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ORIGINAL ARTICLE

Evaluation of Mean Platelet Volume (MPV) in Pre-Eclamptic and Normotensive Women in 3rd Trimester of Gestation

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ABSTRACT

Objective: To determine the mean platelet volume (MPV) in pre-eclamptic and normotensive women presenting in 3rd trimester of pregnancy.

Study Design: Descriptive Cross-sectional study.

Place and Duration: Department of Obstetrics & Gynecology, Multan Medical and Dental College/Ibn-e-Sina Hospital, Multan during from 29-May-2019 to 28-Nov-2019.

Methodology: 246 pregnant females were included in this study. Patients were assessed for pre-eclampsia those who were history of blood pressure >140 mmHg and 90 mmHg diastolic as seen on examination on three consecutive readings. Data of maternal hemogram taken at presentation was recording using an automated hematology analyzer. mean platelet volume (MPV) was recorded at completion of 36th week of gestation.

Results: Mean age of patients included in this study was 34.22±5.02 years. Mean body mass index (BMI) of patients was 24.58±4.65 kg/m^2. Mean parity was 2.63±0.78. Mean blood pressure of patients was 128.37±15.06 mmHg. The mean platelet volume in patients with normotensive pregnancy was 9.27±1.31 fL versus 12.49±1.51 fL in patients pre-eclampsia. This difference was statistically significant with p-value of <0.0001.

Conclusion: As a biomarker for preeclampsia severity, MPV is a valuable tool. In a clinical context, MPV is regularly acquired during a complete blood count, making it a potentially cost-effective prediction tool for evaluating pre-eclampsia

Keywords: Pregnancy, Pre-eclampsia, Mean Platelet Volume (MPV)

INTRODUCTION

When a pregnant woman has preeclampsia, she is at risk for serious health issues. As a result, it causes perinatal and maternal morbidity, as well as death in 3 to 8 percent of pregnancies. Presbyopia is defined by the International Society for Study of Hypertension in Pregnancy (ISSHP) as "two or more consecutive occurrences >4 hours apart with one 24-hour collection with total protein excretion >300 mg/24 hour" [1].

Pre-eclampsia affects the health of the mother and the fetus in a variety of ways. As a result, women may suffer from eclampsia and cerebral hemorrhage, while their fetuses can suffer from intrauterine growth retardation (IUGR) and an extended stay in the neonatal intensive care unit (NICU). Some variables, including as oxidative stress and a lack of trophoblastic invasion of the maternal vascular bed with consequent decrease of placental blood flow [4], have been implicated with preeclampsia. Maternal endothelial dysfunction and increased vascular permeability result from placental hypoperfusion. As soon as platelets come into touch with a damaged endothelium, the coagulation system is triggered and platelet consumption and production increase.

Various biophysical and biochemical tests have been developed to estimate their role as markers for presence and stratification of severity of pre eclampsia like angiotensin II sensitivity test, Doppler analysis of uterine artery waveform, hemoglobin concentration, uric acid levels, serum calcium levels, LDH levels, Proteinuria estimation etc [5, 7].

In a study “Is mean platelet volume a better biomarker in pre eclampsia ” by Vichez G, Lagos M,Kumar K, Argoti P, they compared 150 pre eclamptic cases with 297 control cases and found that MPV was significantly higher in pre eclamptic group 11.3 +/- 1.0 fL as compared normotensive group which was 10.1 +/- 0.8 fL [8].

As there is no local data available in evaluating the role of MPV as a marker of severity of pre eclampsia in our population. CBC is routinely done in pregnant females to assess the level of anemia. MPV is a part of the detailed report of CBC. We conducted present study with aimed to determine the MPV in pre-eclamptic and normotensive women.

MATERIALS AND METHODS

Total 246 pregnant females presenting in Deptt of Obstetrics & Gynaecology, Multan Medical and Dental College/Ibn-e-Sina Hospital, Multan at 3rd trimester aged 20-40 years were included in this study. Detailed demographics including, age, gestational age, and body mass index were recorded after taking written informed consent. Women delivered before 36 weeks of gestation, mild to severe eclampsia, thyroid disease evident by history and thyroid function test, women with preexisting hypertension or renal disease, women with diabetes mellitus evident by history and HbA1C more than 6.6%, and women with liver diseases were excluded.

Patients were enrolled at 36th week of gestation. Patients were assessed for pre-eclampsia those who were history of blood pressure >140 mmHg and 90 mmHg diastolic as seen on examination on three consecutive readings, proteinuria positive on dipstick test.

Data was collected using pre-designed questionnaire. Maternal weight and height was recorded and body mass index (BMI) was calculated as Kg/m2. Data of maternal hemogram taken at presentation was recording using an

automated hematology analyzer (Sysmex XN-9000, Sysmex Corporation, Hyogo, Japan). MPV was recorded at completion of 36th week of gestation.

SPSS for Windows (version 23.0) was used for the data analyses. Mean & standard deviation was calculated for quantitative variables like age, weight, height, BMI, BP and MPV.To compare mean platelet volume in normotensive and pre-eclamptic pregnant women, t test was applied.P-value ≤0.05 was taken as significant.

RESULTS

Mean age of patients included in this study was 34.22±5.02 years.Minimum age was 20 years and maximum age was 40 years.Mean height of patients was 160.84±9.98 cm.Minimum height was 135 cm and maximum height was 196 cm.Mean weight of patients was 63.90±15.23 Kg. Minimum weight was 39 Kg and maximum weight was 116 Kg.Mean body mass index (BMI) of patients was 24.58±4.65 kg/m2. Minimum BMI was16.41 kg/m2 and maximum BMI was 45.33 kg/m2.Mean parity of patients was 2.63±0.78. Minimum parity was 01 and maximum parity was 05.Mean blood pressure of patients was 128.37±15.06 mmHg. Minimum blood pressure was 110 and maximum blood pressure was 190 mmHg.Mean of mean platelet volume of patients was 9.96±1.89 fL. Minimum mean platelet volume was 07 FL and maximum mean platelet volume was 16 fL.(Table 1)

Table No 1: Baseline details of all the patients

Variables	Mean Value	Minimum	Maximum
Age (Years)	34.22±5.02	20	40
Height (Cm)	160.84±9.98	135	196
Weight (Kg)	63.90±15.23	39	116
BMI (kg/m)	24.58±4.65	16.41	45.33
Parity	2.63±0.78	01	05
BP (mmHg)	128.37±15.06	110	190
MPV (fL)	9.96±1.89	07	16

Proteinuria was diagnosed in 53 (21.54%) patients and it was not diagnosed in 193 (78.46%) patients. (Figure 1)

On comparison of mean platelet volume between the groups, the mean platelet volume in patients with normotensive pregnancy was 9.27±1.31 fL versus 12.49±1.51 fL inpatients pre-eclampsia. This difference was statistically significant with p-value of <0.0001 (Table 2).

Figure No 1: Frequency of Proteinuria among all the patients

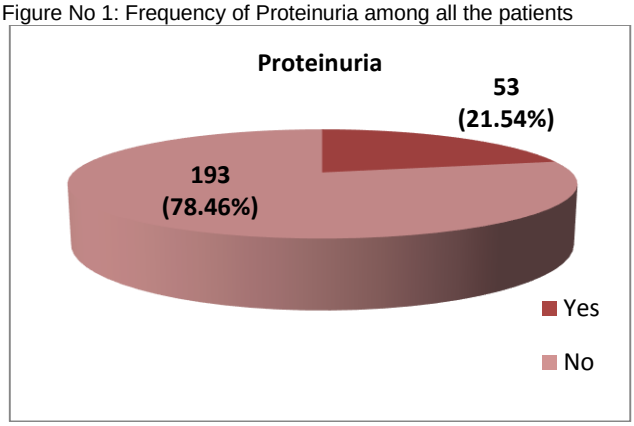

Table No 2: Comparison of MPV between pre-eclamptic and normotensive women

Groups	Mean Platelet Volume (MPV)		P-value
	Mean	S.D.	
Normotensive Pregnancy	9.27	1.31	
Pre-eclampsia	12.49	1.51	<0.0001

DISCUSSION

In poor nations, pregnancy-induced hypertension is a major cause of maternal and fetal morbidity and death [9]. A connection between platelet indices and blood pressure was studied in preeclampsia in the present research. Thrombocytopenia and low PCT values were not significant in preeclampsia patients compared to normotensive pregnant women, although MPV and PDW were.

According to the current research, MPV is a good biomarker of pre-eclampsia and is more strongly linked with this disease than other standard laboratory indicators. In contrast to other laboratory indicators, MPV rises linearly as gestation continues, unlike other markers that do not. When pre-eclampsia is severe, it rises linearly. It is lowest in women with normal blood pressure and greatest in those with eclampsia of this disease. Comparatively, MPV rises linearly as gestation continues, starting at a low point throughout pregnancy and reaching its peak after delivery. Pre-eclamptic women's blood pressure is the lowest, whereas eclamptic women's blood pressure is the highest [10].

When used as a biomarker in various medical diseases such as cardiovascular disease, stroke and thromboembolic events, MPV has been shown to be useful, and there is good evidence that the inverse connection between platelet count and size exists [11, 12]. As a result of this, an increase in platelet aggregation is offset by an increase in platelet production and MPV [13]. Uncontrolled intravascular platelet activation, fibrin deposition, and platelet consumption have been reported in pregnancies complicated by hypertensive diseases, resulting in increased MPV towards the end of pregnancy. During pregnancy, both pre-eclamptic and normotensive women's platelet size rises, although the increase is greater in pre-eclampsia [14, 15].

As a consequence of varying sample sizes, eligibility criteria, and methods, the predictive potential of MPV for poor neonatal outcomes and hypertensive diseases has been studied with contradictory findings. It has been observed that MPV is 78–90% sensitive and 83%–86% specific for pre-eclampsia prediction. Even weeks before the start of preeclampsia, elevated MPV raises the risk of preeclampsia nearly twofold [17, 18]. MPV has also been shown to be substantially different from normotensive women in postpartum pre-eclampsia. Increased MPV occurs in pre-eclampsia as a consequence of increased platelet generation from platelet consumption in peripheral circulation. Particularly in high-risk pregnant women, MPV may be a stronger predictor of severity than platelet count.

Pre-eclampsia patients had an MPV of 11.81.7 fL, whereas normotensive women had an MPV of 10.52.8 fL, according to Thalor et al. Conclusion: MPV is an important biomarker for predicting pre-eclampsia in pregnant women [21]. Another research by Reddy et al. came to the same

conclusion as the previous study. They found that pre-eclampsia patients had an MPV of 11.671.4 fL as opposed to 8.070.8 fL in normotensive pregnancy [22] Also, Vilchez et al. [23] found comparable results.

CONCLUSION

For stratification of preeclampsia severity, MPV is a good biomarker to utilize. In a clinical context, MPV is typically collected during a full blood count. Further research in this area may reveal additional platelet modification mechanisms and their connection to pre-eclampsia pathogenesis.

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