ABSTRACT: INTRODUCTION: Pregnancy induced hypertension includes gestational hypertension, preeclampsia, and eclampsia. In PIH, lower the platelet count, greater are maternal and fetal morbidity and mortality. Recent studies suggest that platelet parameters like platelet indices are most simple and cost effective method for prediction of PIH, way before the appearance of derangements in PT, APTT, TT values so we undertook this study with an aim to see an association between platelet indices and pregnancy induced hypertension. MATERIAL AND METHOD: This was prospective analytical case control study. Study included 125 cases, who were diagnosed as PIH with B.P. >140/90 mmHg, detected after 20 weeks of pregnancy. Under all aseptic precautions samples were collected randomly in EDTA vials. Samples were analysed for platelet indices. RESULT: Maximum number of cases of Preeclampsia (88.57%) & Eclampsia (87.5%) were found in age group of 21 to 25. Controls were of same age group i.e. 21 to 25 years. It was observed that platelet count showed gradual decrease in eclampsia (1.44580±36,210) & pre-eclampsia patients (1.97850±39,010) as compared to normotensive subjects (2.42620±40,412). MPV showed gradual increase in eclampsia (10.49±1.12) & pre-eclampsia (9.14±0.612) patients as compared to normotensive subjects (8.422±0.743). PDW value also shows gradual increase in eclampsia (18.39±2.62) & pre-eclampsia (16.29±2.34) patients as compared to normotensive subjects (12.09±2.53). CONCLUSION: Study showed that platelet indices were important, simple, effortless and cost effective investigations which can be used for early recognition of preventable eclampsia complications. KEYWORDS: Pregnancy induced hypertension, platelet indices (MPV, PDW), Platelet count.

INTRODUCTION: Pregnancy Induced Hypertension (PIH) is defined as hypertension that occurs in pregnancy for the first time after 20 weeks of gestation and disappears following delivery. Pregnancy induced hypertension includes gestational hypertension, preeclampsia, and eclampsia. It occurs in approximately 11 to 29% of pregnancies in Indian population. In PIH, lower the platelet count, greater are maternal and fetal morbidity and mortality. Recent studies suggest that platelet parameters like platelet indices are most simple and cost effective methods for prediction of PIH, way before the appearance of derangements in PT, APTT, TT values.¹,² So we undertook this study to see that if there is any variation in platelet count and indices like MPV & PDW in pregnancy induced hypertension.

MATERIAL AND METHOD:
AIM: To study an association between platelet indices and pregnancy induced hypertension.
OBJECTIVES:
1) To study the variation in platelet indices in pregnancy induced hypertensive patients.
2) To study the platelet indices in normal pregnant women of more than 20 weeks.
3) To compare the platelet indices between the normal and hypertensive pregnant patients.
4) To associate the variation in platelet indices with different forms of pregnancy induced hypertension.

Type of study: This was prospective observational analytical case control study.

Confounding Variables Recognized were:
Previous history of:
- Hemorrhagic disorder.
- Epilepsy.
- Hypertension.
- Drug intake affecting platelet count.
- Diabetes mellitus.
- Renal disease.
- Anemia or haemoglobinopathy.

and they served as Exclusion Criteria for the study.

Study was conducted in Department of Pathology of Pt. J. N. M. Medical College, Raipur. Study included 125 cases, who were diagnosed as PIH with B.P. >140/90 mmHg, detected after 20 weeks of pregnancy. Under all aseptic precaution samples were collected randomly in EDTA vials. All relevant clinical details were collected from patients. Samples were analysed for platelet indices {Platelet count (PC) Platelet distribution width (PDW), Mean Platelet volume (MPV), on auto analyzer after collection in EDTA vials.

On the basis of clinical symptom patient were segregated in three group:
Group 1: Women having (B.P. >140/90 mmHg) and significant proteinuria (>300 mg per 24 hrs) and/or edema were treated as preeclampsia.
Group 2: Women affected with convulsions and having the signs of pre-eclampsia during pregnancy or within seven days after delivery after ruling out epilepsy or any other convulsive disorders were treated as "eclamptic women".
Group 3: normotensive women having pregnancy more than 20 weeks were considered as control group.

RESULT: After assessment of clinical details out of total 125 subjects 35 had preeclampsia, 40 had eclampsia and 50 were normotensive.

Mean age range of patient for our study was 23.45±3.23 years.
Maximum number of cases of Preeclampsia (88.57%) & Eclampsia (87.5%) were found in age group of 21 to 25. Controls were of same age group i.e. 21 to 25 years. (Table 1).
Table 1: Distribution of cases according to age

| Age range | Control | Preeclampsia | Eclampsia | Total |
|-----------|---------|--------------|-----------|-------|
|           | Number  | Number       | Number    | Number|
| 16-20     | 03      | 00           | 00        | 03    |
| 21-25     | 43      | 31           | 35        | 109   |
| 26-30     | 04      | 2            | 3         | 09    |
| 31-35     | 00      | 2            | 2         | 04    |
| Total     | 50      | 35           | 40        | 125   |

Thrombocytopenia was most common deranged platelet parameter in PIH. Out of 35 cases of preeclampsia, 31.42% cases were having thrombocytopenia (11.4% cases having platelet count 50,000 to 1,00,000/cumm and 20% cases between 1.0 to 1.5 lakhs). Out of 40 cases of eclampsia 32.5% cases were having thrombocytopenia (5% cases were having platelet count less than 50000, 10% cases were having platelet count between 50,000 to 1,00,000/cumm and 17.5% cases between 1.0 to 1.5 lakhs). Out of 50 controls, 20 % were having thrombocytopenia (1.0 to 1.5 lakhs) and 80% were having normal platelet count. (Table 2)

Table 2: Platelet count in PIH. (Lakhs/µl)

| Platelet Count(Lakh/cumm) | Control | Preeclampsia | Eclampsia | Total |
|---------------------------|---------|--------------|-----------|-------|
|                           | Number  | Number       | Number    | Number|
| <.5                       | 00      | 00           | 00        | 02    |
| 5.1-1                     | 00      | 04           | 11.4      | 04    |
| 1.0-1.5                   | 10      | 07           | 20.0      | 07    |
| 1.5-4.5                   | 40      | 24           | 68.6      | 27    |
| TOTAL                     | 50      | 35           | 100.0     | 40    |

In 77 % cases of preeclampsia patients MPV was found between 8 to 10 and in 23% of cases, between 10 to 12. In 55 % cases of eclampsia MPV value was found to be between 8 to 10 and in 45% of cases between 10 to 12.

PDW was > 14 in 86% cases of preeclampsia and 87.5% cases of eclampsia while, PDW value of 9 to 14 was in 14.3% cases of preeclampsia and12.5% cases of eclampsia. MPV was found to be between 8 to 10 in 96% of controls and PDW was found to be between 9 to 14 in 92% of controls. (Table 3)

Table 3: Platelet indices

| Platelet indices | Control | Preeclampsia | Eclampsia | Total |
|------------------|---------|--------------|-----------|-------|
| MPV(fl)          | Number  | Number       | Number    | Number|
| 8-10             | 48      | 27           | 22        | 55    |
| 10-12            | 02      | 08           | 18        | 45    |
| >12              | 00      | 00           | 00        | 00    |
DISCUSSION: Present prospective observational analytical case control study included 125 subjects, out of which 50 were controls and 75 were having PIH. In this study an attempt was made to assess the role of platelet indices in assessment of severity of preeclampsia and eclampsia. In developing countries PIH has been attributed to be a significant cause of maternal and perinatal morbidity & mortality. In our study mean age of patients was 23.45±3.23 years, which is comparable with the studies of Vamsheedhar et al, Shivakumar S et al. and Prakash J et al. with mean age of 24.57±3.46, 24.3 and 24.75±3.360 respectively, however in Onisai et al study he observed that the mean age of PIH was 29.8 years.<ref>4</ref>,<ref>5</ref>

In the our study mean platelet count in pre-eclampsia was 1.97 Lakhs/cu mm which is comparable to studies by Vamsheedhar et al and Mohapatra et al, showing 1.5 Lakhs/cu mm and 1.8 Lakhs/cu mm respectively. Mean platelet count in eclampsia in our study was 1.44 Lakhs/cu mm which is agreeable with Anila et al. and Vrunda et al. who observed platelet count of 1.2 Lakhs/cu mm & 1.3 Lakhs/cu mm respectively.<ref>6</ref>,<ref>7</ref>

Langer at el has stated that approximately 50% of preeclampsia cases will develop thrombocytopenia, in our study 31.4% cases of pre-eclampsia & 32.5% cases of eclampsia were having thrombocytopenia. Thrombocytopenia in PIH is mostly caused due to increase consumption of platelet may be due to adherence of platelet at the site of damaged vascular endothelium.

The platelet count in our series was compared which correlated well with values of other studies.

|                | Mohapatra et al<sup>1</sup> | Vrunda et al<sup>2</sup> | Present study |
|----------------|-----------------------------|--------------------------|---------------|
| Normotensive   | 2.38000                     | 2.20000                  | 2.42620       |
| Preeclampsia   | 1.82000                     | 1.40000                  | 1.97850       |
| Eclampsia      | 1.30000                     | 1.30000                  | 1.44580       |

In present study we found an increase in MPV & PDW values from normotensive pregnant women to pre-eclampsia & eclampsia patients which correlated well with other studies. In our study MPV is 9.14 in preeclampsia which is comparable with Giles et al who observed MPV of 9.9, Annam et al observed the value of MPV as 10.3 in pre-eclampsia.<ref>8</ref>
In our study MPV is 10.49 in eclampsia which is comparable with, Annam et al who observed the value of MPV as 11 in eclampsia.

In our study PDW is 16.29 in preeclampsia which is comparable with Giles et al who observed PDW of 16 & Annam et al who observed the value of PDW as 15.51 in preeclampsia.

In our study PDW is 18.39 in eclampsia which is comparable with Giles et al who observed PDW of 19, Annam et al observed the value of PDW as 16.78 in eclampsia.

| Parameter | Annam et. al.⁹ | Giles et. al.⁸ | Present study |
|-----------|----------------|----------------|---------------|
| Normotensive | | | |
| MPV | 8.6 | 8.7 | 8.422 |
| PDW | 11.07 | 12 | 12.09 |
| Preeclampsia | | | |
| MPV | 10.3 | 9.9 | 9.14 |
| PDW | 15.51 | 16 | 16.29 |
| Eclampsia | | | |
| MPV | 11 | NA | 10.49 |
| PDW | 16.78 | 19 | 18.39 |

Comparison of mean platelet volume (MPV) & PDW between control, pre-eclampsia, eclampsia.

It was observed that platelet count showed gradual decrease in eclampsia (1.44580±36,210) & preeclampsia patients (1.97850±39,010) as compared to normotensive subjects (2.42620± 40,412).

MPV showed gradual increase in eclampsia (10.49±1.12) & preeclampsia (9.14±0.612) patients as compared to normotensive subjects 422±0.743).

PDW value also showed gradual increase in eclampsia (18.39±2.62) & preeclampsia (16.29±2.34) patients as compared to normotensive subjects (12.09±2.53).

So it is advised to monitor platelet count, MPV &PDW which are simple, economical and rapid investigations to monitor the progress of PIH.

We found an association between platelet indices and severity of preeclampsia. The study showed the platelet indices as the most consistent and reliable investigation for early detection of PIH cases. So platelet indices can also be used as a prognostic marker.

**CONCLUSION:** Study showed that platelet count & platelet indices are simple and routine tests, which can be easily estimated by automated hematology analyzer. They help in suspecting a deranged coagulation status associated with PIH early in course of disease and help plan preemptive management strategies. Mortality and morbidity of both mother and fetus can be reduced with prompt institution of treatment after early detection of PIH.

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