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A COMPARATIVE STUDY OF COAGULATION PROFILE IN PRE-ECLAMPTIC AND ECLAMPTIC PREGNANT PATIENTS WITH NORMOTENSIVE PREGNANT PATIENTS AT TERM

Obstetrics & Gynaecology

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ABSTRACT

Aim: To study and compare the coagulation profile in pre-eclamptic and eclamptic pregnant patients with normotensive pregnant patients at term. **Material and Methods:** The study was conducted in the Department of Obstetrics and Gynaecology, Jorhat Medical College and Hospital for a period of one year. A total of 120 pregnant women at term were included in the study comprising of 60 normotensive women (Group A), 40 pre-eclamptic(Group B) and 20 eclamptic (Group C) pregnant women. Coagulation parameters such as BT, CT, PT, aPTT, platelet count and D-dimer were studied and compared between the three groups. **Results:** In pre-eclampsia and eclampsia, decrease in platelet count was highly significant ($p<0.001$). Prothrombin time, activated partial thromboplastin time, bleeding time and D-dimer were prolonged in pre-eclampsia and eclampsia and was statistically significant. Clotting time also increased in pre-eclampsia and eclampsia but was not significant. **Conclusion:** The abnormalities pertaining to coagulation parameters in hypertensive disorders of pregnancy indicate the intravascular coagulation. Thus suspecting a deranged coagulation status helps to plan preemptive management strategies that have a crucial role in reducing the morbidity and mortality of mother and fetus.

KEYWORDS

Pre-eclampsia, Eclampsia, Coagulation parameters, Thrombocytopenia

INTRODUCTION

Hypertension is considered as one of the most common medical complications during pregnancy. It is a leading cause of maternal and perinatal mortality, with an incidence of 5-10%. The incidence in developing countries varies from 1 in 100 to 1 in 1700 cases, whereas approximately, 1 in 2000 deliveries is complicated by eclampsia in developed countries.[1] The incidence of pre-eclampsia in India is reported to be 8-10%.

Normal pregnancy is a hypercoagulable state caused by profound changes in the coagulation and fibrinolytic system.[2] The concentration of coagulation factors VII, VIII, IX, X XII and Von Willebrand factor rise significantly during pregnancy. This is often accompanied by a relevant increase in the concentration of plasma fibrinogen level. Plasma fibrinolytic activity is reduced as the placenta released plasminogen inhibitor.[3] Thus the cycle of coagulation and fibrinolysis in pregnancy is continuously triggered by all these events, complicating pregnancy with preeclampsia.[4]

Haematological abnormalities of coagulation develop in severe pre-eclampsia and eclampsia.[1] Thrombocytopenia is the most common hematological abnormality found out of all the hematological changes that occur in pre-eclampsia and eclampsia.[5] The frequency and intensity of thrombocytopenia vary and depend upon the severity and duration of the preeclampsia and eclampsia. Elevated factor VIII consumption, increased levels of fibrinopeptides A and B and D-dimers, and reduced levels of regulatory proteins antithrombin III and proteins C and S are some of the subtle changes consistent with intravascular coagulation.[6]

The tests like prothrombin time, activated partial thromboplastin time, bleeding time and clotting time are considered more sensitive.[7] The function of endogenous and exogenous coagulation pathways is reflected by aPTT and PT respectively. A certain degree of coagulative dysfunction occurs in the endogenous coagulative pathway of severe preeclampsia patients while their exogenous coagulative do not change greatly.[8] Thus, by using correct and necessary laboratory tests we can diagnose the complications of hypertensive disorders of pregnancy.[7]

Pre-eclampsia and eclampsia forms a substantial portion of admissions in our hospital. Disseminated intravascular coagulation (DIC) in these patients can contribute significantly to the morbidity and sometimes even to mortality. Early assessment and management of severity of pre-eclampsia and eclampsia is necessary to prevent complications and decreased maternal and fetal morbidity and mortality.

Thus it was extremely necessary to study the occurrence of derangements in the coagulation system in patients with pre-eclampsia and eclampsia.

AIM

To compare the coagulation profile in pre-eclamptic and eclamptic pregnant patients with normotensive pregnant patients at term.

MATERIAL AND METHODS

The study was conducted in the Department of Obstetrics and Gynaecology with collaboration of Department of Pathology, Jorhat Medical College and Hospital during a period of one year. It is a Hospital based observational cross sectional study. The study was conducted over a period of one year from July 2021 to June 2022. The study population consists of all pregnant patients coming to Obstetrics and Gynaecology Department in Jorhat Medical College and Hospital, who fulfill the selection criteria.

Sample Size

Based on hospital records available, the number of patients fulfilling the selection criteria in the year 2019 and 2020 was 120 and 137 respectively. Therefore, the expected number of samples would be 120 from these available records, under 95% confidence interval, 10% absolute error, using Epi info software. Normotensive patients (Group A) - 60, Pre-eclamptic (Group B) and Eclamptic(Group C)-60.

Selection Of Cases

Inclusion Criteria

All normotensive, pre-eclamptic and eclamptic pregnant women between 37 to 42 weeks of gestation who came for safe delivery.

Exclusion Criteria.

Pregnant Women:

1. With known bleeding disorders like von Willebrand disease, Bernard-Soulier syndrome,Glanzmann thrombasthenia, etc.
2. On anticoagulant therapy.
3. With abruption placentae and placenta previa.
4. With IUD and multifetal pregnancy.
5. Preexisting medical disorders – Diabetes mellitus, chronic hypertension, seizure disorders, renal diseases, haemoglo-

binopathies, thyroid disorders and severe anaemia
6. Patients who did not give consent.

Study Variables
1. Bleeding time (BT)
2. Clotting time (CT)
3. Prothrombin time (PT)
4. Platelet count
5. Activated partial thromboplastin time (aPTT)
6. D-dimer

60 pregnant women were selected with normal blood pressure (Group A). Those with blood pressure of 140/90mmHg and above, who developed hypertension for the first time during pregnancy after 20 weeks of gestation are divided into two groups. The pre-eclampsia group (Group B) consists of 40 pregnant women with blood pressure between 140/90mmHg and 160/110mmHg with symptoms like vomiting, headache, visual disturbances, upper abdominal pain, and low platelet count. The eclampsia group (Group C) consists of 20 pregnant women with systolic blood pressure above 160mmHg and diastolic blood pressure above 110mmHg along with convulsion and symptoms like vomiting, headache, visual disturbances, upper abdominal pain, and low platelet count.

Blood was drawn from the study subjects upon admission into the Obstetrics ward and transported to the laboratory immediately. The following methods were used for estimation of different study variables.
1. Bleeding time (BT) – By Duke's method
2. Platelet Count – By using Manual method or Sysmex XN-550 Japan, 6 part fully automated hematology cell counter.
3. Clotting time (CT) – By Wright's capillary tube method
4. Prothrombin time (PT) and Activated partial thromboplastin time (aPTT) – By using Automated Analyser SYSMEX CA-101.
5. D-dimer- By using The Finecare D-dimer Rapid quantitative test. It is a fluorescence immunoassay used along with Finecare FIA System for quantitative determination of D-dimer.

Prothrombin time and activated partial thromboplastin time were considered abnormal if they were > 14 seconds and >35 seconds respectively. Bleeding time was considered abnormal if it was more than >7.1 minutes (430 seconds) and clotting time was abnormal if it was > 10 minutes (600seconds).

Statistical Analysis
Data was compiled and analysed using Microsoft Excel and data is presented in terms of percentage, mean+/- SD and Analysis of variance (ANOVA) is used to find p value.
p value > 0.05 not significant
p value < 0.05 significant
p value < 0.001 highly significant

RESULTS
A total of 120 subjects were included in this study. 60 subjects were normotensive pregnant patients (GroupA). 60 subjects were patients with pre-eclampsia and eclampsia. Out of these 60 patients 40 patients were with pre-eclampsia (Group B), 20 patients were with eclampsia (Group C).

Table 1: Distribution Of Women According To Demographic Characteristics.

Characteristics	Frequency (%)	
Age	<20 years	11.66
	20-25 years	50
	26-30 years	25.83
	>30 years	12.5
Residence	Rural	75
	Urban	25
Parity	PRIMI	58.33
	MULTI	41.66
Socio-economic status	CLASS I	3.33
	CLASS II	8.33
	CLASS III	12.5
	CLASS IV	50
	CLASS V	25.83

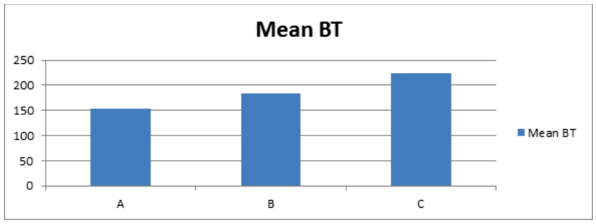

Fig-1: Shows The Comparison Of Mean Bleeding Time (bt)

The bleeding time shows an increasing trend from Group A to Group C.

But the mean value of BT lies within the normal range in all the 3 Groups.

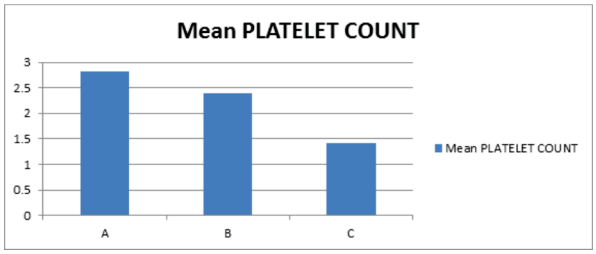

Fig-2: Shows The Comparison Of Mean Platelet Count

The Platelet Count shows a decreasing trend from Group A to Group C.

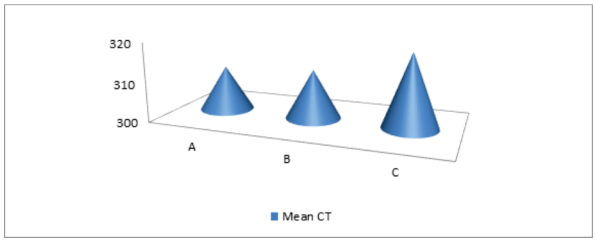

Fig-3: Shows The Comparison Of Mean Clotting Time (ct)

The Clotting time shows an increasing trend from Group A to Group C. But the mean value of CT lies within the normal range in all the 3 Groups.

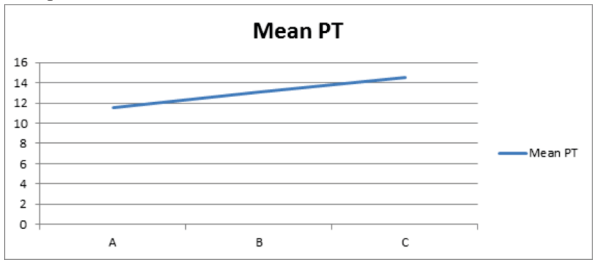

Fig-4: Shows The Comparison Of Mean Prothrombin Time (pt)

The Prothrombin time shows an increasing trend from Group A to Group C.

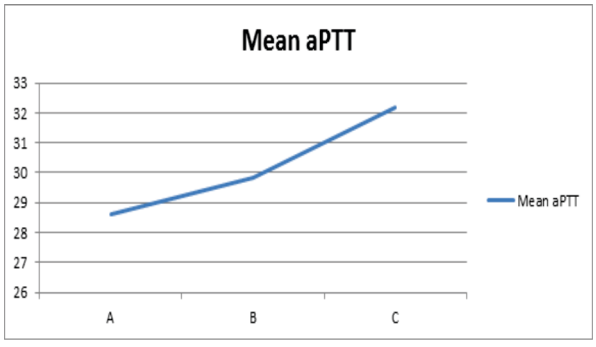

Fig-5: Shows The Comparison Of Mean Activated Partial Thromboplastin Time (aptt)

The aPTT shows an increasing trend from Group A to Group C.

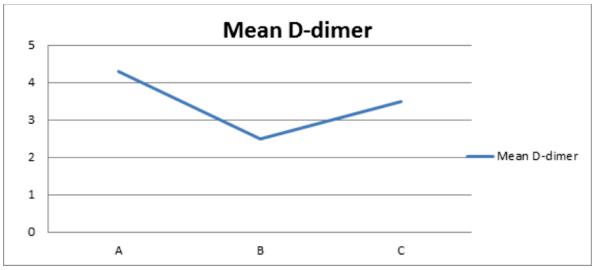

FIG-6: SHOWS THE COMPARISON OF MEAN D-DIMER

The D-dimer shows an increasing trend from Group A to Group C indicating increased fibrinolytic activity.

Table 2- Comparison Of Coagulation Profile

Coagulation Parameters	A	B	C	p-value	Signifacance
BT	153.63± 22.76	184.27± 16.41	224.7± 19.94	0	significant
Platelet count	2.81± 0.76	2.39± 0.54	1.42± 0.31	0	significant
CT	311.53± 73.69	312.5± 55.48	318.75± 78.63	0.9196	Not significant
PT	11.57± 1.33	13.06± 2.08	14.52± 2.05	0	significant
aPTT	28.63± 3.74	29.81± 3.59	32.16± 3.033	0.001	significant
D-dimer	1265.76± 123.39	1518.27± 278.62	2344.4± 535.237	0	significant

As depicted in Table-1 above, all the parameters showed statistical significance, except clotting time (CT) was statistically insignificant.

DISCUSSION

The present study was undertaken to study and compare the coagulation profile in pre-eclamptic and eclamptic pregnant patients with normotensive pregnant patients at term and to diagnose coagulation defects early and manage before it worsens. The results and observations of the present study are compared in this chapter in the light of available data, information and observations made by other workers in similar region or elsewhere.

In this study, Platelet count was estimated to be 2.81lacs/mm^3±0.76 in normal pregnant patients, 2.39 lacs/mm^3 ±0.54 in pre-eclampsia and 1.42 lacs/mm^3±0.51in eclampsia. This is supported by a study conducted by S. Mohapatra et.al[9] where platelets were found to be 2.38 lacs/mm^3 ± 0.33 in control group, 2.23 lacs/mm^3 ± 0.19 in mild PIH, 1.82lacs/mm^3 ± 0.45 in pre-eclampsia and 1.21 lacs/mm^3 ±0.49 in eclampsia. This indicated that there is an inverse relationship between the severity of PIH and platelet count. The p value of our study also correlates well with other authors and was found to be highly significant (p<0.001).

Present study showed the mean bleeding time for normal pregnancy, pre-eclampsia and eclampsia was 153.63 seconds, 184.27 seconds and 224.7 seconds respectively. P-value <0.001 is significant. Kelton et.al[10] showed that thrombocytopenia in pre eclampsia was frequently associated with prolonged bleeding time. In our study also BT showed an increasing trend from normal patients to eclampsia patients but was within normal range.

The mean clotting time for normal pregnancy was 311 seconds, clotting time for pre-eclampsia was 312 seconds and eclampsia was 318 seconds, the P-value 0.9196 is not significant. Similar results were found in studies done by Chauhan P et al [7], Vijayalaxmi et al[11] and Upam Sharma et al[12]. Chauhan P et. al[7] in their study 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.

In present study the mean prothrombin time for normal pregnancy, pre-eclampsia and eclampsia patients were 11.57 seconds, 13.06 seconds and 14.52 seconds respectively, with significant P-value <0.001. Meena P et al[13] and Mishra et al[14] observed that the mean PT was found to be significantly increased with p value of <0.05 in their studies.

In present study the mean aPTT for normal pregnancy, pre-eclampsia and eclampsia patients were 28.63 seconds, 29.81 seconds and 32.165 seconds respectively. The statistical analysis shows the p value to be significant (p<0.001).Findings similar to present study are also seen in studies done by Vijayalaxmi et al[11] and Thakur B et al[15].

In the current study D-dimer levels of pre-eclamptic women as compared to normal controls were significantly high, 1265.76±76 ng/dl vs 1518.27±278.62 ng/ml (p<0.001) which is consistent with a study conducted by Kucukgoz Gulec U et.al[16] where D-dimer levels were significantly higher in study group than the control group and it was also significantly higher in the patients with severe pre-eclampsia than mild pre-eclampsia.

CONCLUSION

From our study, we can conclude that coagulation profile is an important tool in the detection of coagulation failure early and its management before the condition worsens. Platelet count showed inverse relationship with severity of disease while Bleeding time, Prothrombin time and Activated Partial Thromboplastin time showed prolonged values.

Both preeclampsia and eclampsia are an important cause of severe morbidity, long-term disability and death among mothers and their babies. Thus by knowing the coagulation profile adequate management can be taken i.e. fresh frozen plasma, compatible blood transfusion induction of labour or caesarean section so that mothers and their babies can be saved from this fatal condition.

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