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Comparative study of Coagulation Profile in Pre-Eclamptic and Eclamptic Patients with Normotensive Pregnant Patients: 2 Year Study

Suresh Arjunrao Chaware*, Shivaji Dadarao Birare, Namita Vinod Naigaonkar***, Sanjaykumar Khemlal Mahule*****

*Associate Professor **Associate Professor and Head ***Resident, Dept. of Pathology, GMC, Latur, Maharashtra, India.

Abstract

Background: Pregnancy induced hypertension (PIH) is one of the most common causes of both maternal and neonatal morbidity and associated with adverse pregnancy outcomes.Profound changes in coagulation and fibrinolytic system occur during normal pregnancy causing hypercoagulable state. Early identification of high risk women and monitoring derangements in their coagulation system are surely pivotal in the prevention of complications. Hence, this study was undertaken to compare the coagulation profile in pre-eclamptic and eclamptic patients with normotensive pregnant patients. *Material and Methods:* A total of 240 patients were categorized into two equal groups as Group I - Cases (120 patients of pre-eclampsia and eclampsia) and Group II - Control (120 healthy pregnant women). The coagulation parameters such as BT, CT, PT, aPTT, platelet count of the patients required for the study were carried out by using semi-automated CA-54 coagulation analyzer and kits. *Results:* Mild PE did not reveal any significant changes in coagulation parameters as compared to healthy pregnant women. However, severe PE and eclampsia were characterized by thrombocytopenia and coagulation abnormalities indicating intravascular coagulation. Platelet count and aPTT had predictive value in screening for consumptive coagulopathy in the severe cases of PE and eclampsia. *Discussion:* Coagulation studies are the simple, cost effective and readily available tools in early diagnosis of maternal derangement of coagulation in pre-eclampsia and eclampsia. The information of present study might enrich the knowledge of clinician for early identification of pre-eclampsia.

Keywords: Pregnancy Induced Hypertension; Coagulation Profile; Eclampsia; Pre- Eclampsia.

Introduction

Over half a million women die each year from pregnancy related causes [1]. In many low Income countries, complications of pregnancy and childbirth are the leading cause of death amongst women of reproductive years. It is the third leading cause of maternal mortality responsible for 15% of maternal deaths [2].

Pregnancy Induced hypertension (PIH) still remains a nightmare for every obstetrician. PIH is defined as hypertension that occurs in pregnancy for the first time after 20 weeks of gestation and disappears following delivery. Hypertensive disorders complicating pregnancy are common and form one of the deadly triad along with haemorrhage and infection that results in maternal and perinatal morbidity [3]. Perinatal mortality is high following pre-eclampsia and even higher following eclampsia. Together they constitute about 10-15% of maternal morbidity and mortality rates [2].

Due to low socioeconomic status, apathetic attitude, poor health education and lack of regular antenatal supervision the incidence of pre-eclampsia is more in developing countries like India [4].

Profound changes in coagulation and fibrinolytic system occur during normal pregnancy causing hypercoagulable state. There is a distinct possibility

Corresponding Author: Suresh Arjunrao Chaware, Priyaplazza Residency, Flat 304, Venkateshnagar, Near Mayurban Row House, Ambajogi Road, Latur- 413512, Maharashtra.

E-mail: drsureshchaware2000@rediffmail.com

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of accentuation of these hypercoagulative changes in pre-clampsia and eclampsia [5]. The prothrombotic state may culminate in a process of chronic disseminated intravascular coagulation (DIC) leading to changes in kidney and placenta [6]. These underlying coagulation abnormalities increase the risk of bleeding complications especially during operative deliveries. These subtle changes consistent with DIC occurring in pre-eclampsia and are potentially serious [7].

Coagulation profile can be assessed by tests such as, Bleeding Time (BT), Clotting Time (CT), Prothrombin Time (PT), Activated Partial Thromboplastin Time (aPTT) and platelet count [8].

In the mother, pre-eclampsia may cause premature cardiovascular diseases, such as chronic hypertension, heart disease and stroke. Later in life, while children born after pre-eclamptic pregnancies and who are relatively small at birth, have an increased risk of stroke, coronary heart disease and metabolic syndrome in adult life [9]. Thus, early identification of such high risk women and monitoring derangements in their coagulation system are surely pivotal in the prevention of complications.Hence, this study was undertaken to compare the coagulation profile in pre-eclamptic and eclamptic patients with normotensive pregnant patients.

Material and Methods

A total of 240 patients admitted in Tertiary Care Hospital in Department of Obstetrics and Gynaecology, Govt. Medical College Latur, Maharashtra, India were studied. These patients were categorized into two equal groups as Group I - Cases (120 patients of pre-eclampsia and eclampsia) and Group II - Control (120 healthy pregnant women).

The Group I consisted of patients presented with pre-eclampsia and eclampsia between 20-42 weeks of gestation. Pre-eclampsia cases were divided into mild and severe grades as follows- Mild pre-eclampsia- Blood pressure between 140/90 mm Hg to 160/110 mm Hg, recorded 6 hrsapart with patient at bed rest. Severe pre-eclampsia- Two or more of the following signs- BP ≥160/110 mm Hg,recorded 6 hrs apart with patient at bed rest and/or proteinuria of 3+ to 4+ proteins on dipstickand/or oligouria- urine output <400 ml/24hr and/or epigastric pain and/or cerebral or visual disturbances with eye changes- fundoscopy performed under the guidance of an ophthalmologist and/or pulmonary edemaand/or elevated serum creatinine levels.

Patients with history ofknownbleedingdisorders, hydatidiform mole, epilepsy, essentialhypertension and onanticoagulationtherapy were excluded from the study.

After taking history and clinical examination, blood samples were collected for routine laboratory investigations and for coagulation studies. The coagulation parameters such as BT, CT, PT, aPTT, platelet count of the patients required for the study were carried out in the Department of Pathology, by using semi-automated CA-54 coagulation analyzer. PT was done on coagulometer. The kit used was DIAGNOS THROMBO 1.0 whereas; DIAGNOS aPTTkit was used for aPTT level (manufactured by Diagnostic Enterprises).

Statistical Analysis

The data was statistically analyzed using percentages and Pearson chi square test. The results were considered significant if 'p' value is ≤0.05.

Results

Out of total 120 cases of pre-eclampsia and eclampsia, 60 patients had mild PE, 30 had severe PE and remaining 30 hadeclampsia. Most of the patients in study and control group were in the age ranging between 21-29 years. Most of the patients included in the study were primigravidae. As compared to mild and severe PE, eclampsia was more common in primigravidae (Table 1).

In present study, 20 patients (33.3%) of mild PE, 28 patients (93.3%) of severe PE and all 30 patients (100%) of eclampsia show significant i.e., 2+ to 4+ proteinuria. Edema was observed in 31 patients (51.7%) of mild PE. 24 (80%) and 27 (90%) patients of severe PE and eclampsia respectively showed edema of hands, feet and generalized edema. Clinical features like headache, visual disturbances and epigastric pain were increased with increase in the severity of the disease.Convulsions were seen in all 30 patients (100%) of the eclampsia. The platelet count decreases significantly with increase in severity of the disease, due to consumption during intravascular coagulation. Thrombocytopenia was seen in 7 (23.33%) and 9(30%) patients of severe PE and eclampsia respectively.

Bleeding time was not significantly prolonged with increase in severity of pre-eclampsia. Mean bleeding time in eclampsia was 2.1±0.49 min with p value <0.05 indicating significant prolongation of BT. The clotting time increases slightly in pre-eclampsia and eclampsia

compared to normal pregnant women, however the increase was not statistically significant (Table 2).

Although prothrombin time was slightly increased with increase in severity of pre-eclampsia, it was not significantly prolonged. Mean prothrombin time in eclampsia was 14.48±1.41 sec with p value <0.05 indicating significant prolongation of PT in eclampsia.

The aPTT increases significantly in severe pre-eclampsia and eclampsia compared to normal pregnant women, although increase in mild PE was

Table 1: Baseline values of the patients

	Mild PE (n=60)	Severe PE (n=30)	Eclampsia (n=30)	Control (n=120)
Mean Age (years)	24.85	24.56	24.63	24.69
Parity n (%)				
Primigravida	35 (58.3)	20 (66.7%)	21 (70%)	65(54.2%)
2nd gravida	18 (30%)	7 (23.3%)	5 (16.7%)	35 (29.2%)
3rd gravida	7 (11.7%)	3 (10%)	4 (13.3%)	20 (16.7%)
Mean Systolic BP (mmHg)	146.4	162.53	166.23	123.93
Mean Diastolic BP (mmHg)	96.86	112.4	103.46	81.66

Table 2: Coagulation profile in all groups

	Platelet count (lac/cmm)	BT (min)	CT (min)	PT (sec)	aPTT (sec)
Control (n=120)	2.48 ±0.35	1.9 ±0.34	4.15±0.40	13.74 ±1.19	28.23 ± 2.35
Mild PE (n=60)	2.29 ±0.37	1.93 ±0.34	4.20 ±0.45	13.87 ±1.02	28.56 ± 2.56
Severe PE (n=30)	1.60 ±0.52	2.02±0.41	4.25 ±0.54	14.22 ± 1.11	30.80 ± 6.01
Eclampsia (n=30)	1.40 ±0.55	2.1±0.49	4.3 ±0.53	14.48 ± 1.41	31.75 ± 6.74
			P value		
Mild vs Severe PE	<0.05	>0.05	>0.05	>0.05	>0.05
Mild vs Eclampsia	<0.05	>0.05	>0.05	>0.05	>0.05
Severe PE vs Eclampsia	<0.05	<0.05	>0.05	<0.05	>0.05

(P value >0.05 - Not significant; < 0.05 – Significant)

not statistically significant. 23.33% patients of severe PE and eclampsia show aPTT> 35 sec (Table 2).

Discussion

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. The purpose of this study was to study the variation in platelet count and various parameters of coagulation such as BT, CT, PT, aPTT between women having normal pregnancy and women with pre-eclampsia and eclampsia. The present study was carried out in 240 patients in our institute over the period of 2 yrs. These were equally grouped as cases and control (120 cases each).

Out of 120 cases, 60 were having mild pre-eclampsia, 30 women with severe pre-eclampsia and 30 were having eclampsia. These cases were compared with the 120 healthy pregnant women used as control.

Most of the patients in study and control group were in the age ranging between 21-29 years. The findings are consistent with studies of Sogani et al [10] and Chauhan et al [11] which showed the mean age of 25 years and 22.90 yearsrespectively.

Majority of the cases of mild PE, severe PE and eclampsia were primigravidae. Joshi SR et al [12] and Feroza Sultana et al [13] also showed in their study that most of the patients of mild PE, severe PE and eclampsia were primigravidae. Mean systolic and mean diastolic BP in the eclampsia cases in present study were 166.23 mmHg and 103.46 mmHg respectively. These findings are consistent with Chauhan P et al [11], Mohapatra et al [14] and Meshram DP et al [15].

In present study, 20 patients (33.3%) of mild PE, 28 patients (93.3%) of severe PE and all 30 patients (100%) of eclampsia show significant proteinuria. Proteinuria is important indicator of severity because it usually develops late in the course of disease. Our findings of clinical features in present study correlates with studies of Shetty et al [16] and McKay et al [17]. Out of 120 cases, four cases (3.33%) were diagnosed of having HELLP syndrome in our study which were belonging to eclampsia group. All these four cases of HELLP syndrome had DIC.Weinstein et al [18] and Metz et al [19] also reported HELLP syndrome in 4-10% of cases of pre- eclampsia.

In the present study, there is significant decrease in platelet count with increase in severity of disease. Thrombocytopenia was seen in 23.33%and 30% patients of severe PE and eclampsia respectively. The low platelet count was attributed to immunologically mediated destruction, platelet aggregation and consumption. Chauhan et al [11] also observed a statistically significant decrease in platelet count with an increase in severity of PIH. Joshi SR et al [12] observed thrombocytopenia in 43.75% and 55% patients of severe PE and eclampsia respectively. Jambhulkar et al [20] found significant decrease in platelet count in severe PE with thrombocytopenia in 14% cases and in eclampsia. Vrunda JK et al [21] observed thrombocytopenia in 21.8% and 39.3% patients of severe PE and eclampsia respectively. Mohapatra S et al [14] found an inverse relationship between the severity of PIH and platelet numbers.

Bleeding time was not significantly prolonged with increase in severity of pre-eclampsia although there is significant prolongation of BT in eclampsia patients. Increase in BT observed was may be due to generalised vasoconstriction. Joshi et al [12] in their study found that bleeding time was not significantly prolonged in various severity of pre-eclampsia. However, Chauhan et al [11] and Vijayalaxmi et al [22] found that there is significant increase in bleeding time in eclampsia.

In the present study, clotting time increases slightly in pre-eclampsia and eclampsia compared to normal pregnant women, however the increase was not statistically significant. Similar results were found in studies done by Joshi SR et al [12], Vijayalaxmi et al [22] and Upam Sharma et al [23].

Prothrombin time was slightly increased with increase in severity of pre-eclampsia, but it was not significantly prolonged. Mean prothrombin time in eclampsia was 14.48±1.41 sec with p value <0.05 indicating significant prolongation of PT in eclampsia. PT was prolonged in 6 cases of eclampsia. Chauhan et al [11], Meshram DP et al [15], Jambhulkar S et al [20] and Jahromi et al [24] didn't found any significant prolongation in the prothrombin time between control group and severe pre-eclampsia. But, Vijayalaxmi et al [22] and Girija P. et al [24] found significant increase in prothrombin time in pre-eclampsia as compared to normal pregnancy.

In the present study, aPTT increases significantly in severe pre-eclampsia and eclampsia compared to normal pregnant women, although increase in mild PE was not statistically significant. 23.33% patients of severe PE and eclampsia show aPTT>35 sec.Meshram DP et al [15] in their study found that mean aPTT in pre-eclampsia and eclampsia was significantly increased when compared with control. Findings similar to present study are also seen in studies done by Jahromi et al [7], Chauhan P et al [11], Joshi SR et al [12] and Vijayalaxmi et al [22].

In conclusion, mild PE did not reveal any significant changes in coagulation parameters as compared to healthy pregnant women. However, severe PE and eclampsia were characterized by thrombocytopenia and coagulation abnormalities indicating intravascular coagulation. Platelet count and aPTT had predictive value in screening for consumptive coagulopathy in the severe cases of PE and eclampsia and helps in their smooth management. Coagulation studies like BT, CT, PT, and aPTT are the simple, cost effective and readily available tools in early diagnosis of maternal derangement of coagulation in pre-eclampsia and eclampsia. The information of present study might enrich the knowledge of clinician for early identification of pre-eclampsia. This is important for management of both pre-eclamptic mother and newborn babies.

The fact that PIH is largely a preventable condition, is established by observing that there is negligible incidence of pre- eclampsia and eclampsia with the institution of early clinical management. In case an abnormal platelet count or abnormalaPTT is detected in a patient with severe pre-eclampsia, a coagulopathic disorder should be clinically suspected.The early detection of compromised status combined with the institution of prompt treatment has been proven to have a crucial and definite role in reducing morbidity and mortality of both mother and fetus.

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