Original Article

Platelet Count in Preeclampsia, Eclampsia and Normal Pregnancy

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Abstract

Background: *The most important cause of maternal and perinatal morbidity and mortality is hypertensive disorder (preeclampsia and eclampsia). In preeclampsia and eclampsia, there is hypercoagulable state which acts as a risk factor for thromboembolism and disseminated intravascular coagulation (DIC).* ***Objective:*** *This study was carried out to compare the coagulation indices in normal pregnancy, preeclampsia and eclampsia.* ***Materials and Methods:*** *This cross sectional study was conducted in Dhaka Medical College. Total 150 women aged 18 – 40 years were selected for this study. Among them 50 normal pregnant, 50 preeclamptic and 50 eclamptic women were selected as study group and age matched 50 healthy nonpregnant women were considered as control group. Platelet count was analyzed on automated hematology analyzer.* ***Results****: In this study, platelet count was significantly lower in preeclamptic and eclamptic women than those of healthy nonpregnant women.* ***Conclusion:*** *From this study it can be concluded that platelet count decreased in preeclampsia, eclampsia and normal pregnancy.*

Keywords: Preeclampsia, Eclampsia, Platelet count.

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Introduction

Preeclampsia is a pregnancy specific, idiopathic multisystem disorder characterized by the development of hypertension and proteinuria after the 20 weeks of gestation.[1,2] Worldwide, the incidence of preeclampsia ranges between 2-10% of pregnancies.[3]

Preeclampsia when associated with convulsion known as eclampsia.[3] Eclampsia is clinically characterized by a chronic, gradual process that begins with the development of preeclampsia and results in generalized convulsions or coma. But, in approximately 15-20% of cases, the onset of eclampsia may be abrupt without previous evidence of preeclampsia.[2] Overall 10-15% of direct maternal mortality is associated with preeclampsia and eclampsia.[4]

Preeclampsia creates a functional derangement of multiple organ system. Complications of preeclampsia include eclampsia, placental abruption, ascities, hepatic infarction and rupture, intra-abdominal bleeding, pulmonary edema and acute renal failure. Complications affecting the developing fetus include intrauterine growth retardation, prematurity, oligohydramnios, bronchopulmonary dysplasia and increased risk of perinatal death.[2] Preeclampsia is an important obstetric problem and is associated with a five-fold increase in perinatal mortality.[5]

During normal pregnancy profound changes occur in the coagulation and fibrinolytic system of the mother causing a hypercoagulable state which accentuate in preeclampsia.[6] Coagulation abnormalities such as thrombocytopenia and decrease in some plasma clotting factors may develop in preeclampsia.[7]

Coagulation abnormalities may cause life threatening condition like disseminated intravascular

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coagulation (DIC) and hemolysis, elevated liver enzymes, and low platelets (HELP) syndrome. Monitoring of coagulation parameters may help to overcome these complications.[7]

Platelets are essential for primary hemostasis and endothelial repair. Platelet function can be determined by its size, shape and number.[9] Altered platelet count, size and function have been reported in patients with preeclampsia.[1,10] In preeclampsia there is increase in platelet size and thrombocytopenia. The incidence and degree of thrombocytopenia varies with degree of disease process. Several studies have demonstrated decreased platelet count in preeclampsia and eclampsia.[6, 7, 11] This thrombocytopenia is mainly responsible for increased maternal and fetal mortality and morbidity in preeclampsia.[11, 12]

Platelets play a major role in pathogenesis of preeclampsia by releasing thromboxane A2 which promotes vasospasm, induces supplementary platelet aggregation and endothelial damage. This leads to platelet dysfunction and promoting platelet consumption resulting in thrombocytopenia, which is an important sign of severe preeclampsia. In preeclampsia, there is also decreased production of prostacyclin which has antiplatelet action. The deficient production of prostacyclin may be linked with coagulation abnormalities in preeclampsia and eclampsia. So, in preeclampsia, there is imbalance between thromboxane A2 and prostacyclin and increase in thromboxane A2/prostacyclin ratio.[1,10] This causes vasoconstriction of small arteries and activation of platelets. Therefore, in preeclampsia and eclampsia, excessive platelet activation is associated with endothelial dysfunction, thrombosis in microcirculation, end organ degenerative necrosis and placental infarction.[1,10]

From the above studies, it has been revealed that decrease platelet count act as a future risk for complications in preeclampsia and eclampsia. Several studies have done abroad to observe the platelet count in these groups but their exact relationship with preeclampsia and eclampsia still debatable. As there is less published data available regarding this topic in our country, the relationship among this parameter in the Bangladeshi preeclamptic and eclamptic is not precisely known. Furthermore, we need a data from which we can compare these parameters in our population.

Materials and Methods

The present cross sectional analytic study was conducted in the Department of Physiology, Dhaka Medical College, Dhaka. For this study, 150 women aged 18 to 40 years were selected as study group B (B_1: 50 normal pregnant women, B_2: 50 diagnosed preeclamptic women and B_3: 50 diagnosed eclamptic women). 50 healthy nonpregnant women with same age range were considered as control group (group-A) for comparison. Before taking blood detailed family and medical history were taken and recorded in a prefixed data schedule. In addition, body mass index (BMI) was calculated and blood pressure was measured. Presence of proteinuria was determined by conventional heat coagulation test. Then interpretation of the heat coagulation test was done according to presence of turbidity in the urine as nil/trace (0), 1+, 2+, 3+ and 4+.[13] For statistical analysis one-way ANOVA test was performed as applicable using SPSS for windows version 22.

Results

The mean systolic and diastolic blood pressure were significantly higher in preeclampsia and, eclampsia compared to healthy non pregnant women. Again the mean urinary protein level was significantly higher in study group compared to healthy non pregnant women **Table 1.**

Table: I General characteristics of the subjects in different groups (n=200)

Parameters	Healthy non pregnant (n=50)	Normal pregnant (n=50)	Preeclampsia (n=50)	Eclampsia (n=50)
Age (years)	28.24±4.63 (20-38)	26.74±3.93 (20-38)	26.86±5.33 (18-37)	25.88±5.99 (18-40)
BMI (kg/m2)	26.17±2.58 (20.2-32.3)	27.54±5.50 (21.5-60.5)	27.72±3.5 (18.3-40.9)	27.97±1.85 (24.1-38.3)
SBP (mmHg)	112.2±7.1 (100-130)	118.0±9.5 (100-140)	159.8±19.2 (140-170)	180.2±19.6 (150-200)
DBP (mmHg)	73.0±6.1 (60-80)	75.0±6.8 (60-100)	110.0±9.9 (90-130)	125.0±15.5 (100-140)
Urinary protein level (gm/L)	Nil	.013+0.043 (0-0.15)	1.34±1.72 (0.15-7.0)	1.82±1.98 (0.15-7.0)

Results are expressed as Mean ±SD; Figures in parentheses indicate range; One-way ANOVA test was performed to compare among four groups; n = Number of subjects; BMI= Body mass index; SBP= Systolic blood pressure; DBP= Diastolic blood pressure.

The mean platelet count was lower in preeclampsia, eclampsia and normal pregnancy compared to healthy non pregnant women and the result was statistically significant (Table 2).

Table: II Platelet count of the subjects in different groups (n=50)

Parameter	Healthy non pregnant(A) (n=50)	Healthy pregnant women (B1) (n=50)	Women with preeclampsia (B2) (n=50)	Women with Eclampsia (B3) (n=50)	Platelet count *p* value
Platelet count (103/µL)	283.2±28.4 (200-330)	249.4±55.0 (22-320)	171.5±28.3 (130-260)	163.4±46.6 (130-322)	<0.001

Results are expressed as Mean ±SD. Figures in parentheses indicate range. One-way ANOVA test was performed to compare among four groups. n = Number of subjects; Group A: Healthy adult non pregnant women (Control group); Group B1: Women with normal pregnancy, Group B2: Women with preeclampsia, Group B3: Women with eclampsia, $p < 0.05$ indicates level of significance.

Moreover in this study, decreased platelet count (<150x103/µL) were found in different percentages of preeclampsia, eclampsia and normal pregnant women (Table 3).

Table: III Distribution of the subjects by platelet count in study groups (n=50)

Parameter	Normal pregnant women (n=50)	Preeclamptic women (n=50)	Eclamptic women (n=50)
Platelet count <150(x103/µl) > 150(x103/µl)	12(24%) 38(76%)	34(68%) 16(32%)	38(76%) 12(24%)

Results are expressed as frequency and percentage.
n= Number of subjects.

Discussion

Preeclampsia and eclampsia remains one of the important causes of perinatal mortality and maternal death in most developing countries.[8] Its exact pathophysiology is not yet fully understood.[2] Out of all hematological changes that occur in preeclampsia thrombocytopenia is the most common and the degree of thrombocytopenia increases with the severity of disease.[3] Preeclampsia and maternal mortality might be reduced through serial monitoring of platelet count as a part of antenatal check-up. The main aim of this study is to detect level of platelet in preeclampsia, eclampsia and normal pregnancy.

In the present study, the mean platelet count was 283.2±28.4 x103/µL of blood, 249.4±55.0 x103/µL of blood, 171.5±28.3 x103/µL of blood and 163.4±46.6 x103/µL of blood in group A, B1, B2 and B3 respectively. So, the mean platelet count was lower in preeclamptic, eclamptic and normal pregnant women than that of healthy nonpregnant female and the result was statistically significant ($p < 0.001$).

This finding was in agreement with the study of many researchers of different countries.[6,12,14,15]

Again, out of 50 normal pregnant women 12 was thrombocytopenic, 34 preeclamptic women out of 50 preeclamptic and 38 eclamptic women out of 50 eclamptic women were thrombocytopenic in this study.

Conclusion

From the result of this study, it may be concluded that platelet count is decreased in pregnancy and pregnancy induced hypertension. Therefore, measurement of this parameter may reflect the severity of preeclampsia and helps to provide appropriate treatment to ensure a satisfactory outcome for mother and fetus.

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