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RESEARCH ARTICLE

ASSESSMENT OF PLATELET COUNT AND PLATELET INDICES IN PREGNANCY INDUCED HYPERTENSION.

Sujata N¹, Shinde P J², Verma A¹, Ghatge R. M¹, Gupta S¹ and Inamdar A.A¹.

1. Post Graduate student, Department of Pathology, D.Y. Patil Medical College, Kolhapur.
2. Associate Professor, Department of Pathology, D.Y. Patil Medical College, Kolhapur.

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Key words:-

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Abstract

Hypertensive disorders of pregnancy complicate up to 10% of pregnancies worldwide, constituting one of the greatest causes of maternal and perinatal morbidity and mortality. The basic pathology of pregnancy induced hypertension (PIH) is poor placentation, and vasospasm of vessels along with alteration of hematological profile. The study was conducted in Dr. D. Y. Patil Hospital and Research institute, Kolhapur, on 50 patients clinically diagnosed as PIH, and 50 normotensive pregnant women both with gestational age ≥ 20 weeks. In the present study of the 50 PIH cases 22 cases (44%) had severe PIH (diastolic BP ≥ 110 mmHg) and 28 cases (56%) had mild PIH (diastolic BP ≤ 100 mmHg). PIH was found to be common in young primigravidas. Thrombocytopenia was the most common haematological aberration seen in PIH. In the present study thrombocytopenia (<1.5 lakhs) was seen in 12 (24%) of total PIH cases. We made a conclusion that simple and routine tests like CBC with platelet count and platelet indices are highly helpful in suspecting deranged coagulation early in courses of disease and have a crucial role in reducing mortality and morbidity of both mother and fetus.

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Introduction:-

Hypertensive disorders of pregnancy, including preeclampsia complicate upto 10% of pregnancies worldwide, constituting one of the greatest causes of maternal and perinatal morbidity and mortality worldwide. The term hypertensive disorders of pregnancy includes a heterogeneous collection of disease complicating pregnancy and form one of the deadly triad along with haemorrhage and infection.

The diagnosis of pregnancy induced hypertension is made in women whose blood pressure reaches 140/90mmHG or greater for first time at ≥ 20 weeks of gestation. Preeclampsia is characterized by hypertension (Blood pressure of 140/90 mmHg or greater), proteinuria (>0.3 g/dl), edema and new signs of end organ dysfunction and begins as early as 20th gestational week. Eclampsia is occurrence of seizures in women with preeclampsia which develops before, during or after labour.¹

The basic pathology of preeclampsia is endothelial dysfunction, poor placentation, and vasospasm of vessels along with alteration of hematological profile². Out of all hematological abnormalities that occur in PIH, thrombocytopenia is the most common seen in 11-29% of patients. These pregnancies also are associated with

qualitative changes suggesting increased platelet production and destruction. There is shortened life span, increased number of megakaryocytes in bone marrow and an increase number of immature platelets seen in peripheral smear⁴. Walker J.J. et al showed that in pregnancy induced hypertension there are changes in platelet number, platelet survival and mean platelet volume, which have been interpreted as evidence of increased platelet consumption⁹. The MPV and PDW were elevated proportionally with the severity of pre-eclampsia when compared with the normotensive control group. There is a gradual increase in MPV from normotensive pregnant women to pre-eclampsia and eclampsia. This increase in MPV in pre-eclampsia and eclampsia probably indicate hyperdestruction of platelets due to shorter platelet half-life¹¹. There was an increase in PDW from normotensive pregnant women to pre-eclampsia and eclampsia in the study conducted by Tygart et al. This probability reflects increased platelet turnover which would support the idea that platelet survival time is decreased resulting in increased destruction of platelets¹². Clinically, platelet indices can be a useful screening test for early identification of pre-eclampsia and eclampsia. Also platelet indices can assess the prognosis of PIH in pregnant women.

Methodology:-

After ethical approval one year prospective study was carried out in D Y Patil Hospital and Research Institute during the period of June 2015 to May 2016. This study was undertaken in Department of Pathology with collaboration of department of Obstetrics and Gynecology, Dr D Y Patil Hospital and Research Institute Kolhapur. The present study includes 50 patients aged 18-35 years clinically diagnosed as pregnancy induced hypertension with gestational age ≥ 20 weeks attending outpatient department or admitted in antenatal ward/labour room in department of OBG, Dr. D. Y. Patil Hospital and Research institute, Kolhapur. Fifty normotensive pregnant women in the age group of 18-35 years with gestational age ≥ 20 weeks were included in the control group. CBC values were determined by Mindray BC- 3000 Plus hematology analyser which is a fully automated three part hematology analyser. Platelet count, mean platelet volume(MPV), platelet distribution width(PDW) estimation was compared between the normotensive pregnant women with PIH patients. The statistical analysis used was mean, standard deviation and students t-test. The p value < 0.05 was accepted as significant.

Results:-

PIH is common in young primigravidas, in the present study mean age was 23.8 ± 3.56 years and primigravidas constituted the majority of patients (68%). Thrombocytopenia is the most common haematological aberration seen in PIH. In the present study thrombocytopenia (< 1.5 lakhs) was seen in 12 (24%) of total PIH cases. The mean platelet count in mild PIH was 2.23 ± 0.64 lacs/cumm and that in severe PIH was 1.67 ± 0.55 lacs/cumm. The mean platelet count in normotensive control was 3.14 ± 0.80 lacs/cumm. (Table No. 1)

Table 1:- Table showing mean platelets count in mild and severe PIH and control cases

	Mean platelet count \pm SD (lacs/cumm)
Control(n=50)	3.14 ± 0.80
Mild PIH(n=28)	2.23 ± 0.64
Severe PIH(n=22)	1.67 ± 0.55

Mean Platelet Volume and Platelet distribution width (PDW):-

In the present study MPV ranged from 7.6 femtolitre to 12.6 fl in mild PIH & 7.8 fl to 13.6fl in severe PIH. Mean MPV in PIH was significantly higher (10.57 ± 2.67 fl) compared to that in control group (7.74 ± 0.92 fl) p < 0.05 significant. In the present study mean PDW in PIH cases was $13.2 \pm 1.97\%$ whereas it was $11.82 \pm 1.52\%$ in control. Mean PDW was significantly increased (p < 0.05) in PIH group compared to control (Table No. 2)

Table 2:- Table showing mean MPV in PIH and control cases

	Mean MPV \pm SD (fl)	Mean PDW \pm SD (%)
PIH (n=50)	10.57 ± 2.67	13.2 ± 1.97
Control (n=50)	7.74 ± 0.92	11.82 ± 1.52

Discussion:-

Women with severe pre-eclampsia develop a variety of hematological aberrations. These hematological aberrations have an impact on the outcome of delivery of these patients so that aggressive therapy can be initiated to prevent maternal and neonatal morbidity and mortality.

Thrombocytopenia is the most common haematological aberration seen in PIH. . It is caused by increased platelet destruction as shown by decreased platelet lifespan, increased number of megakaryocytes in the bone marrow and an increased proportion of young, oversize platelets (megathrombocytes) in the peripheral blood film. Thrombocytopenia is associated with progressive disease & also with disease severity. Thrombocytopenia occurs in 15% of patients with pre-eclampsia. A significant reduction in platelet count is seen frequently during and even before the onset of disease¹³.

Kelton J. G, et al⁴ in their study observed that 34% of patients had thrombocytopenia, Thomas A, et al in their study reported that 16% had thrombocytopenia¹⁴. Vrunda J K. reported 41% thrombocytopenia, Ruchi Verma et al reported 31% thrombocytopenia in their studies. In the present study 24% had thrombocytopenia (Table no. 3).

Table 3:- Table showing comparison of percentage of PIH patients having thrombocytopenia in different studies.

Authors	Thrombocytopenia(%)
Kelton J. G, et al ⁴ (n=26) (1985)	34%
Thomas A. et al ¹⁴ (n=80) (1998)	16%
Vrunda JK ¹⁵ (n=72) (2004)	41%
Ruchi Verma et al ¹⁶ (n=35) (2015)	31.0%
Present study (n=50)(2016)	24%

Severity of PIH and thrombocytopenia are closely correlated which indicates that thrombocytopenia is directly proportional to severity of PIH. The mean platelet count in present study were: 3.14 lacs/cumm in normotensive pregnant women and 2.23 lacs/cumm in mild PIH and 1.67 lacs/cumm in severe PIH cases. When mean platelet count was compared between control and PIH cases, a significant decrease in platelet number was observed and correlated well with the values of other studies. (Table No-4)

Table 4:- Table showing comparison of mean platelet count in normotensive and varying degree of PIH and correlation with other studies

Authors	Mean Platelet volume (lacs/cumm)		
	Control	Mild PIH	Severe PIH
Kulkarni and Sutharia ²⁰ (n=90) (1983)	2.5	1.84	1.19
Srivastava M ¹⁷ (n=119) (1995)	1.94	1.79	1.64
Vrunda Jk ¹⁵ (n=122) (2004)	2.2	2.01	1.4
Jambhulkar et al ¹⁸ (n=194) (2001)	2.38	2.30	1.70
S Mohapatra ¹⁹ (n=90) (2007)	2.38	2.23	1.82
Ellora Devi et al ²¹ (n=60) (2012)	2.44	1.82	1.42
Present study (n=100) (2016)	3.14	2.23	1.67

The normal range for MPV is 8.63±0.87 fl in many studies and distribution of platelet sizes is related to PDW. Platelet size and platelet distribution width are both increased in pre-eclamptic patients even with normal platelet counts. Rise in MPV & PDW can predict the haemostatic abnormality in them⁷ .

Walker J. J. et al⁹ has indicated that rising MPV can be used as a marker for intervention in pre-eclamptic patients. Stubbs et al has reported increased MPV of 11.5fl in his study of PIH patients compared to control subjects (9.7fl). Similar observation was made by various other authors and also in present study. (Table no. 5).

Table 5:- Table showing comparison of mean MPV in present study with other studies.

Authors	Mean Platelet Volume(fl)	
	Control	PIH
Stubbs et al ⁷ (n=20)(1986)	11.5	9.7
Giles et al ¹⁰ (n=550) (1987)	8.7	9.9
Ahmed et al ²² (1993)	9.6	10.2
Vamseedhar et al ¹¹ (n=182) (2011)	8.2	10.2
Fahmi E M et al ²³ (n=70) (2013)	9.5	10.6
Present study(n=100) (2016)	7.7	10.7

Increased mean platelet distribution width of 13.2% in PIH case compared to 11.82% in control cases was observed in present study. Similar observation was made by various other authors (Table No:6)

Table 6:- Table showing comparison of mean platelet distribution width (PDW) in present study with other studies

Authors	Mean PDW (%)	
	Control	PIH
Giles et al ¹⁰ (1987) (n=550)	12	16
Vamseedhar et al ¹¹ (2011)(n=182)	11.07	15.51
Fahmi E M et al ²³ (2013)(n=70)	11.2	13.99
Present study(n=100) 2016	11.82	13.2

Conclusion:-

Pregnancy induced hypertension is the most common complication of pregnancy and remains a leading cause of maternal and fetal morbidity & mortality. As a result of the haemostatic aberrations in PIH, postpartum hemorrhages sometimes so severe as to lead to maternal death may occur. Fetal growth retardation is more frequent in the thrombocytopenic groups. This study gives an outline of the investigations to be done in cases of PIH which can alert the physician of the severity of disease so that appropriate and timely management can be initiated. The estimation of platelet count and platelet indices is a reliable method. In this study an attempt has been made to assess the role of platelet count and platelet indices like MPV and PDW in PIH patients.

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