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Original Article

Comparative Study of Coagulation Profile in Mild Pre-eclampsia, Severe Pre-eclampsia, and Eclampsia

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Abstract

Introduction: Alteration of coagulation factors increases the risk of bleeding complications in pre-eclampsia and eclampsia. To reduce the maternal morbidity and mortality need of accurate and rapid biochemical tests to detect the complications of pre-eclampsia and eclampsia. The aim of the present study is to detect the severity of hypertensive disorders during pregnancy and to compare the coagulation profile in mild pre-eclampsia, severe pre-eclampsia, and eclampsia patients.

Materials and Methods: A total of 200 pregnancy-induced hypertension (PIH) patients were selected for this study, among which 100 were presented with mild pre-eclampsia, 70 were severe pre-eclampsia, and 30 were eclampsia. Coagulation profile was investigated and analyzed.

Results: Platelet count was reduced in pre-eclampsia and eclampsia. Prothrombin time, activated partial thromboplastin time, bleeding time, and clotting time were prolonged in severe eclampsia and eclampsia. Statistical significance of coagulation profile was observed between mild pre-eclampsia and eclampsia, mild pre-eclampsia and severe pre-eclampsia.

Conclusion: Estimates of the biochemical parameters play an important role in the diagnosis of PIH and evaluation of risk factors, early detection, and effective antenatal services, prompt and proper management will decrease the maternofetal mortality, morbidity, and also perinatal mortality.

Key words: Coagulation profile, Eclampsia, Pre-eclampsia

INTRODUCTION

Pregnancy-induced hypertension (PIH) is hypertensive disorders usually appear after the 20th week of gestation, which often results in multiorgan failure.[1] PIH plays a major role in perinatal mortality and morbidity. Globally, about 5-10% of all pregnancies are complicated by hypertensive disorders.

PIH can present in the form of pre-eclampsia or eclampsia. Pre-eclampsia is a multisystem hypertensive disorder characterized by triad of hypertension, proteinuria, and edema. Eclampsia is a severe form characterized by convulsions or coma.

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PIH may also result in a variety of hematological aberrations.[2] Thrombocytopenia is the most common hematological abnormality found in pre-eclampsia and eclampsia.[3] It is a strong indicator of severity of PIH.[2] Other coagulation abnormalities such as prothrombin time (PT), activated partial thromboplastin time (aPTT), fibronectin time, and antithrombin III level are more sensitive.[1]

Alteration of coagulation factors increases the risk of bleeding complications in pre-eclampsia and eclampsia. Hemorrhages are a major problem where it is the main cause of maternal mortality, which usually occur during operative delivery or regional anesthesia procedure.

To reduce the maternal morbidity and mortality need of accurate and rapid biochemical tests to detect the

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complications of pre-eclampsia and eclampsia including HELLP syndrome. Detecting the severity of PIH disorders, help in the better management of patients. Hence, the present study has undertaken to correlate coagulation parameters with the severity of PIH, which helped us in the early management of PIH before it worsens.

The aim of the present study is to detect the severity of hypertensive disorders during pregnancy and to compare the coagulation profile in mild pre-eclampsia, severe pre-eclampsia, and eclampsia patients.

MATERIALS AND METHODS

The study has done on pregnant women with PIH disorders for 1½ years at the Department of OBG, Government General Hospital, Anantapur, from April 2014 to December 2015. This prospective study has started after taking informed consent from all the studied patients. Ethical Committee has approved to do this study.

Inclusion Criteria

Pregnant women with both mild and severe pre-eclampsia and eclampsia in the age group of 16-35 years.

Exclusion Criteria

Pregnant women in labor or with abruptio placentae or with established disseminated intravascular coagulation (DIC) or anticoagulation therapy were excluded in this study.

A total of 200 PIH patients were selected for this study, among which 100 were presented with mild pre-eclampsia, 70 were severe pre-eclampsia, and 30 were eclampsia. Details of the study were explained to all PIH women. Data regarding age, sex, number of pregnancies, socioeconomic status, presenting complaints, significant past, and family history were noted. General, systemic, and obstetrical examination was done.

Patients were advised for blood investigations including routine blood and urine examination, renal and liver function tests, blood sugar, lipid profile, and coagulation profile. Coagulation parameters were assessed using following methods:

1. Platelet count - using automated hematology analyzer
2. PT and aPTT - using a coagulometer
3. Bleeding time (BT) - by Dukes method
4. Clotting time (CT) - by Wright's capillary tube method.

All the data regarding coagulation profile were entered into excel sheet and analyzed.

RESULTS

A total of 200 patients with PIH disorders were included in the study. Peak incidence of PIH disorders was seen in 26-30 years followed by 21-25 years (Figure 1). 90 (45%) patients were in the age group of 26-30 years followed by 78 (39%) were in the age group of 21-25 years.

Out of 200 patients selected for doing this study, 100 were mild pre-eclampsia, 70 were severe pre-eclampsia, and 30 were severe pre-eclampsia. All the three PIH disorders were most commonly observed in the age group of 26-30 years followed by 21-25 years, 31-35 years, and 16-20 years (Table 1).

Mean of coagulation parameters was estimated and tabulated in Table 2. Platelet count reduced with increase in severity (mild pre-eclampsia to eclampsia). PT, aPTT, BT, and CT were prolonged in severe eclampsia and eclampsia.

Statistical significance of coagulation profile was observed between mild pre-eclampsia and eclampsia, mild pre-eclampsia, and severe pre-eclampsia (Table 3).

Prolonged PT and aPTT were observed in severe pre-eclampsia when compared to eclampsia and mild pre-eclampsia (Table 4). PT prolongation in between mild pre-eclampsia and severe pre-eclampsia showed statistically significant ($P = 0.0001$).

DISCUSSION

Pre-eclampsia is an idiopathic multisystem disorder specific to human pregnancy and puerperium. Hematological abnormalities such as thrombocytopenia and decrease in some plasma clotting factors may develop in pre-eclamptic women. Subtle changes suggesting DIC is one of the serious outcomes of pre-eclampsia.

During pregnancy, there is increase in the concentration of clotting factor II, V, VII, VIII, IX, X, XII. Plasma

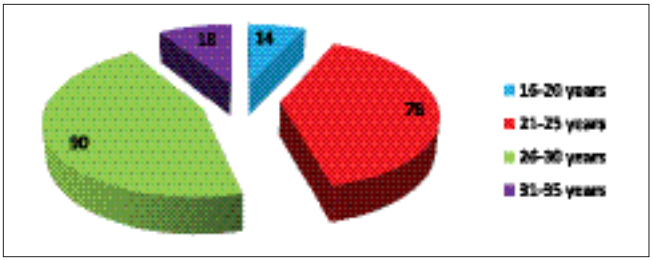

Figure 1: Age-wise distribution of cases

fibrinogen level is significantly increase. Plasma fibrinolytic activity is suppressed during pregnancy and labor. It returns to normal within 1 h of delivery of the placenta. This is due to the liberation of plasminogen inhibitor from the placenta. Because of the hypercoagulable state in pregnancy, the presence of any provocative factor can easily upset the normal balance culminating into IDC. In PIH, due to endothelial injury, the delicate hemostatic mechanism is triggered, which leads to coagulation failure.

In the present study, all the three PIH disorders were most commonly observed in the age group of 26-30 years followed by 21-25 years, 31-35 years, and 16-20 years.

Platelet count reduced with increase in severity (mild pre-eclampsia to eclampsia) in this study. This indicates that there is an inverse relationship between severity of PIH and platelet count.[1] Similar to our study, many studies have shown that platelet count decreased in pre-eclampsia and eclampsia when compared to normal pregnancy.[1-5]

PT, aPTT, BT, and CT were prolonged in severe eclampsia and eclampsia. Statistical significance of coagulation profile was observed between mild pre-eclampsia and eclampsia, mild pre-eclampsia and severe pre-eclampsia in this study. Pritchard *et al*.,[6] Osmanagaoglu *et al*.,[7] and Jambhulkar *et al*.[8] documented that coagulation factors such as PT, BT, coagulation time, and aPTT were decreased among PIH women when compared to normal pregnancy.

As per this study, prolonged PT and aPTT were observed in severe pre-eclampsia when compared to eclampsia and mild pre-eclampsia. Prolonged PT was seen in 8 PIH women and prolonged aPTT was seen in 23 PIH women. Leduc *et al*.[2] found 13 PIH women out of 100 had prolonged PT and aPTT.

An ongoing coagulopathy should be suspected if thrombocytopenia along with prolongation of PT and aPTT is found and treatment should be started at the earliest.

The abnormalities pertaining to coagulation parameters in PIH indicate the intravascular coagulation. Platelet count and aPTT have predictive value in detecting DIC in PIH, and these parameters show more abnormal results with increasing severity of PIH. Total platelet count with PT and aPTT can be taken as an earliest, simple, and rapid procedure for screening pre-eclampsia cases at admission.[9,10]

Table 1: Age-wise distribution of various categories of PIH cases

Age in years	*n* (%)		
	Mild pre-eclampsia	Severe pre-eclampsia	Eclampsia
16-20	7 (4)	5 (7.14)	2 (6.66)
21-25	39 (39)	28 (40)	11 (36.6)
26-30	45 (45)	31 (44.28)	14 (46.7)
31-35	9 (9)	6 (8.58)	3 (10)
Total	100 (100)	70 (100)	30 (100)

PIH: Pregnancy-induced hypertension

Table 2: Coagulation profile in different categories of PIH

Coagulation profile	Normal value	Mild pre-eclampsia	Severe pre-eclampsia	Eclampsia
Platelet count	1.5-4 lakhs	2.1±0.5 lakhs	0.8±0.3 lakhs	0.7±0.3 lakhs
PT	11-13 s	12.4±0.5 s	16.1±2.05 s	15.8±2.4 s
aPTT	27-38 s	33.6±5.4 s	44.6±2.3 s	42.4±3.5
BT	2-5 min	3.5±1.5 min	4.8±1.5 min	5.3±2.4
CT	3-5 min	4.2±1.6 min	5.4±4.3 min	5.6±1.3

PIH: Pregnancy-induced hypertension, PT: Prothrombin time, aPTT: Activated partial thromboplastin time, BT: Bleeding time, CT: Clotting time

CONCLUSION

We conclude that platelet count was decreased, and PT, aPTT, BT, and CT were prolonged in severe eclampsia and eclampsia, which was statistically significant. Prolonged PT and aPTT were observed most commonly in severe eclampsia. Estimates of the biochemical parameters play

Table 3: Statistical significance between PIH disorders

Coagulation profile	Mild pre-eclampsia versus eclampsia		Severe pre-eclampsia versus eclampsia		Mild pre-eclampsia versus severe pre-eclampsia	
	P value	Significance	*P* value	Significance	*P* value	Significance
Platelet count	0.0001	ESS	0.2018	NSS	0.0001	ESS
PT	0.0001	ESS	0.6046	NSS	0.0001	ESS
aPTT	0.0001	ESS	0.0056	ESS	0.0001	ESS
BT	0.0009	ESS	0.3372	NSS	0.0014	ESS
CT	0.0005	ESS	0.8082	NSS	0.0005	ESS

PIH: Pregnancy-induced hypertension, PT: Prothrombin time, aPTT: Activated partial thromboplastin time, BT: Bleeding time, CT: Clotting time, ESS: Extremely statistically significant, NSS: Not statistically significant

Table 4: Abnormal coagulation among PIH cases

Total number of cases	Mild pre-eclampsia	Severe pre-eclampsia	Eclampsia	Total
Patients with prolonged PT	1	4	3	8
Patients with prolonged aPTT	2	14	7	23

PIH: Pregnancy-induced hypertension, PT: Prothrombin time, aPTT: Activated partial thromboplastin time

an important role in the diagnosis of PIH and evaluation of risk factors, early detection, and effective antenatal services, prompt and proper management will decrease the maternofetal mortality, morbidity, and also perinatal mortality.

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