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Significance of Platelet Count In Predicting Feto-Maternal Outcome in Pregnancy Induced Hypertension

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Abstract
Introduction*: Pregnancy induced hypertension contributes significantly to maternal morbidity & mortality with an increasing prevalence, affecting nearly 7-15% of all gestations. It is a multi system disorder with various biochemical markers, physiological changes & clinical presentations. Thrombocytopenia is a relatively common haematological abnormality encountered in PIH. It can be easily evaluated & is a prognostic marker in assessing feto maternal outcome in PIH.*
Aim*: 1. To study the accuracy of platelet count as a prognostic marker in preeclampsia &eclampsia.*
2. To evaluate feto maternal outcome in relation to low platelet levels in cases of PIH.
Methodology*: A prospective study was conducted in 100 pregnant women, in the age group of 20-40 years, in the third trimester of pregnancy,in the Department of Obstetrics & Gynaecology, MGMMCH, Jamshedpur. The cases were divided into two groups comprising of 50 subjects each. Group A consisted of cases of preeclampsia of varying severity &eclampsia, while group B served as control group. The study was carried out over a period of one year from May 2017 & the subjects were followed until delivery. Cases & controls were compared on various parameters & the results statistically analysed.*
Results: *In the present study,out of total 100 subjects57 cases of thrombocytopenia were found. Thrombocytopenia was associated with early onset PIH, & with increasing severity of the disease process. Maternal & foetal outcome was considerably affected in more severe cases of PIH with low platelet counts.*
Conclusion: *It has been shown in the study that platelet count is an important predicting factor of maternal & foetal outcome in pregnancy induced hypertension.*
Key Words*: Preeclampsia, Thrombocytopenia, Ecclampsia, Platelet count, Prognostic marker*

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I. Introduction

Hypertensive disorders of pregnancy is a multi system disorder with a broad spectrum of clinical presentations ranging from mild preeclampsia to life threatening eclampsia. Its incidence is 7-15% of all pregnancies, from 20 weeks onwards. It may also lead to complications such as HELLP syndrome, DIC, abruptio placentae, acute renal failure, pulmonary oedema, ARDS, cerebral oedema, stroke& maternal death. The foetus may suffer from IUGR, foetal distress, IUFD, low APGAR score& ultimately neonatal mortality.

In normal pregnancy, platelet count may slightly fall, upto 15% of pre-pregnancy level due to haemodilution& increased platelet consumption. But it does not cause any complication. Thrombocytopenia is diagnosed when platelet count falls below 1,50,000/cumm. In mild to moderate preeclampsia, this platelet fall does not lead to much complications, but as the severity of the disease increases, as in severe preeclampsia &eclampsia, it leads to bleeding diathesis. Low platelet count is a component of HELLP syndrome, ultimately progressing to DIC & maternal death.

The basic underlying pathology in PIH is endothelial dysfunction & intense vasospasm. This is because of defect in the endovascular trophoblast invasion in the walls of spiral arterioles of the placental bed leading to placental insufficiency. A host of vasoactive factors, such as thromboxane A2, get activated to improve placental perfusion leading to a rise in blood pressure. This vasospasm, in turn causes endothelial dysfunction by increasing oxidative stress & inflammatory mediators. There is increased platelet destruction, thrombi formation in micro circulation &microangiopathic haemolysis.

Decrease in platelet count is proportional to severity of disease. Assessment of platelet count is a simple, cost effective & sensitive method to know the prognosis &fetomaternal outcome in preeclampsia &eclampsia.

AIMS AND OBJECTIVES

Aims:

1. To study the accuracy of platelet count as a prognostic marker in preeclampsia &eclampsia.
2. To evaluate feto maternal outcome in relation to low platelet levels in cases of PIH.

Objectives:

1. To find a correlation between severity of PIH & low platelet count.
2. To analyse maternal complications in relation to thrombocytopenia.
3. To analyse foetal outcome in relation to thrombocytopenia.
4. To aid in early diagnosis & management of complications & thereby improving maternal & foetal outcome.

II. Materials And Methods

A cohort of 100 pregnant women, in the age group of 20-40 years, in the third trimester of pregnancy were admitted in the Department of Obstetrics and gynaecology,MGMMCH, Jamshedpur, East Singhbhum, Jharkhand.

A prospective study was carried out over a period of 1 year from May 2017. The study participants were divided into two groups consisting of 50 subjects each. Group A comprised of cases of preeclampsia of varying severity &eclampsia, while group B served as control group with cases of normal pregnancy without any confounding factor. Both the groups were comparable in demographic features & followed up until delivery. Total number of cases diagnosed with thrombocytopenia were 57 out of 100.

Criteria of diagnosis:

Preeclampsia: It is diagnosed when BP$\geq$140/90 mmHg & proteinuria $\geq$ 300 mg/24hrs. It is further categorised as following

Mild preeclampsia (MPE) : Systolic BP between 140-159 mmHg & diastolic BP between 90-109 mmHg, with significant proteinuria.

Severe preeclampsia (SPE) : Systolic BP $\geq$ 160 mmHg & diastolic BP $\geq$ 110 mmHg, with significant proteinuria.

Eclampsia : Preeclampsia with convulsions without any other attributable cause.

Thrombocytopenia: Platelet count below 1,50,000/cumm.

Criteria of inclusion: Patients diagnosed as cases of preeclampsia, above 20 weeks of gestation after giving written informed consent.

Criteria of exclusion:

1. Patients diagnosed with haematological or any coagulation disorder
2. Pregnancy below 20 weeks
3. Preexisting renal, vascular, auto immune or hepatic disorder
4. Patients taking any drug which may interfere with coagulation pathway.
5. Patients not willing to give consent

STUDY DESIGN: Prospective study

III. Methodology

100 cases, who fulfilled the inclusion criteria, were selected for the study. Detailed antenatal history & complete general & obstetric examination was done. BP measurement was done in semi recumbent posture in the right brachial artery. Platelet count was estimated as a part of complete blood count using automated particle counters (Normal platelet count taken as 1,50,000- 4,50,000/cumm). When thrombocytopenia is reported, conformation is done by peripheral smear. This is done because EDTA also causes clumping of platelets in around 1% cases & may give false low platelet values. All the haematological tests were carried out in the Department of Clinical Pathology, MGM MCH.

IV. Results And Distribution

Table 1: Platelet counts during pregnancy

Normal range	24 weeks	28 weeks	34 weeks	40 weeks
150-400x10^9/l	132x10^9/l	126x10^9/l	112x10^9/l	65x10^9/l

Table 2: Age distribution of mothers in group A & group B

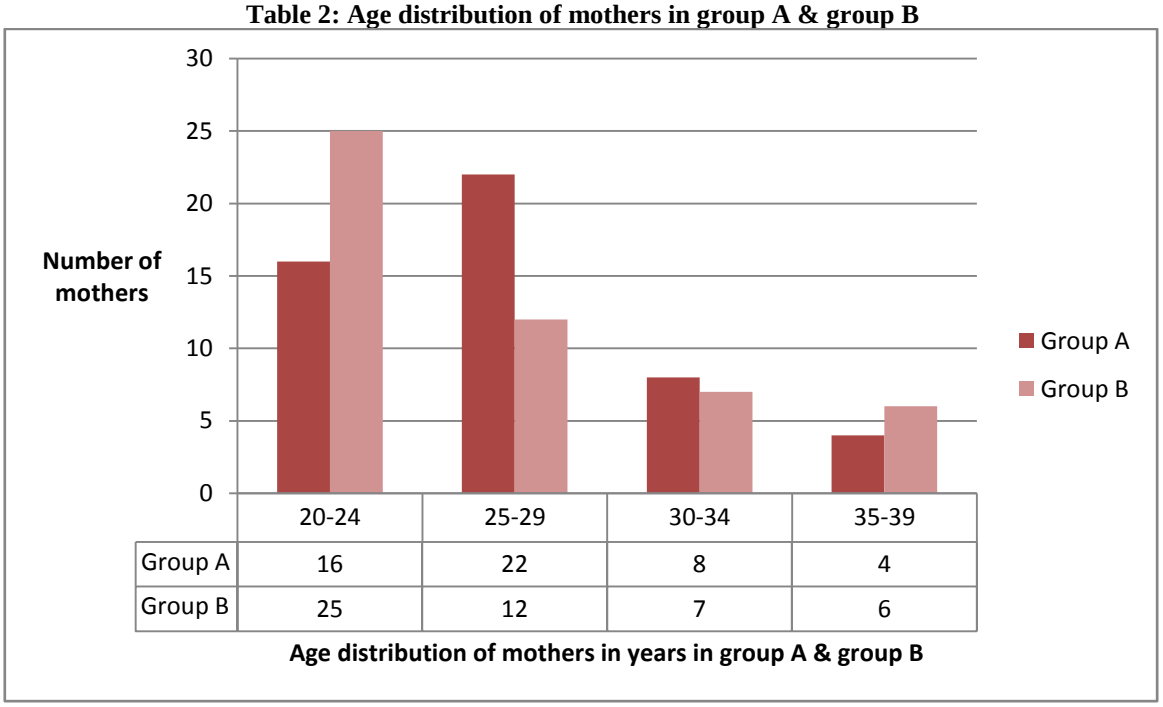
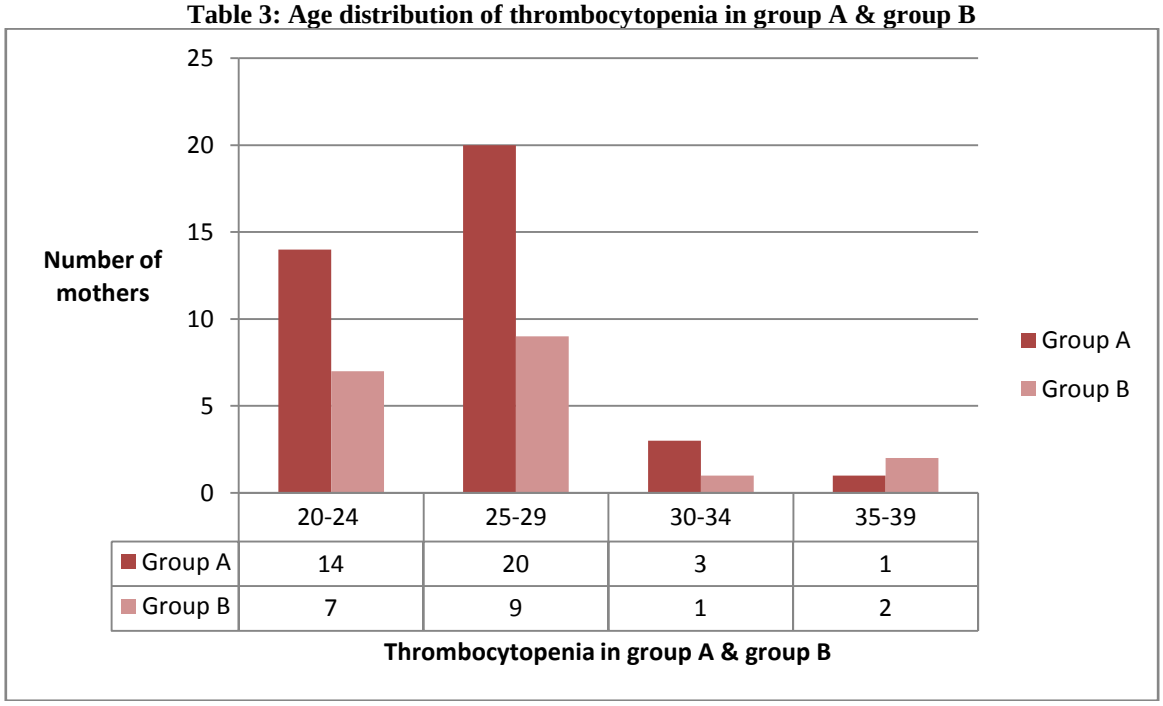


Table 3: Age distribution of thrombocytopenia in group A & group B

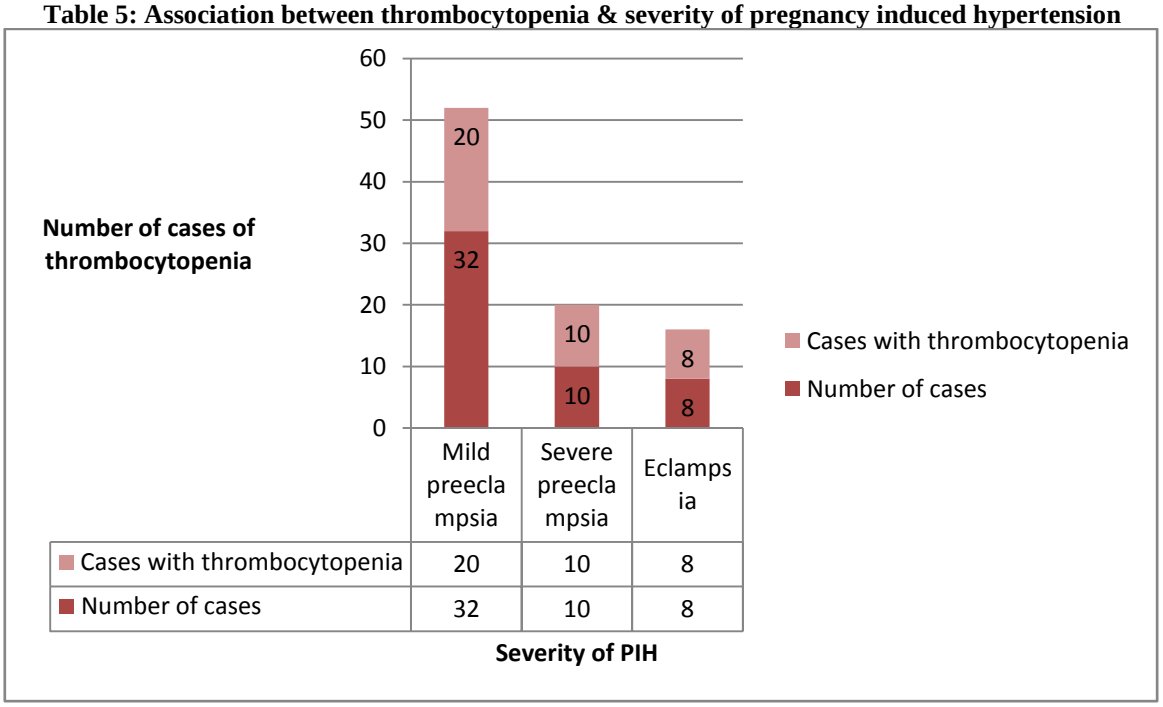


Age groups	Group A	Group B	Total
20-24	14 (36.8%)	7 (35%)	21 (36.8%)
25-29	20 (52.6%)	9(47.3%)	29(50.8%)
30-34	3 (7.8%)	1(5.2%)	4(7.2%)
35-39	1 (2.6%)	2(10.5%)	3(5.2%)
	38	19	57

Table 4: Association between gravidity & thrombocytopenia in group A & group B

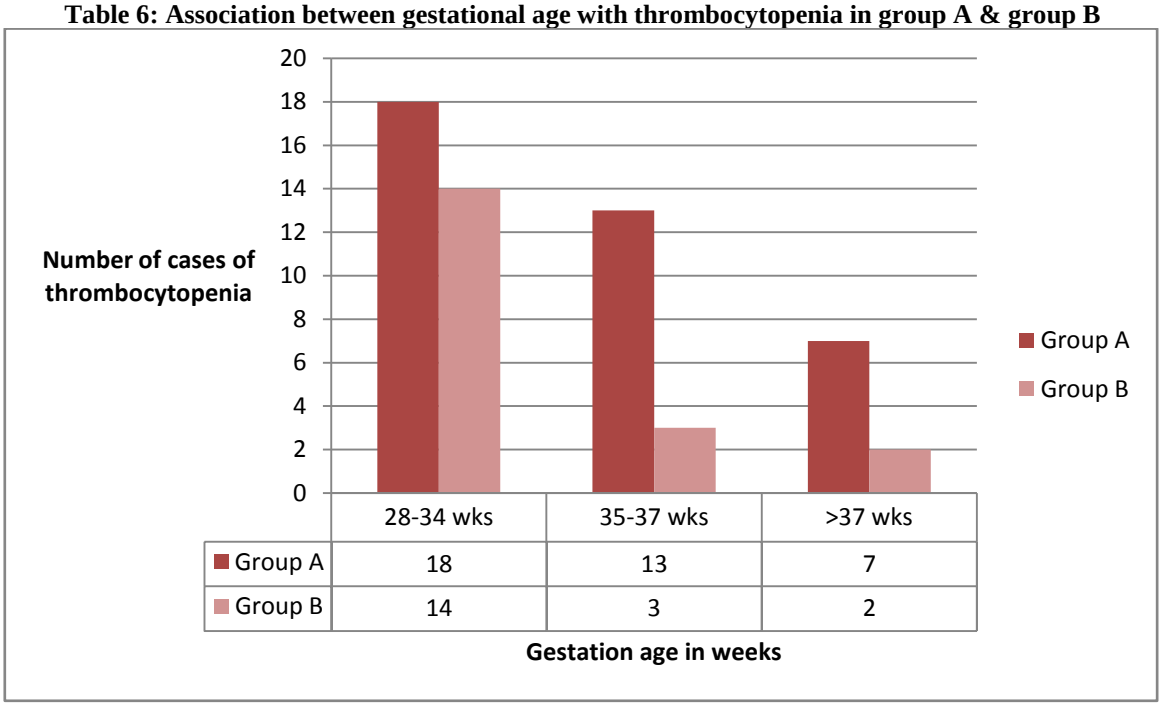
Gravidity	Group A	Group B	Total
G1	19 (50%)	10 (52.6%)	29 (50.8%)
G2	16 (42.1%)	7 (36.8%)	23 (40.3%)
G3	2 (5.2%)	1 (5.2%)	3 (5.2%)
G4	1 (2.6%)	1 (5.2%)	2 (3.5%)
	38	19	57

Table 5: Association between thrombocytopenia & severity of pregnancy induced hypertension



Mild PE- 62.5%
Severe PE- 100%
Eclampsia- 100%

Table 6: Association between gestational age with thrombocytopenia in group A & group B



Gestation age (weeks)	Group A	Group B	Total
28-34	18 (47.3%)	14 (73.6%)	32 (56.1%)
35-37	13 (34.2%)	3 (15.7%)	16 (28.2%)
>37	7 (18.4%)	2 (10.5%)	9 (15.8%)
	38	19	57

Table 7: Association between thrombocytopenia &maternal complications due to pregnancy induced hypertension in group A

	HELLP	DIC	Abruptio	PPH	ARF	PE	Death
MPE (32)	0	0	0	0	0	0	0
SPE (10)	1	0	1	3	0	1	0
Eclampsia (8)	2	1	1	1	1	0	2
Total	3	1	2	4	1	1	2

DIC- Disseminated Intravascular Coagulation
PPH- Post partum haemorrhage
ARF- Acute renal failure
PE- Pulmonary oedema

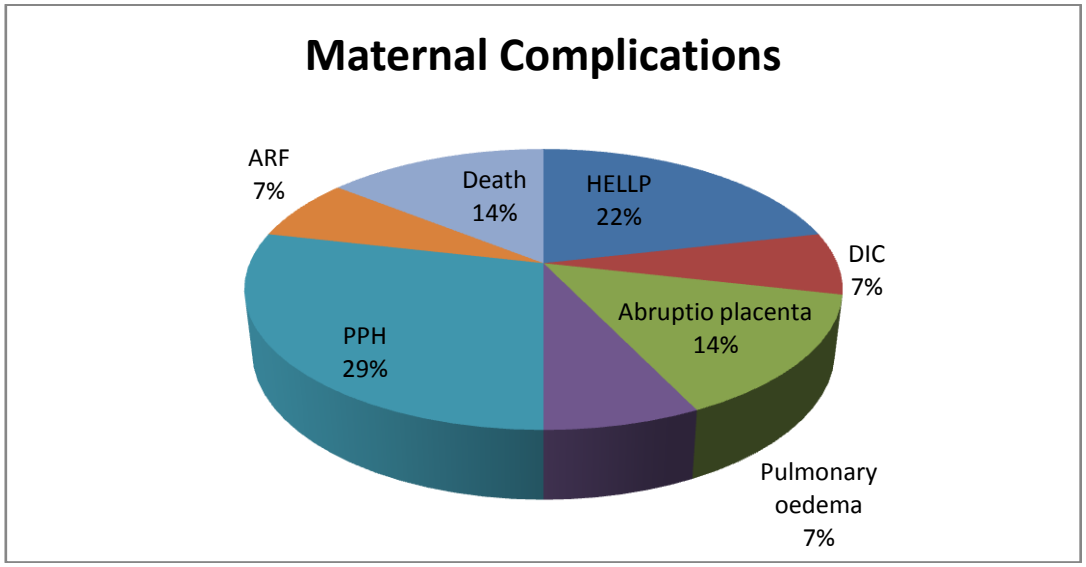


Table 8: Association between thrombocytopenia & foetal complications in group A

	IUGR	IUD	RDS	MAS	Preterm	Jaundice
MPE (32)	6	0	1	0	4	0
SPE (10)	3	1	0	1	2	2
Eclampsia (8)	2	4	1	1	0	0
Total	11	5	2	2	6	2

IUGR- Intrauterine growth restriction
IUD- Intrauterine death
RDS- Respiratory Distress Syndrome
MAS- Meconium Aspiration Syndrome

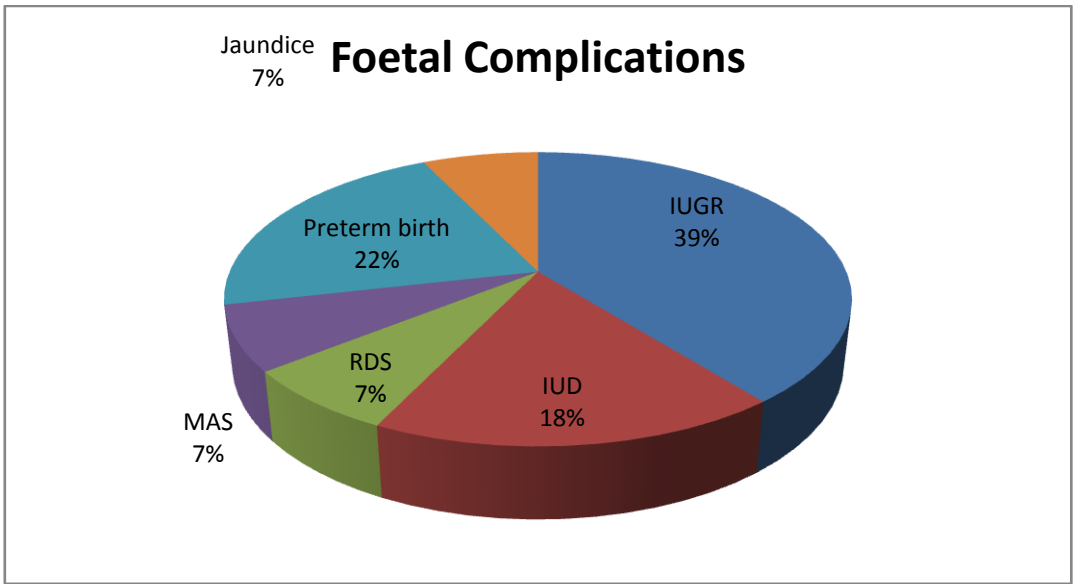


Table 9: Distribution of platelet count in group A

Platelet count(lakh cells/cumm)	Mild PE	Severe PE	Eclampsia	Total
<1	0	1(10%)	5(62.5%)	6(12%)
1-1.5	0	8(80%)	3(37.5%)	11(22%)
1.5-2.0	4(12.5%)	1(10%)	0	5(10%)
>2	28(87.5%)	0	0	28(56%)
	32(100%)	10(100%	8(100%)	50(100%

Table 10: Distribution of platelet count in group B

Platelet count(lakh cells/cumm)	Group B
<1	0
1.0-1.5	0
1.5-2.0	14 (28%)
>2.0	36 (72%)
	50

Table 11: Mean platelet count of group A

	Mean ±SD	P value
Mild PE	2.24 ± 0.43	<0.001
Severe PE	1.37 ± 0.42	<0.001
Eclampsia	0.97 ± 0.38	<0.001

Table 12: Comparison of mean platelet counts of group A & group B

	Group A	Group B	Test of significance	P value
Mean platelet count	1.58 ± 0.51	2.26 ± 0.46	t Test	<0.001

Table 13: Comparison of mean values of haemoglobin, bleeding time & clotting time of group A & group B

Mean±SD	Mild PE 32	Severe PE 10	Eclampsia 8	Group B Control
Haemoglobin	9.56± 1.43	9.82±1.29	9.46± 1.78	10.2± 2.24
Bleeding time	3.2± 1.14	3.96± 1.37	3.84± 1.25	2.63± 1.4
Clotting time	5.27± 1.8	6.27± 1.34	6.18± 1.65	4.3± 1.07

V. Discussion & Observation

In pregnancy, there is a slight decline in platelet count in the third trimester because of haemodilution due to increase in plasma volume by 40-50 %. The normal platelet trends in pregnancy according to weeks of gestation has been shown in (Table 1)

In the study population frequency of women in the younger age groups was found to be more in group A as well as group B (Table 2).

Age is also an important criterion associated with thrombocytopenia. It is more frequently observed in younger age groups. Maximum percentage of 50.8% in the age group of 25-29 yrs. 36.8% cases found in the age group of 20-24 years, which is also considerably high as compared to 7.2% cases in 30-34years age group, &5.2% in 35-39 years age group (Table 3).

Gravidity index is not a statistically significant factor for thrombocytopenia per se. In group A, 50% cases in primigravida, 42.1% cases in G2, 5.2% cases in G3, 2.6% cases in G4. In group B, 52.6% cases in primigravida, 36.8% cases in G2, 5.2% cases in both G3 & G4. The results were not found significant with P value > 0.05 (Table 4).

Group A is further subdivided on the basis of severity of preeclampsia with 32 cases of mild preeclampsia, 10 cases of severe preeclampsia & 8 cases of eclampsia. It has been found that as the severity increased, number of cases of thrombocytopenia also increased. Low platelet counts were observed in 62.5% cases of MPE, 100% cases of SPE & 100% cases of eclampsia. Hence, proving a significant correlation between thrombocytopenia & severity of preeclampsia(Table 5).

In the present study, thrombocytopenia was observed more commonly in cases with lower gestational age. In group A, 47.3% cases found in 28-34 wks, 34.2% in 35-37 wks& 18.4 % cases in >37 wks. In group B, 73.6% cases in 28-34 wks, 15.7% cases in 35-37 wks& 10.5 % cases in >37 wks (Table 6).

In group A, as the severity of preeclampsia increased a number of maternal complications were observed leading to poor prognosis & maternal outcome. In mild preeclampsia no significant complication was seen. In severe preeclampsia &eclampsia, complications such as HELLP syndrome in 3 cases, DIC, acute renal failure & pulmonary oedema led to maternal mortality in 2 cases. Placental abruption & PPH was also encountered (Table 7).

Foetal complications were also found to be more in worsening cases of preeclampsia associated with thrombocytopenia. There was a significant rise in cases of IUGR (11 cases) & IUFD (5 cases). Other foetal

complications included respiratory distress syndrome, meconium aspiration syndrome, pre term delivery & neonatal jaundice causing neonatal morbidity & mortality (Table 8).

The number of platelets fall in progressively deteriorating cases of preeclampsia. In mild preeclampsia, 12.5% cases had platelet counts between 1.5-2.0 lakh/cumm, 87.5% more than 2.0 lakh/cumm. In severe preeclampsia, 80% cases between 1.5-2.0 lakh/cumm, while 10% cases < 1.0 & 10% between 1.5-2.0. In eclamptic cases, 62.5% cases <1.0 & 37.5% cases between 1-1.5 lakh/cumm (Table 9)

In group B, platelet counts were found more towards to the higher side, with 28% cases between 1.5-2.0 & 72% cases >2.0 (Table 10)

The mean values of platelet counts, haemoglobin, bleeding & clotting times in group A & group B are compared. (Tables 11,12,13).

VI. Conclusion

Thrombocytopenia in PIH carries a definite risk to the mother & foetus. It is associated with various life threatening maternal complications & also poor foetal outcome. It has been shown that thrombocytopenia has been associated with early onset disease &has a grave prognosis. It is a cost effective & simple investigation but an important prognostic marker in PIH. It can be concluded that platelet counts play a significant role in early diagnosis & appropriate management of PIH & improving maternal & foetal outcome.

Conflict of interests: None declared

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