

PLATELET COUNT AND PLATELET INDICES IN PREGNANCY WITH PREECLAMPSA AND ECLAMPSIA – AN OBSERVATIONAL STUDY

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Introduction

- Detecting pregnant women at higher risk of preeclampsia is a crucial objective in modern obstetrics. Developing a test that is sensitive, specific, cost-effective, and easy to administer would not only enable the identification of women prone to preeclampsia but also facilitate close monitoring, accurate diagnosis, and timely intervention.

Key Platelet Indices:

- Platelet Count: Reflects the number of platelets in the blood.
- Mean Platelet Volume (MPV): Represents average platelet size.
- Platelet Distribution Width (PDW): Indicates variation in platelet size.
- Plateletcrit (PCT): Reflects the total mass of platelets.
- PC/MPV Ratio.

METHODS

Study design and data collection

- A prospective observational study- Duration of 12 months.
- Study population - Antenatal women diagnosed with preeclampsia and eclampsia who fulfilled the inclusion criteria and consented to participate in the study .

Sample size and sampling techniques

$$n = \frac{2 \left(Z_{1-\frac{\alpha}{2+k}} + Z_{1-\beta} \right)^2}{f^2}$$

- Assuming between group effect size to be 0.4 for platelet distribution width (PDW) according to (Singh et al) , at 5% level of significance, and 80% power, the sample size is obtained to be 44 subjects per group.
- Data collection- After obtaining written informed consent and following all aseptic precautions, the anterior cubital vein was venipunctured into EDTA and a plain bulb and subsequently tested for CBC, Platelet indices, LFT, and RFT.

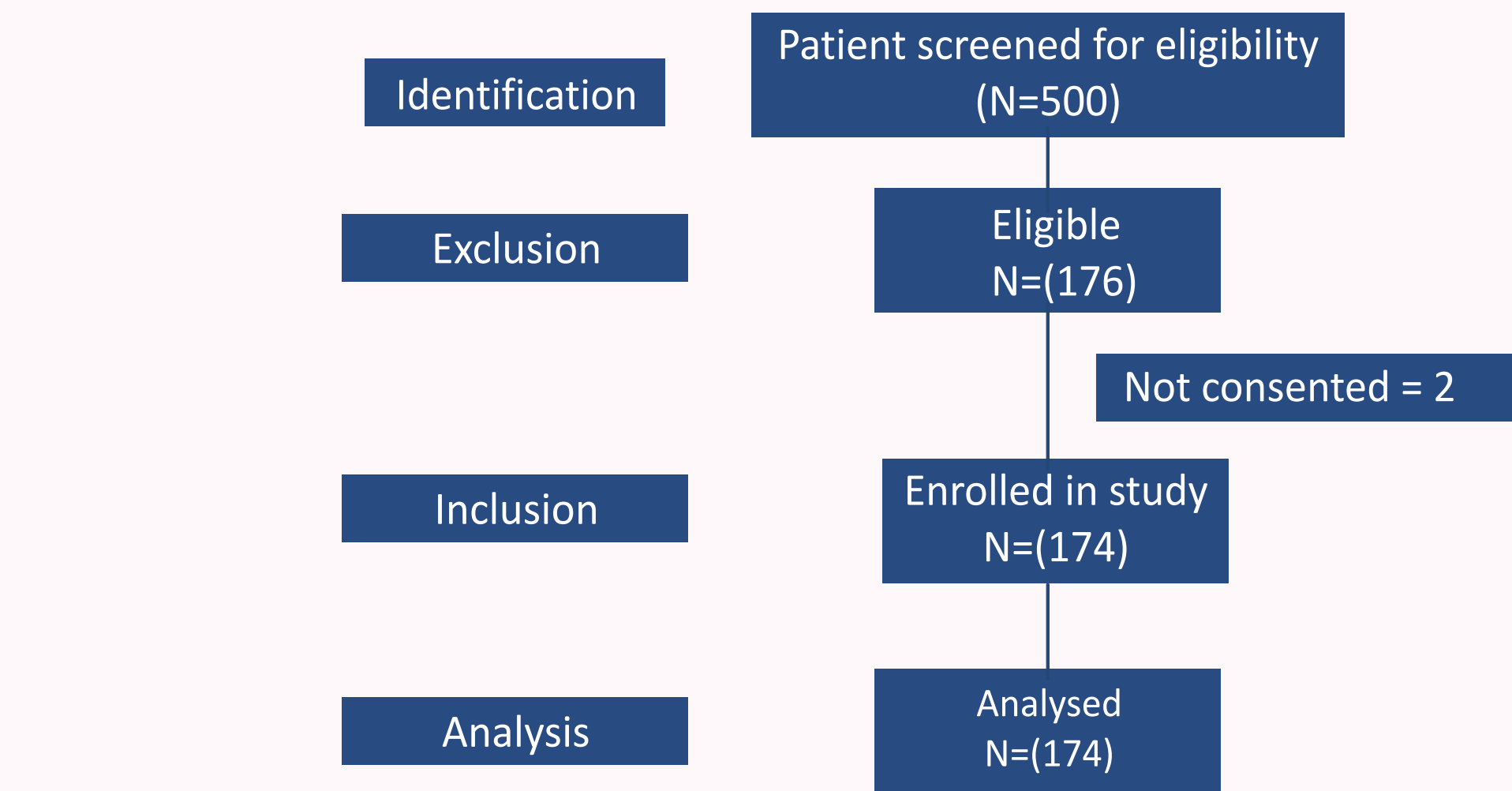
Inclusion and exclusion criteria

Inclusion criteria–

- Group 1** Normotensive - Normal pregnant women of more than 20 weeks of gestational age.
- Group 2** Preeclampsia without severe features —women with Systolic BP >=140 mmHg and or Diastolic BP >=90 mmHg on 2 occasion at least 4 hours apart after 20 week period of gestation along with presence of proteinuria.
- Group 3** Preeclampsia with severe features - Systolic blood pressure >=160 mmHg or diastolic blood pressure >= 110 mmHg on 2 occasions 15 min apart or sign of maternal organ dysfunction with or without proteinuria. Eclampsia—Women with BP >=140/90 mm Hg with convulsions or coma.

Exclusion criteria-

- Chronic hypertension.
- Gestational Hypertension.
- Known case of epilepsy .
- Pre- Existing renal disease.
- Diabetes Mellitus
- ITP, TTP, APLA, SLE
- Drugs affecting platelet count.



Ineligible (n=324)

- Gestational HTN=110
- Severe PE with overt DM=8
- Renal Vascular disease=2
- ITP, TTP, APLA, SLE = 3
- Normotensive =75
- Chronic HTN=12
- HELLP=4
- DM=108
- Intake of drug affecting platelet count = 2

Groups	Number of subjects (%)
Group 1	60 (34.48%)
Group 2	55 (31.61%)
Group 3	59 (33.91%)

S.No	Variables	Subcategory	Group 1- (Normotensive)	Group 2 (Preeclampsia without severe feature)	Group 3 (Preeclampsia with severe feature and eclampsia)	P-Value
1.	SBP		119.9 ± 5.55	141.75 ± 3.57	156.92 ± 16.35	< 0.001**
2	DBP		77.13 ± 5.7	90.8 ± 3.5	98.85 ± 10.15	< 0.001**
3.	MAP		91.3 ± 5.01	107.7 ± 3.08	118.47 ± 11.56	< 0.001**
4.	Proteinuria	NIL	53 (88.33%)	3 (5.45%)	1 (1.69%)	< 0.001 ^{MC*}
		Trace	1 (1.67%)	1 (1.82%)	2 (3.39%)	
		1+	6 (10%)	32 (58.18%)	11 (18.64%)	
		2+	0	17 (30.91%)	26 (44.07%)	
		3+	0	2 (3.64%)	14 (23.73%)	
		4+	0	0	5 (8.47%)	

Distribution of study participants based on clinical parameters in different groups

Variable	Subcategory	Group 1 (Normotensive)	Group 2 (Preeclampsia without severe feature)	Group 3 (Preeclampsia with severe feature and eclampsia)
1. Age	<20 years	4 (2.29%)	1 (0.5%)	4 (2.29%)
	21-25 years	34 (19.54%)	26 (14.94%)	29 (16.6%)
	26-30 years	15 (8.62%)	18 (10.3%)	17 (9.77%)
	>30 years	7 (4.02%)	10 (5.7%)	9 (5.17%)
2.Parity	Primigravida	28(16%)	30 (17.2%)	36(20.6%)
	Multigravida	32(18.3%)	25(14.3%)	23(13.2%)
3. Gestational age	>37 weeks	24 (13.7%)	34 (19.5%)	15 (8.6%)
	<37 weeks	36 (20.6%)	21 (12%)	44 (25.2%)
4.BMI	18.5-24.9	48 (27.5%)	31 (17.8%)	31 (17.8%)
	25-29.9	12 (6.8%)	24 (13.7%)	28 (16%)

Distribution of study participants based on demographic and obstetrics parameters among different groups.

S.no	Variable	Group 1		Group 2		Group 3		P value
		Mean ±SD	Median (IQR)	Mean ±SD	Median (IQR)	Mean ±SD	Median (IQR)	
1.	Platelet	2.42 ± 0.54	2.32(1.37-3.91)	2.28 ± 0.82	2.19(0.57- 4.25)	2.27±0.81	2.25 (0.58- 4.34)	0.4376 [†]
2.	PDW	11.82 ±2.37	11.55 (7.9- 17.7)	12.48 ± 2.28	11.8 (8.4-20.5)	12.91± 2.87	11.8 (8.2- 19.9)	0.1700 [†]
3.	Plateletcrit	0.25±0.06	0.24(0.13- 0.4)	0.24 ± 0.08	0.23 (0.06- 0.49)	0.23±0.07	0.23 (0.07- 0.37)	0.3534 [†]
4.	MPV	10.28 ± 1	10.1 (8.7 – 12.6)	10.3 ± 0.9	10.3 (8.7- 12.5)	10.47 ± 1.18	10.2 (7.8 – 13.2)	0.5420 [†]
5.	PC/MPV	25.47 ± 5.23	24 (13.6-40)	21.8 ± 7.53	20.7 (5.7- 41.95)	21.06 ± 7.32	22 (6.3- 37.6)	< 0.001 ^{†*}

Comparison of platelets count and platelets indices over different study group

A significant correlation between PC/MPV and severity of preeclampsia was found (p value <0.001).

In Group 1 which include normotensive participants mean of PC/MPV was 25.47 where as in group 2 and group 3 the values are 21.8 , 21.06 respectively . There is a decreasing trend of platelet count and plateletcrit over group 1 group2 and group 3 , However it is statistically not significant .Also there is a increasing trend in values of PDW and MPV seen in group 1 , group 2 and group 3 which is statistically not significant .

S.No	Variables	Subcategory	Group 1	Group 2	Group 3
1.	Platelet	Decreased	1 (1.67%)	8 (14.55%)	12 (20.34%)
		Normal	59 (98.33%)	47 (85.45%)	47(79.66%)
2.	PDW	Increased	12 (20%)	15 (27.27%)	21 (35.59%)
		Normal	48 (80%)	40(72.72%)	38 (64.4%)
3.	Plateletcrit	Decreased	18 (30%)	24 (43.64%)	22 (37.29%)
		Normal	42(70%)	31(56.3%)	37 (62.7%)
4.	MPV	Increased	26 (43.33%)	24 (43.64%)	24(40.68%)
		Normal	34(56.67%)	31 (56.36%)	35(59.32%)

Comparison of incidence of change in platelet count and platelet indices in different study groups

In group 2 that is Preeclampsia without severe feature 85.7% have normal platelet count , whereas in group 3 that is preeclampsia with severe feature and eclampsia 79.66% have normal platelet count .

S.No	Groups	Parameter		P-value
		Increased PDW	normal PDW	
1	Nonthrombocytopenic PE with severe features and eclampsia (Group 3) (n=47)	19(40.4%)	28 (59.57%)	<0.03
2	Nonthrombocytopenic PE without severe features (n=47) (group 2)	10 (21.2%)	37 (78.7%)	
		Decreased Plateletcrit	Normal plateletcrit	
3	Nonthrombocytopenic PE with severe features and eclampsia (n=47) (group 3)	15 (31.91%)	32 (68%)	<0.04
4	Nonthrombocytopenic PE without severe features (n=47) (group 2)	16 (34%)	31 (65.9%)	

Comparison of incidence of change in PDW and plateletcrit in preeclampsia and eclampsia.

In group 3 study participants that were nonthrombocytopenic , 40.4% of the them have increased PDW , whereas 21.2% have increased PDW in Nonthrombocytopenic PE without severe feature . Similarly 31.91 % of Nonthrombocytopenic PE with severe feature and eclampsia and 34% of nonthrombocytopenic PE without severe feature have decreased plateletcrit.

Discussion

- This study highlights that preeclampsia is more prevalent among younger women and primigravida..A key finding is that platelet count decreases as the severity of preeclampsia increases, yet most participants remained nonthrombocytopenic, reinforcing the idea that platelet count alone is an insufficient marker for assessing severity.
- Markers like Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW) showed an increasing trend, while plateletcrit decreased, though these changes were not statistically significant. However, the Platelet Count-to-MPV (PC/MPV) ratio emerged as a reliable indicator, decreasing as the severity of the disease increased, with a statistically significant p-value (<0.001).
- Additionally, a notable percentage of nonthrombocytopenic preeclamptic and eclamptic patients showed increased PDW and decreased plateletcrit, with significant p-values(<0.03 and <0.04 , respectively). These findings reinforce the need for a multifaceted approach to evaluating preeclampsia , rather than relying Solely on platelet count .

Conclusion

- Given that most participants remained nonthrombocytopenic, relying solely on platelet count is inadequate for assessing the severity of preeclampsia and eclampsia. Instead, platelet indices—especially the Platelet Count-to-MPV (PC/MPV) ratio—should be evaluated as an additional marker. Serial monitoring of PC/MPV throughout pregnancy can assist in determining disease progression.
- Further studies are needed to find a correlation between platelet indices in early pregnancy and predicting risk of preeclampsia. This could prove to be a valuable tool in outreach setting and rural area where costly tools may not be available to predict possibility of preeclampsia.
- Changes in platelet indices may also play a role in optimizing delivery timing and enhancing the management of patients with preeclampsia and eclampsia.

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