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Original Research Article

# Study of Association of Platelet Counts with Hypertensive Disorders of Pregnancy

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**Abstract:** Care for expectant mothers has been based on one over-riding objective that each pregnancy should result in a healthy mother and a healthy baby. Whilst the majority of pregnancies will progress satisfactorily with minimal intervention from caring professionals, there will always be the need to identify high risk groups for whom a greater degree of care is required. Hypertensive disorder of pregnancy is the most common complication in pregnancy and together they form one member of the deadly triad, along with haemorrhage and infection. So the study was undertaken to know the association of platelet counts with severity of hypertensive disorders in pregnancy, and establish it as an easier and faster way to identify high risk groups. A total 156 primigravidas with singleton pregnancy, and no known medical disorder, in their third trimester were recruited from antenatal clinic and inpatient ward. The study group was further divided into 4 subgroups (gestational hypertension, mild pre-eclampsia, severe pre-eclampsia, eclampsia on the basis of BP, proteinuria and clinical symptoms. As a control group 78 healthy nulliparous singleton pregnant women were taken. Demographic data and haematological parameters were recorded and analysed. Mean platelet count in Hypertensive disorders is 1.56±.35 as compared to control 2.08 ±.21, which is statistically significant. In HDP cohort, when mean platelet count of severe pre-eclampsia (1.4±.2) is compared with mild pre-eclampsia (1.67±.32) and gestational hypertension (1.9±.25), the decreased in platelet count is statistically significant (p<.001). Hence it is concluded that the estimation of platelet count is an early, economical and rapid procedure of assessment of severity of Hypertensive cases and can have a significant impact on maternal and perinatal outcome.
**Keywords:** Hypertensive disorders of pregnancy (HDP), platelets, high risk, and severity

## INTRODUCTION

Throughout history, care for expectant mothers has been based on one over-riding objective that each pregnancy should result in a healthy mother and a healthy baby. Whilst the majority of pregnancies will progress satisfactorily with minimal intervention from caring professions, there will always be the need to identify high risk groups for whom a greater degree of care is required. This 'High Risk' group requires early diagnosis to develop a plan of care that is tailored to the needs simultaneously with the lives of (at least two) intricately interwoven patients-the mother and her baby (ies).

Hypertensive disorder of pregnancy is the most common complication in pregnancy and together they form one member of the deadly triad, along with haemorrhage and infection, which contribute greatly to maternal morbidity and mortality rates [1]. The reported incidence of HDP in India was 5.38 % while pre eclampsia, eclampsia and HELLP syndrome accounted for 44%, 40% and 7% of complications, respectively. How pregnancy per se incites or aggravate hypertensive vascular disease remains elusive, despite decades of intensive research; and these disorders remain among the most important unsolved problems in Obstetrics. Out of all the hematological changes that occur in HDP, thrombocytopenia is the most common hematological abnormality found [2].

To date, there is no single, reliable and cost-effective screening test for pre-eclampsia and that a combination of indices would be most effective [3-5]. So this study was undertaken to assess the possibility of using platelet count to predict the severity of PIH by a method that is rapid, cheaper and can be used in routine monitoring.

**AIMS AND OBJECTIVES**

1. To evaluate the relationship between hypertensive disorders in pregnancy and platelet count
2. To find out association of platelet count with severity of hypertensive disorders in pregnancy.

**METHODOLOGY:**

This case-control study was a hospital based observation conducted in the Department of Obstetrics and Gynecology, Mahila Chikitsalaya Sanganeri Gate, SMS Medical College. A total 156 primi subjects in their third trimester, with singleton pregnancies and no known medical disorder were recruited randomly for the study between April 2013 and March 2014, from antenatal clinic and inpatient ward.

The **INCLUSION CRITERIA** included nulliparous singleton pregnancy with age between 18-30 years, non –smokers **and** non-alcoholics.

The **EXCLUSION CRITERIA** included Multiparous women, Multi-fetal gestation**,** Pregnancy with known medical disorders such as

- Chronic hypertension
- Endocrine disorders eg Diabetes Mellitus, hypothyroidism or hyperthyroidism, etc
- Epilepsy
- Hemorrhagic disorders
- Pre-existing thrombophilias
- Hepatic disorder
- Renal disorder
- Drug intake which can alter platelet count and function (eg furosemide, phenytoin, valproic acid, heparin

Blood pressure was measured by auscultatory method using a mercury sphygmomanometer in a sitting position after making patient comfortable and atleast 10 minutes of rest. SBP was recorded at the appearance of the first korotkoff sound and DBP was recorded at disappearance of fifth phase korotkoff. Blood was collected for hematological and biochemical parameters. All blood smears were also examined for the presence of platelet clumps, which affect the accuracy of the platelet count.

The study group was further divided into 4 subgroups on the basis of BP, proteinuria and sign and symptoms. It comprised of 19 gestational hypertension, 20 mild pre-eclampsia, and 20 severe pre-eclampsia and 19 Eclampsia. As a control group 78 healthy primiparous singleton pregnant women were taken. The demographic details such as age, weight, residence, socio economic status were noted. Patients were considered hypertensive if DBP was greater than or equal to 90 mmHg on two occasions 4 hrs apart or single reading of 110 mmHg. They were further divided into mild and severe pre eclampsia. Cases with SBP between 140 and 160 mmHg and DBP between 90 and 110mmhg without proteinuria were grouped as gestational hypertension, with proteinuria >300 mg/24 hrs or >1 dipstick were considered as mild and those with SBP greater than 160mmHg and diastolic greater than 110 mmHg were considered as severe eclampsia according to WORKING GROUP OF NATIONAL HIGH BLOOD PRESSURE EDUCATION PROGRAMME 2000. Presence of headache, visual disturbances, epigastric pain, oliguria, elevated LFT, elevated RFT, thrombocytopenia were classified as severe pre-eclampsia and occurrence of seizures as eclampsia. Blood pressures were recorded and blood was collected for hematological and biochemical parameters every 4 weeks in the third trimester.

**OBSERVATION AND RESULTS:**

Out of the each 78 Cases and controls taken, 59(75 %) were less than 25 years and 19(24 %) were more than 25 years of age in cases, where as 60(76.93% ) were less than 25 years and 18 (23 %) were more than 25 years in control. The mean age of the study population in the study was 22.94 with maximum number of subjects belonging to age group 20 – 24 years.

Majority of the cases were age < 25 years. Severe pre-eclampsia and eclampsia continue to occupy the highest occurrence of the cases i.e 17 (21.79%) each. Out of 20 subjects each in mild and severe pre-eclampsia 14(17.95) and 17(21.79) are aged < 25 years respectively. In case of 19 eclamptic patients 17(21.79) are <25 years whereas only 2 patients are > 25 years. In gestational hypertension group, 11(14.10) are <25 years and 8 (10.26) are > 25 years (Table 1). This reflects an increase prevalence of HDP in young nulliparous women.

**Table 1: Distribution of HDP according to age of cases**

| | **Age group (in yrs)** | | **Total** |
|---|---|---|---|
| | **< 25** | **> 25** | |
| Mild Pre eclampsia | 14 (17.95) | 6 (7.69) | 20 (25.64) |
| Severe Pre-eclampsia | 17 (21.79) | 3 (3.85) | 20 (25.64) |
| Eclampsia | 17 (21.79) | 2 (2.56) | 19 (24.36) |
| Gestational Hypertension | 11 (14.10) | 8 (10.26) | 19 (24.36) |
| Total | **59 (75.64)** | **19 (24.36)** | **78 (100.00)** |

The importance of economic and social factors on the health and wellbeing of the women is well known. While pregnancy is a normal alternative condition for the female body, it is stressful, and all nutritional needs are increased in order to meet the needs of the pregnancy (Amy *et al.;* [6]).there was an increased occurence of HDP in lower socio-economic group. Out of the total 78 cases, 26(33%) and 25 (32%) belong to lower middle and upper lower group respectively. In contrast, 51(65%) of the controls belong to lower middle strata. There is an inverse association between HDP and economic status (table 2).

**Table 2: Distribution according to SES (Kuppuswamy's socio-economic status scale) of case & control subjects**

| **SES** | **Case** | | **Control** | |
|---|---|---|---|---|
| | **No.** | **%** | **No.** | **%** |
| Upper | 1 | 1.28 | 0 | 0.00 |
| Upper Middle | 11 | 14.10 | 4 | 5.13 |
| Lower Middle | 26 | 33.33 | 51 | 65.38 |
| Upper Lower | 25 | 32.05 | 23 | 29.49 |
| Lower | 15 | 19.23 | 0 | 0.00 |
| Total | 78 | 100.00 | 78 | 100.00 |

Table 3 shows distribution of subjects according to ante-natal booking status enrolled in the study. Out of the total 156 women taken up for final evaluation, 26 cases had no initial ante-natal ($1^{st}$ and $2^{nd}$ trimester) visits compared to 11 in control group. Probably the initial ante-natal care had identified women at risk and preventive strategies were given such as administration of low dose aspirin, calcium and anti-oxidant vitamin C and E which decrease the risk of pre –eclampsia.

A systematic review of 33,437 women enrolled in 43 trials. Duley *et al.;* [7] in 2003 found that the use of aspirin was associated with a 19% decrease in the risk of pre-eclampsia. There was a greater reduction of risk of pre-eclampsia to 27% in women at high risk than in women at moderate risk 9 (15%). A systematic review of 11 randomized clinical trials (Atallah *et al.;* in 2002 [8]) found a significant decrease in the risk of hypertension in general and also in the risk of pre-eclampsia with administration of dietary calcium supplementation. A small randomized clinical trial Chapel *et al.;* in 1999 [9] using vitamin C and E in women at risk, selected on the bases of uterine Doppler studies at 20 weeks , demonstrated a significant decrease in the incidence of pre-eclampsia in the treated group.

**Table 3: Distribution of HDP according to booking status of subjects**

| | **Booking Status** | | **Total** |
|---|---|---|---|
| | **Booked** | **Unbooked** | |
| Mild Pre eclampsia | 16 (20.51) | 4 (5.13) | 20 (25.64) |
| Sever Pre eclampsia | 14 (17.95) | 6 (7.69) | 20 (25.64) |
| Eclampsia | 7 (8.97) | 12 (15.38) | 19 (24.36) |
| Gestational Hypertension | 15 (19.23) | 4 (5.13) | 19 (24.36) |
| Total | **52 (66.67)** | **26 (33.33)** | **78 (100.00)** |

When the value of platelet estimation is compared between control and study groups, a significant decrease in platelet count number was observed (p<0.001). The mean value of platelet in the case and control group is 1.56 + 0.35 and 2.08 + 0.21 respectively.

The mean values of platelets for the control i.e healthy pregnant subjects , gestational hypertension , mild and severe pre-eclampsia, eclampsia is given in table 5 and 6 .Statistically significant difference of platelets was observed when comparison was done between healthy pregnant and gestational hypertension groups (p <.01). However, when the comparison was done between healthy pregnant with mild pre-eclampsia, severe pre-eclampsia and eclamptic groups the values in healthy pregnant was significantly higher (p<0.001, p<0.001, P<0.001) respectively.

In HDP cohort, when mean platelet count of severe pre-eclampsia (1.4±.2) is compared with mild pre-eclampsia (1.67±.32) and gestational hypertension (1.9±.25), the decreased in platelet count is statistically significant (p<.001). When the mean values of platelets for gestational hypertension and mild pre-eclampsia women were compared it was found to be lower in the latter group and the difference comes to be statistically significant (<0.01). When the mean values of platelets for gestational hypertension and severe pre-eclampsia ,and gestational hypertension and eclampsia were compared, the values was significantly higher in gestational hypertension as compared to that of severe pre-eclampsia and eclampsia (p<0.001).

Similarly on comparing platelet mean for mild pre-eclampsia with severe pre-eclampsia and eclampsia the values was found to be lower in the latter group i.e severe pre-eclampsia and eclampsia and the difference comes to be statistically significant (<0.001). However, when mean of severe pre-eclampsia and eclampsia were compared the difference between the groups were not significant statistically (p >.05). Joshi *et al.;* in 2004 [10] conducted a study with the objective to know the variation in platelet count between normal pregnancy and PIH. The result of the study was a significant difference between platelet count of severe PIH (p=.001), eclampsia (p=.001) and mild PIH p= (.044) when compared to control group. Minimum counts are seen in patients with severe pre eclampsia and eclampsia. The study shows that thrombocytopenia is directly proportional to the severity of PIH. Counts below 1 lac / ml indicates increased risk of DIC and HELLP syndrome

**Table 4: Mean + Sd of Platelet count of case & control subjects**

| | **Mean + Sd** | | **P - value** | **Significance** |
|---|---|---|---|---|
| | **Case** | **Control** | | |
| Platelet count | 1.56 + 0.35 | 2.08 + 0.21 | < .001 | HS |

**Table 5: Mean + Sd of Platelet count**

| | **No.** | **Mean + Sd** |
|---|---|---|
| Control | 78 | 2.08 + 0.21 |
| Gestational Hypertension | 19 | 1.90 + 0.25 |
| Mild Pre eclampsia | 20 | 1.67 + 0.32 |
| Sever Pre eclampsia | 20 | 1.40 + 0.20 |
| Eclampsia | 19 | 1.29 + 0.24 |

**Table 6:**

| | |
|---|---|
| Control v/s Gestational Hypertension | P < .01 Sig |
| Control v/s Mild Pre eclampsia | P < .001 HS |
| Control v/s Sever Pre eclampsia | P < .001 HS |
| Control v/s Eclampsia | P < .001HS |
| Gestational Hypertension v/s Mild Pre eclampsia | P < .01 Sig |
| Gestational Hypertension v/s Sever Pre eclampsia | P < .001 HS |
| Gestational Hypertension v/s Eclampsia | P < .001 HS |
| Mild Pre eclampsia v/s Sever Pre eclampsia | P < .001 Sig |
| Mild Pre eclampsia v/s eclampsia | P < .001 HS |
| Severe Pre eclampsia v/s eclampsia | P > .05 NS |

**CONCLUSION:**

Hypertension is one of the most common obstetrics problems seen in pregnant women. The obstetrician relies increasingly upon laboratory tests for the management of pregnant women. It has become an accepted practice to undertake various laboratory tests on groups of patients and express in terms of a mean and standard deviation with the implication that individuals will follow these mean changes. The estimation of platelet count is a reliable method. In this study an attempt has been made to assess the role of platelet count in normotensive pregnant women and hypertensive disorders in pregnancy. Pre-eclamptic women have decreased platelet count as compared to healthy pregnant women. . Thus, the estimation of platelet count can be considered as an early, economical and rapid procedure of assessment of severity of HDP cases and their management which can be done even in rural hospitals.

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