

Coagulation Parameters in Pre-eclamptic and Eclamptic Patients - A Comparative Study of 90 Cases

Upam Kr. Sharma¹, Reena Kouli², Ramesh Sonowal³, Projnan Saikia⁴

ABSTRACT

Introduction: Pregnancy Induced Hypertension (PIH) is one of the most common disorders seen in human pregnancies. In roughly half of the cases the disorder progresses into pre-eclampsia, a dangerous condition that can prove fatal to expectant mothers. Early assessment of severity of pre-eclampsia and eclampsia is necessary to prevent maternal and fetal morbidity and mortality. Hence, this study was undertaken with the objective to compare the coagulation parameters of women with pre-eclampsia and eclampsia.

Material and Methods: Total 90 PIH cases in their third trimester of pregnancy comprising of 30 Mild Pre-eclampsia, 30 Severe Pre-eclampsia and 30 Eclampsia patients were enrolled for the study. Coagulation parameters such as BT, CT, PT, aPTT, platelet count were studied in these patients. Data were analyzed using MS Excel 2007 and GraphPad Prism 7.

Results: There was statistically significant increase in the BT and aPTT with increase in the severity. Although CT and PT increase with the severity of PIH, it was not found to be statistically significant. Platelet count decreases significantly with increase in the severity.

Conclusion: The abnormalities pertaining to coagulation parameters in PIH indicate the impending intravascular coagulation.

Keywords: Coagulation parameters, Eclampsia, PIH, Pre-eclampsia

INTRODUCTION

Pregnancy Induced Hypertension (PIH) is one of the most common disorders seen in human pregnancies.¹ Though relatively benign on its own, in roughly half of the cases the disorder progresses into pre-eclampsia, a dangerous condition that can prove fatal to expectant mothers.²

PIH is defined as hypertension that occurs in pregnancy for the first time after 20 weeks of gestation and disappears following delivery. It remains a disease of theories as its exact cause is not yet fully established.³ Approximately 1,00,000 women die worldwide per annum because of eclampsia.⁴ It is said that pre-eclampsia and eclampsia contribute to death of a woman every 3 minutes worldwide.⁵ In India the incidence of pre-eclampsia is reported to be 8-10% of the pregnancy.⁶ It is the third leading cause of maternal mortality responsible for 17% of maternal deaths.^{6,7}

There are many terms used to classify the hypertensive disorders of pregnancy, the classifications recommended by the American College of Obstetrics and Gynaecology in 1986 is listed below: American College of Obstetrics and Gynaecology Classifications for Hypertensive Disorders of Pregnancy.⁸

- Pregnancy-Induced Hypertension
- (a) Pre-eclampsia: Mild
Severe

(b) Eclampsia

- Chronic Hypertension Preceding Pregnancy (Any Etiology)
- Chronic Hypertension (Any Etiology) With
 - (a) Superimposed Pregnancy Induced Hypertension
 - (b) Superimposed Pre-eclampsia
 - (c) Superimposed Eclampsia

Profound changes in the coagulation and fibrinolytic system occurs during normal pregnancy causing a hypercoagulable state.⁹ There is a distinct possibility of accentuation of this hypercoagulable state of pregnancy during eclampsia and pre-eclampsia. The prothrombotic state may culminate in a process of chronic disseminated intravascular coagulation (DIC) leading to changes in kidney and placenta.¹⁰

Early assessment of severity of pre-eclampsia and eclampsia is necessary to prevent complications like HELLP syndrome and increased maternal and fetal morbidity and mortality. Hence, this study was undertaken with the aim to compare the coagulation parameters of women with pre-eclampsia and eclampsia.

MATERIAL AND METHODS

A hospital based cross-sectional study was conducted for a period of one year from July 2014 to June 2015. Total 90 PIH cases in their third trimester of pregnancy comprising of 30 Mild Pre-eclampsia, 30 Severe Pre-eclampsia and 30 Eclampsia patients from the Department of Obstetrics and Gynaecology, in a tertiary care centre of North-Eastern India, were enrolled for the study.

Ethical clearance was obtained from the Institutional Ethics Committee for conducting the study. Details of the study were explained to the subjects and written informed consent was taken from all the study subjects.

The coagulation parameters such as BT, CT, PT, aPTT, platelet count of the patients required for the study were carried out in the Advanced Hematology, Service Laboratory under Department of Pathology, in a tertiary care centre of North-Eastern India, by using SYSMEX XS-800i 5 part haematology analyzer and SYSMEX CA-500 series Coagulometer.

Criteria for selection of cases

Pregnant females in their third trimester with signs and

¹Post graduate trainee, ²Associate Professor, ³Associate Professor, Department of Obstetrics and Gynaecology, ⁴Professor and Head of the Department of Pathology, Assam Medical College and Hospital, Dibrugarh, Assam, India

Corresponding author: Dr. Upam Kr. Sharma, Department of Pathology, Assam Medical College and Hospital, Dibrugarh, PIN-786002, Assam, India.

How to cite this article: Upam Kr. Sharma, Reena Kouli, Ramesh Sonowal, Projnan Saikia. Coagulation parameters in pre-eclamptic and eclamptic patients - a comparative study of 90 cases. International Journal of Contemporary Medical Research 2016;3(8):2235-2238.

symptoms of PIH were included in the study. Criteria for selection is elevation of systolic blood pressure above 140 mm of Hg and/or diastolic blood pressure above 90mmof Hg or a rise in former of at least 15 mm of Hg above baseline value on at least two occasions and at least 6 hours apart. All the patients fulfilling these criteria with or without edema or proteinuria after 20 weeks of pregnancy were included in the study.

These patients were further categorized into three different categories: Mild Pre-eclampsia, Severe Pre-eclampsia and Eclampsia. Pre-eclampsia was diagnosed according to American College of Obstetrics and Gynaecology (ACOG) criteria;⁸ a blood pressure higher than 140/90 mm of Hg, edema and proteinuria >300mg/24 hours or $\geq 1+$ dipstick method after 20th week of gestation. Patient with blood pressure > 140/90 mm of Hg but <160/110 mm of Hg without proteinuria were included in the mild cases. And patient with blood pressure $\geq 160/110$ mm of Hg, proteinuria and presence of headache, visual disturbances, upper abdominal pain, oliguria and thrombocytopenia were included in severe cases. Eclampsia is defined as pre-eclampsia associated with seizures.

Exclusion criteria

- (1) All cases with pre-existing hypertension other than PIH.
- (2) Patients having co morbid conditions such as
 - Severe anaemia
 - Diabetes mellitus
 - H/o auto immune disorder.
 - H/o I.T.P. (Idiopathic Thrombocytopenic Purpura)
 - H/o receiving drugs like aspirin, anti-coagulants etc
- (3) Patients who didn't give consent for the study.

STATISTICAL ANALYSIS

Data were presented with percentages and mean with standard deviation. Statistical significance among the groups were assessed using ANOVA (Analysis of Variance) followed by Bonferroni. Data were analyzed using MS Excel 2007 and GraphPad Prism 7.

RESULTS

The mean bleeding time (BT) among the mild pre-eclampsia, severe pre-eclampsia and eclampsia cases were 87.87 (± 7.48) sec, 102.50 (± 10.15) sec and 103.27 (± 16.78) sec respectively (Figure-1). There was statistically significant increase in the BT between mild and severe pre-eclampsia and mild pre-eclampsia and eclampsia cases (Table-1).

The mean clotting time (CT) was 144.50 (± 8.44) sec among the mild pre-eclampsia cases and 156.17 (± 11.57) sec among the eclampsia cases. Among the severe pre-eclampsia cases the mean CT was 152.83 (± 9.53) sec. Although the CT increased with the severity of PIH it was not found to be statistically

significant.

The mean prothrombin time (PT) was 9.20 (± 1.14) sec among the mild pre-eclampsia cases and 9.68 (± 1.24) sec among the eclampsia cases. The increase in PT with the severity of PIH was not found to be statistically significant.

Among the mild pre-eclampsia and eclampsia cases the mean aPTT levels were 25.03 (± 1.75) sec and 35.14 (± 4.76) sec respectively. The increase in aPTT level with the severity of PIH was found to be statistically significant.

The mean platelet count among the mild pre-eclampsia cases was

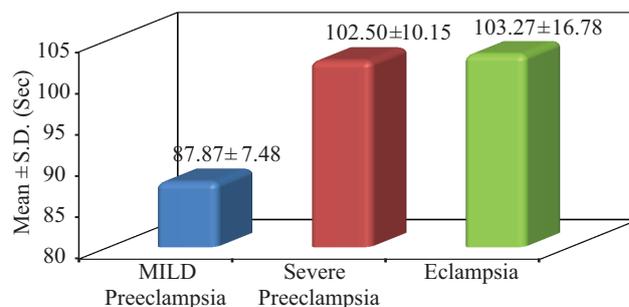


Figure-1: Coagulation profile of pih cases (bleeding time)

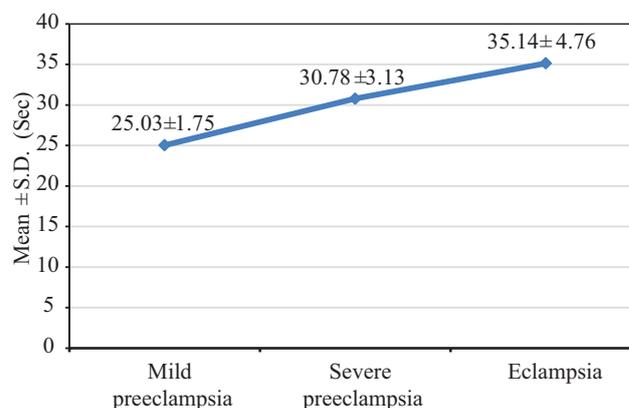


Figure-2: Coagulation profile of pih cases (apt level)

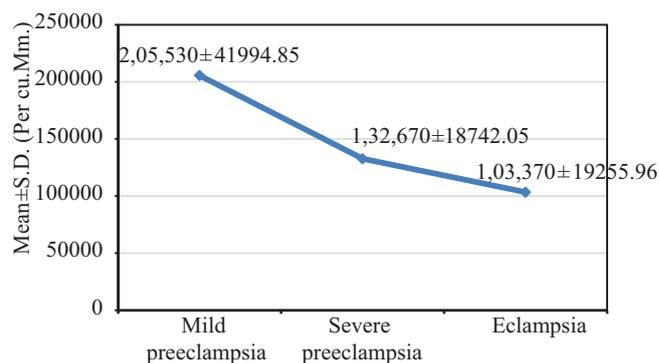


Figure-3: Coagulation profile of pih cases (platelet count)

	BT (sec)	CT (sec)	PT (sec)	aPTT (sec)	Platelet count (lacs per cu.mm.)
Mild pre-eclampsia (1)	87.87 ± 7.48	144.50 ± 8.44	9.20 ± 1.14	25.03 ± 1.75	205530 ± 41994.85
Severe pre-eclampsia (2)	102.50 ± 10.15	152.83 ± 9.53	9.27 ± 0.98	30.78 ± 3.13	132670 ± 18742.05
Eclampsia (3)	103.27 ± 16.78	156.17 ± 11.57	9.68 ± 1.24	35.14 ± 4.76	103370 ± 19255.96
	P value	P value	P value	P value	P value
Group 1 vs 2	0.000	1.000	1.000	0.00	0.000
Group 1 vs 3	0.000	0.061	0.293	0.000	0.000
Group 2 vs 3	1.000	0.495	0.461	0.000	0.000

Table-1: Comparison of Coagulation parameter in patients with pre-eclampsia and eclampsia

2, 05, 530 (± 41994.85) per mm^3 and 1, 03, 370 (± 19255.96) per mm^3 among the eclampsia cases. The platelet count decreased significantly with the increase in severity.

DISCUSSION

In the present study, there was statistically significant increase in the BT between mild and severe pre-eclampsia and mild pre-eclampsia and eclampsia cases. Chauhan P et al.¹¹, found that BT was 294.0 ± 43.20 (sec) in mild pre-eclampsia, 324.79 ± 59.00 (sec) in severe pre-eclampsia and 470.08 ± 189.00 (sec) in eclamptic patients and observed that the bleeding time increased significantly with the severity of PIH. The findings of the present study are in accordance with the study conducted by Chauhan P et al.¹¹

In the present study, although the CT increased with the severity of PIH it was not found to be statistically significant. Joshi SR et al.¹² in their study of coagulation profile in pregnancy induced hypertension at MIMER Medical College, Talegaon, Dabhade found that CT was 4.24 min in mild pre-eclampsia, 4.17 min in severe pre-eclampsia, 4.27 min in eclampsia patients and didn't find any significant prolongation of CT. Chauhan P et al.¹¹ in their comparative study of coagulation profile in pre-eclamptic and eclamptic patients with normotensive patients found that the clotting time was 368.40 ± 146.20 sec, 374.20 ± 124.80 sec, 376.64 ± 130.40 sec in mild pre-eclamptic, severe pre-eclamptic and eclamptic patients accordingly. However this increase in clotting time was not statistically significant. Shete AN et al.¹³ in their study found that the clotting time increased in eclampsia patients compared to normal pregnant women. The increase was however not statistically significant. Jambhulkar S et al.¹⁴ in their study in Govt. Medical College, Nagpur on coagulation profile in PIH patients didn't find any significant prolongation in the CT.

In the current study, although the PT increased with the severity of PIH it was not found to be statistically significant. Joshi SR et al.¹² in their study of coagulation profile in pregnancy induced hypertension at MIMER Medical College, Talegaon, Dabhade found that PT was 13.78 sec in mild pre-eclampsia, 13.93 sec in severe pre-eclampsia, 13.98 sec in eclampsia patients. Chauhan P et al.¹¹ in their comparative study of coagulation profile in pre-eclamptic and eclamptic patients with normotensive patients found that PT was 13.78 ± 1.82 sec in mild pre-eclampsia, 13.83 ± 1.82 sec in severe pre-eclampsia, 14.14 ± 1.50 sec in eclampsia patients. However this increase in prothrombin time was not statistically significant. Jambhulkar S et al.¹⁴ in their study in Govt. Medical College, Nagpur on coagulation profile in PIH patients didn't find any significant prolongation in the PT. Osmanağaoğlu MA et al.¹⁵ in their study on coagulation inhibitors in pre-eclamptic pregnant women didn't observe any significant difference in the prothrombin time value between severe pre-eclamptic and the control group. The findings of the present study are almost similar to the study conducted by Joshi SR et al.¹², Chauhan P et al.¹¹, Shete AN et al.¹³, Jambhulkar S et al.¹⁴ and Osmanağaoğlu MA et al.¹⁵

In the present study, the increase in aPTT level with the severity of PIH was statistically significant. Joshi SR et al.¹² found that aPTT was 28.44 (sec) in mild pre-eclamptic patients, 30.32 (sec) in severe pre-eclamptic patients and 31.62 (sec) in eclamptic patients and observed that the aPTT level in PIH patients was

significantly prolonged. Osmanağaoğlu MA et al.¹⁵ in their study on coagulation inhibitors in pre-eclamptic pregnant women observed a significant difference with regard to partial thromboplastin time between severe pre-eclamptic and the control group ($p < 0.0001$). Jambhulkar S et al.¹⁴ in their study in Govt. Medical College, Nagpur on coagulation profile in PIH patients found that PTTK (aPTT) was significantly prolonged. The present study is in accordance with the study conducted by Joshi SR et al.¹², Osmanağaoğlu MA et al.¹⁵ and Jambhulkar S et al.¹⁴

In the current study, the platelet count decreased significantly with the increase in severity. Chauhan P et al.¹¹ in their study found platelet count 173.33 ± 25.91 in mild pre-eclampsia, 145.04 ± 23.76 in severe pre-eclampsia, 121.05 ± 22.44 in eclampsia and observed a statistically significant decrease in platelet count with an increase in severity of PIH. Sarkar PD et al.¹⁶ in their study found that platelet count was 1.98 ± 0.41 lacs/cumm in mild pre-eclamptic women and 1.47 ± 0.32 lacs/cumm in severe pre-eclamptic patients and this difference in the platelet count was statistically significant. Mohapatra S et al.³ in their study found that platelet count was 2.23 ± 0.19 lacs/cumm in mild pre-eclamptic, 1.82 ± 0.45 lacs/cumm in severe pre-eclamptic, 1.21 ± 0.49 lacs/cumm in eclamptic patients and observed that there is an inverse relationship between the severity of PIH and platelet numbers. Vrunda JK et al.¹⁷ in their study found platelet count was 2.00 (lacs/cumm) in mild pre-eclamptic patient, 1.40 (lacs/cumm) in severe pre-eclamptic patients and 1.30 (lacs/cumm) in eclamptic patients and observed that thrombocytopenia is directly proportional to the severity of PIH. Shete AN et al.¹³, Government Medical College, Aurangabad, conducted a study to assess the physiological stress during Pregnancy Induced Hypertension and observed a significant decrease in platelet count. In a study conducted by Sultana R et al.¹⁸ on platelet count in pre-eclampsia, it was observed that the mean platelet count in cases and controls were 1, 44, 260 \pm 96, 472 and 1, 98, 100 \pm 51, 219 respectively. The study revealed that low platelets count is associated with pre-eclampsia. The findings of the present study therefore correlates with the study conducted by Chauhan P et al.¹¹ (2014), Sarkar PD et al.¹⁶, Mohapatra S et al.³, Vrunda JK et al.¹⁷, Shete AN et al.¹³ and Sultana R et al.¹⁸

CONCLUSION

In the light of the results and observations of the present study, we can say that certain coagulation parameters such as BT, aPTT, platelet count were associated with the severity of the disease, although certain coagulation parameters such as CT, PT did not show a significant change with the severity of PIH. These abnormalities pertaining to coagulation parameters in PIH indicate the impending intravascular coagulation. Timely measurement of these parameters and prompt treatment might reduce systemic complications and maternal death due to Pregnancy Induced Hypertension.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 17-06-2016; **Published online:** 20-07-2016