



EVALUATION AND CORRELATION OF FOETOPLACENTAL WEIGHT WITH PLATELET COUNT IN TOXEMIA OF PREGNANCY.

Anatomy

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ABSTRACT

Toxemia of pregnancy is a scantily understood condition of human pregnancy, which can influence multiple organs and is a foremost reason of maternal mortality worldwide. There is also indication that preeclampsia is usually related with placental hypoxia and endothelial dysfunction. Many researchers gave their efforts to recognize the exclusive screening test that would predict the risk of developing preeclampsia before the typical symptoms appear. There are number of studies which suggest platelet may play a chief role in the etiopathogenesis of preeclampsia. The present study done in 170 pregnant mothers divided into four groups. 40 cases of mild preeclampsia, 40 cases of severe preeclampsia, 40 cases of Eclampsia and 50 cases of control (Normotensive) pregnant women admitted in Department of Obs and Gynae, Rama Medical College, hospital and research centre. There was significant difference between platelet counts of eclampsia (<0.0001), severe preeclampsia (0.0002), mild preeclampsia (P=0.0004) when compared to control group. In this present study the mean placental, birth weights were low in different grades of toxemia of pregnancy when compared with control group. Morphometrical parameters of foetus, placenta positively correlating with platelet count. Platelet count may be considered as an early, economical and quick method to estimate the severity of toxemia of pregnancy. It can also be a useful screening test for early recognition and to assess the prognosis of the disease and outcome in pregnant women.

KEYWORDS

Pregnancy Induced Hypertension (PIH), Preeclampsia, Eclampsia, Platelet count, Hematological marker, weight of placenta and foetus.

1. INTRODUCTION

Hypertensive disorders complicating pregnancy (Toxaemia of pregnancy) are common and forming a deadly triad along with haemorrhage and infection^[1]. Pre-eclampsia (PE) is considered severe if one or more of the following criteria are present: Blood pressure 140 mm Hg or higher systolic or 90 mm Hg or higher diastolic after 20 weeks of gestation in a woman with previously normal blood pressure. Proteinuria: 0.3g or more of protein in a 24-hour urine collection (usually correspond with 1+ or greater on a urine dipstick test) known as mild preeclampsia^[1]. When systolic blood pressure of 160 mmHg or higher or 110 mmHg or higher diastolic on two occasions at least six hours apart in a woman on bed rest, the condition is known as severe preeclampsia. It is associated with proteinuria and oliguria, Cerebral or visual disturbances, seizures, Pulmonary oedema, cyanosis, Epigastric pain or right upper quadrant pain, Impaired liver function, Thrombocytopenia and Foetal growth restriction known as eclampsia^[1].

Maternal hypertension (toxaemia of pregnancy) is diagnosed in 6-10% of all deliveries; is associated with 22% of all perinatal foetal deaths and 30% of all maternal deaths^[2].

Preeclampsia is a scantily understood condition of human pregnancy, which can influence multiple organs and is a foremost reason of maternal mortality worldwide^[3]. The exact pathophysiology of preeclampsia is not yet fully understood. However abnormal placental is one of the initial events^[4]. There is also indication that preeclampsia is usually related with placental hypoxia and endothelial dysfunction^[5]. Many researchers gave their efforts to recognize the exclusive screening test that would predict the risk of developing preeclampsia before the typical symptoms appear. There are number of studies which suggest platelet may play a chief role in the etiopathogenesis of preeclampsia. Changes in coagulation system in established PIH are well known^[6]. Out of all haematological changes that occur in preeclampsia, thrombocytopenia is the most familiar. Thrombocytopenia is typically defined as a platelet count less than 1,50,000/cu mm^[7]. The level of thrombocytopenia increases with the severity of disease. Lower the platelet count, greater in maternal and foetal mortality and morbidity^[8]. Thrombocytopenia may be one of the contributory factors in the etiopathogenesis of preeclampsia. Low platelet count in preeclampsia are related with abnormal activation of coagulation system and accelerated platelet consumption^[9]. Thrombocytopenia is a well-documented procedure in preeclampsia, thereby maternal mortality might be reduced through serial monitoring of platelet count as a part of antenatal check-up. But very few studies are present on this ground in our country. Therefore

the present study is designed to evaluate the relationship of platelet count with toxemia of pregnancy.

2. MATERIALS AND METHODOLOGY

The present study has done in 170 pregnant mothers, divided into four groups 40 cases of mild preeclampsia, 40 cases of severe preeclampsia, 40 cases of Eclampsia, 50 cases of control (Normotensive) pregnant women admitted in Department of Obs and Gynae, Rama Medical College, hospital and research centre. Inclusion criteria: Antenatal mothers who did not have hypertension at the time of pregnancy without any other abnormality taken in to control group. Antenatal mothers diagnosed with toxemia of pregnancy with their blood pressure of 140/90 mmHg or more after 20th week of pregnancy in to test group. Exclusion criteria: Antenatal mothers with the history of renal, liver failure, seizures hypertensive disorder before the pregnancy and other medical problems. Before the conduction of this study, permission has taken from the institution ethical committee and written consent of cases and controls. 1.5 ml of blood was drawn from ante-cubital vein and collected in an EDTA containing tube for counting platelet. Platelet count was done by Sysmex 800i fully automated hematology analyzer. The placentae with cord and membranes were collected and examined immediately after the delivery for abnormality of the umbilical cord and membranes. The amnion and chorion were trimmed from all placenta. The umbilical cord was cut at a distance of 10 centimeters from the site of insertion. Placentae were washed in slow running tap water, dried with the help of blotting paper. The placentae along with the umbilical cord were given code numbers and were preserved in 10% formalin solution. The placentae were weighed with a standard weighing machine. The fetal weight was noted from the case records provided by the department of obstetrics and gynecology.

2.1. STATISTICAL ANALYSIS:

Statistical analysis was performed by using computer based software, Statistical Package for Social Science (SPSS). Mean values of parameters were compared to determine the differences between two groups by using Student's unpaired 't' test. For all statistical analysis, two tailed 'p' value < 0.05 was considered as a lowest level of significance.

3. RESULTS

The study sample was 170, Distributed in to 40 samples of mild preeclampsia, 40 samples of severe preeclampsia, 40 samples of eclampsia and 50 cases of normotensive mothers. For comparing the platelet count and to determine its increasing or decreasing trends, the mean value for each group was determined. There was significant

difference between platelet counts of eclampsia ($P<0.0001$), severe preeclampsia ($P=0.0002$), mild preeclampsia ($P=0.0004$) when compared to control group. The mean weight of placenta and foetus also decreased significantly in eclampsia, severe and mild preeclampsia when compared with control group of placenta and fetuses. For comparing the platelet count, placental and fetal weight to determine its increasing or decreasing trends, the mean value for each group was determined.

Table.1 Comparison Of Placentae Weight In Between Control And Case With Sub Groups.

Groups	No of samples	Mean±S.dev (Grams)	P value compared with control group
I. Control	50	470.15±95.00	-----
II. Mild PET	40	351.62±96.9	= 0.0042
II. Severe PET	40	272.14±79.80	<0.0001
IV. Eclampsia	40	228.04±73.4	<0.0001

Table.2 Comparison Of Fetal Weight In Between Control And Case With Sub Groups.

Groups	No of samples	mean± S. Dev (Kg)	P value compared with control group
I. Control	50	2.91±0.36	-----
II. Mild PET	40	2.32±0.81	= 0.038
II. Severe PET	40	1.82±0.48	<0.0001
IV. Eclampsia	40	1.68±0.54	<0.0001

Table.3. Comparison Of Platelet Count In Between Control And Case With Sub Groups.

Group	No of subjects	Mean+/- s.dev (Lacs/cumm)	P value compared with control group
I. Control	50	2.30+/- 0.61	-----
II. Mild PET	40	1.76+/- 0.55	=0.0004
II. Severe PET	40	1.69+/- 0.64	=0.0002
IV. Eclampsia	40	1.30+/- 0.27	<0.0001

Table.4. Comparison Of Foetoplacental Weight And Platelet Count In Between Control And Case With Sub Groups.

Groups	No of samples	Placental weight mean±S.Dev (Grams)	Fetal weight mean±S.Dev (kg)	Platelet count Mean+/- s.dev (Lacs/cumm)
I. Control	50	470.15±95.00	2.91±0.36	2.30+/- 0.61
II. Mild PET	40	351.62±96.9	2.32±0.81	1.76+/- 0.55
II. Severe PET	40	272.14±79.80	1.82±0.48	1.69+/- 0.64
IV. Eclampsia	40	228.04±73.4	1.68±0.54	1.30+/- 0.27

4. DISCUSSION

Toxemia of pregnancy is one of the most common obstetric problems seen in pregnant women. The obstetrician relies gradually more upon laboratory tests for the management of pregnant women suffering from toxemia of pregnancy. Estimation of platelet indices is a reliable and economical method. In this study tried to show the platelet count and its association with toxemia of pregnancy. In Present Study Significant lower platelet count was observed among pregnant women with toxemia of pregnancy compared to individuals from control group. A relationship between low platelet count and PIH is found in significant levels. Despite this, the etiology and pathogenesis of preeclampsia still remain poorly understood. It is often characterized by suboptimal uteroplacental perfusion associated with a maternal inflammatory response and maternal vascular endothelial dysfunction and platelet count falling to below $100 \times 10^9/L$. Jaremo P et al., 2000 mentioned in their study¹⁰¹. Srivastava et al., (1995) reported mean platelet count of 1.94 lakh/cumm in normal pregnant control, 1.79 lakh/cumm in mild preeclampsia, & significantly low platelet count in severe preeclampsia i.e. 1.64 lakh/cumm and in eclampsia i.e. 1.52 lakh/cumm¹⁰¹. Kulkarni and Sutaria, et al., 1983 in their study observed platelet count as follows, in mild Preeclampsia 1.84lacs/cumm, in severe preeclampsia 1.94lacs/cumm, in eclampsia 1.18 lacs/cumm and in control 2.5lacs/cu mm respectively with these results, mentioned platelet count reduces as the severity of disease increases with significant difference between each group¹⁸¹. Giles C and Inglis TC., 1981 also observed significant difference in between each group, platelet count reduces with severity of disease¹⁰². Agarwal and

baradkar., 1978 and Dube et al., 1975 in their studies mentioned platelet count is reduced significantly and it is correlated with severity of disease^{103,104}. In the study of Vrunda et al., 2004 mentioned severity of disease and thrombocytopenia closely correlated, which indicates that thrombocytopenia is directly proportional to the severity of toxemia of pregnancy¹⁵¹. Mahapatra et al., 2007 study results also correlate with above mentioned study results, they have mentioned platelet count is good, economical prognostic hematological marker to assess the severity of disease and its outcome¹⁶⁰. According to Missfelderlobos H et al., 2006 Transient mild thrombocytopenia is seen due to increased platelet consumption during pregnancy¹⁷¹. The lower platelet count is associated with abnormal activation of coagulation system and is believed to reflect increased platelet consumption Parnas M, et al., 2006 observed in their study¹⁸¹.

Mohan et al (1989) reported in that mean placental, foetal weight and fetal placental weight ratio were less in preeclampsia and eclampsia groups when compared with control group and also noticed placental, fetal weight and fetoplacental weight ratio reduced significantly as the severity of the disease increases.¹⁹⁹

Das et al (1996) reports also suggested that placental, fetal weight and fetoplacental weight ratio reduces significantly as the severity of the disease increases. In their study mentioned majority of birth weights in severe PET and eclampsia groups were <2.5kg due to the very low placental weight leads to intra uterine growth retardation (IUGR).²⁰¹

Summit Gupta et al (2013) study also revealed that placental, birth weights were significantly reducing in mild, severe preeclampsia groups when compared with control group.²¹¹

In present study observations shows significant difference in between each group and also seen placenta and foetal weight and platelet count reduces significantly as the severity of disease increases and coincides with above mentioned study results.

5. CONCLUSION:

From the present study, it can be concluded that, the toxemia of pregnancy adversely influences the weight of the placenta and foetal outcome. Thus, placenta acts as an effective index by examination of which we can predict the status of foetus in neonatal life as it can act as an indicator to the overall development of the foetus. In present study we observed a specific pattern of disease and its related variation in coagulation status. Finally, with present study results and interpretation with previous worker's studies, came to a conclusion that estimation of platelet count may be considered as an early, economical and rapid method of assessment of severity of PIH cases. It can also be a useful screening test for early detection and to assess the prognosis of the disease and outcome of pregnancy in pregnant women.

6. REFERENCES

- ACOG practice Bulletin. 2002 Diagnosis and management of preeclampsia and eclampsia. *obstetgynaecol*;99:159-167.
- Fernandoarias., Practical guide to high risk pregnancy and delivery, Mosby, Harcourtasia private Ltd., 2000; 2nd edition: 184-185.
- Gleicher N. Why much of the pathophysiology of preeclampsia and eclampsia must be of an autoimmune nature. *Am J Obstet Gynecol*. 2009; 196(1): 501 – 507.
- Fernando A, Daftary SN, Bhide AG. Hypertensive disorders in pregnancy. Practical guide to high risk pregnancy and delivery. New Delhi: Elsevier; 2008; 3rd ed: p. 411.
- Mise H, Sagaw N, Matsumoto T, Yura S, Nanno H. Augmented placental production of leptin in preeclampsia possible involved of placental hypoxia. *J Clin Endocrinol Metab*. 1998; 83(9): 3225 – 29.
- Bonnar J, Mcnicol GP, Douglas AS. Mean platelet and red cell volume measurement to estimate the severity of hypertension in pregnancy. *Br. M Journal*. 1971; 2: 12.
- Shehata N, Burrows R, Kelton JG. Gestational thrombocytopenia. *Clin Obstet Gynecol*. 1999; 42: 327 – 34.
- Kulkarni RD, Sutaria UD. Platelet counts in toxemia of pregnancy. *Ind J Obstet Gynecol*. 1983; 33: 321-325.
- Redman CWG, Bonnar J, Beilin L. Early platelet consumption in preeclampsia. *BMJ*. 1978; 1: 467 – 490.
- Jaremo P, Lindahl TL, Lennmarken C, Forsgren H. The use of platelet density and volume measurements to estimate the severity of pre-eclampsia. *Eur J Clin Invest*. 2000; 30: 1113-1118.
- Srivastava M; Bali S; Pandey J; Nayyar V; Talib VH. Pregnancy induced hypertension and antithrombin III. *Indian J Pathol Microbiol* 1995 Jul; 38(3): 257-60.
- Giles C: The platelet counts and mean platelet volume. *Br J Haematol*. 1981; 48: 31-37.
- Agarwal S, Asha Buradkar. Coagulation studies in toxemia of pregnancy. *Journal of Obstetrics and Gynaecology of India* 1978; 992-996.
- Dube B, Bhattacharya S, Dube RK. Blood coagulation profile in Indian patients with pre-eclampsia and eclampsia. *Br J Obstet Gynecol*. 1975; 82: 35-39.
- Vrunda JK, Saila S. Lowered platelet count. A prognostic index in pregnancy induced hypertension. *J Obstet Gynaecol Ind*. 2004; 54(3): 235-236.
- Mohapatra S, Pradhan BB, Satpathy UK, Mohanty A, Pattnaik JR: Platelet estimation: its prognostic value in pregnancy induced hypertension. *Ind J Physiol Pharmacol*. 2007; 51(2): 160-164.
- Missfelderlobos H, Teran e, Leess C, Albaiges C, Nicolaidis KH. Platelet changes and subsequent development of pre eclampsia and foetal growth restriction in women with

- abnormal uterine artery Doppler screening. *Ultrasound Obstet Gynecol.*2002; 19: 443-8
18. Parnas M, Sheiner E, Shoham-Vardi I, Brustein E, Yrmiahu T, levi I, Holeberg G, Yerushalmi R. Moderate to severethrombocytopenia during pregnancy. *Eur J ObstetGynecolReprod Biol.*2006; 128:163-8.
 19. Mohan H, Sodhi S, Mohan PS, Jaiswal TS, Nagpal K, Rathee S. Fetal correlation with placental pathology in toxemia of pregnancy. *Journal of ObstetGynecol India.* 1989;170-5.
 20. Das B, Dutta D, Chakraborty S, Nath P. Placental morphology in hypertensive disorders of pregnancy and its co-relation with fetal outcome. *Journal of ObstetGynecol India.* 1996:40-6.
 21. Sumit G. Correlation of placental weight and fetal outcome in pregnancy induced hypertension. *Journal of ObstetGynecol India.* 2013;170-5.