension in pregnant women. The findings of this study are in harmony with the study conducted by

Table: Comparison of Parameters among the Study Groups (n=120)

Variables	Group-A: Patient with normal blood pressure (n=60)	Group-B: Patients with preeclampsia (n=60)	p-value
Hemoglobin (g/dL)	11.47±2.24	10.87±2.02	<0.01
Platelet count x103	278.40±26.36	300.88±27.30	0.68
Platelet Distribution Width (fL)	16.80 ± 2.57	19.60 ± 5.17	0.378
Plateletcrit (%)	0.40 ± 0.08	0.21 ±0.04	<0.01
Mean Platelet Volume (fL)	11.95±1.11	10.21±1.37	0.12
Mean Age (years)	32.28±9.77	34.30±6.20	0.01
Weight (kg)	55.69±3.67	55.86±3.13	<0.01
Fasting Blood Sugar (mg/dL)	90.18±8.7	118.15±18. 50	0.457
Random blood sugar (mg/dL)	130.74±12.14	145.70±18.33	0.352
Gestational Age (weeks)	32.59 ±2.73	33.06 ± 2.60	0.01
Parity	2.70 ± 1.50	2.30 ± 1.30	0.64
Body Mass Index(kg/m2)	28.40 ± 1.5	29.25 ± 1.60	0.01

Chaudhary et al who reported that MPV was increased among preeclampsia patients as compared to normal cases. Platelet indices were more deranged among patients with preeclampsia.[15] Our study is also comparable in results with study conducted by Nayyar *et al.*, who stated that PDW and MPV were deranged in patients with preeclampsia as compared to normal women. Platelet count (PC) and PC /MPV were deranged among women with preeclampsia.[16] According to a study conducted in Pakistan by Saeed et al reported that patients with preeclampsia suffering from complications like nephropathy were having elevated platelet indices. They stated that there was a positive relationship between severity of the disease and platelet indices, while HDL had negative relation with platelet indices.[17] Manzoor et al in their study found that PDW was not significantly changed among women with severe preeclampsia, mild preeclampsia and normal individuals.[18] However many other studies have shown significant difference in PDW among diseased and normal individuals. Another study conducted in Pakistan by Rashid *et al.*, reported that MPV, PDW and platelet large cell ratio (PLCR) were increased in preeclampsia as compared to those without complications (13.42 ± 2.21 fl vs

10.71±1.42), (17.12±2.13 vs 13.88±2.71), (29.02±8.14 vs 22.43±7.15).[19] According to a study conducted by Changmai et al 1240 preeclampsia cases were included in the study and out of them 70.4% patients had higher value of MPV.[20] Iskender et al in their study reported that no significant difference was found in mean platelet count, PDW and PCT. While MPV was higher in cases as compared to controls (9.55±1.62 vs 8.73±1.47).[21]

LIMITATIONS OF STUDY

This was a single center study. Blood pressure readings of study cases were observer dependent.

CONCLUSION

This study concluded that platelet indices are important in predicting risk of preeclampsia among pregnant ladies and their values are significantly different among the patients with preeclampsia as compared to normal pregnant ladies.

Conflict of Interest: None.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

UB & TA: Conception, study design, drafting the manuscript, approval of the final version to be published.

EUH & AP: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

RJ & SAW: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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