Original Article

Frequency of Deranged Coagulation Profile in Pregnant Women Having Pregnancy Induced Hypertension

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ABSTRACT

Objective: To determine the frequency of deranged coagulation profiles in women having pregnancy-induced hypertension (PIH).

Study Design: Cross-sectional study.

Place and Duration of Study: This study was conducted at the Department of Gynecology and Obstetrics at Nishtar Hospital Multan from January 2023 to August 2023.

Methods: Overall, 370 patients were enrolled, 175 (47.3%) normotensive pregnant women, considered as Group A whereas 195 (52.7%) patients were gestational hypertension. The following variables were calculated and assessed, age, gravidity, gestational age, diagnosis of PIH, platelet count, clotting time, bleeding time, PT, and aPTT.

Results: The mean platelet count of Group A and Group B was 2.59±0.63 and 2.55±0.55, respectively. The distribution of platelet count in both groups was almost equal. The mean platelet volume of groups was 8.89±0.88 and 8.68±0.75, respectively. The mean prothrombin time of Group B was greater than Group A, 19.33±3.59 minutes, and 14.45±2.42 minutes, respectively. Most of the patients of Group B had prolonged prothrombin time 74.9% versus 20.0% for Group A. The mean aPTT of Group B was greater than Group A, 39.61±7.78 and 31.40±6.52, respectively. Most of the patients 63.6% in Group B had prolonged aPTT.

Conclusion: Platelet counts exhibited an inverse relationship with pregnancy-induced hypertension (PIH), while prothrombin time (PT) and activated partial thromboplastin time (APTT) showed a direct relationship with increasing severity of PIH as it increases with increase in blood pressure.

Key Words: Pregnancy Induced hypertension, Coagulation profile, Platelet count, Prothrombin time, Clotting time

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INTRODUCTION

Pregnancy-induced hypertension is a significant health issue during pregnancy, affecting approximately 3 to 8 percent of pregnancies and leading to notable maternal morbidity and mortality[1]. This condition poses serious risks to both the mother and the baby. A coagulation profile is essential to diagnose any changes in blood hemostasis associated with this disorder[2]. This profile typically includes assessments of activated partial thromboplastin time (aPTT), prothrombin time, full blood count, platelet count, thrombin time, fibrin degradation products, fibrinogen, and D-dimer to identify any coagulation disorders present in the blood[3,4].

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In pregnancy-induced hypertension (PIH), the wildly characterized hematological abnormality is thrombocytopenia, and its severity is associated with the disease's progression[5]. During normal pregnancy, changes in the coagulation system create a hypercoagulable state, which can be further exacerbated in PIH[6]. The associated coagulation abnormalities increase bleeding risk and its complications, particularly during intervention for regional anesthesia and surgical procedures[7]. Consequently, it is important to perform related investigations like complete blood count for platelet count in hypertensive patients during pregnancy[8-9].

Activated partial thromboplastin time (APTT) and prothrombin time (PT) are commonly used tests in a coagulation profile to detect coagulation defects, as they measure the activities of enzymes that lead to coagulate blood[10]. During pregnancy, the hemostatic system shifts towards a more procoagulant state, characterized by reduced levels of naturally occurring anticoagulants such as S and C proteins.

Study aimed to compare the coagulation profiles and platelet parameters of pregnant women and normotensive, those with pregnancy-induced hypertension. Additionally, the study sought to

coagulate failures and detect platelet defects early to treat complications before they worsen.

METHODS

This descriptive cross-sectional study was conducted in the Department of Gynecology and Obstetrics at Nishtar Hospital Multan from January 2023 to August 2023. A total number of 370 patients were involved in the study and the sample size was calculated by an online computer software openepi.com using a 95% confidence interval 80% power of study and prolonged prothrombin time in 57.1% of PIH patients. All the patients were involved in the study after taking informed consent. Ethical approval for our study was taken from the Hospital Ethics Committee. Inclusion criteria were set as; patients diagnosed with the help of history, clinical examination, and investigations as confirmed cases of PIH. Patients diagnosed with anti-phospholipid syndrome and any acute or chronic liver disease or cases of congenital blood clotting disorder, pregnant women with a history of grand multi-parity, history of postpartum hemorrhage, multiple pregnancies, and hydromnios, thrombocytopenia caused by other than PIH (drug induced, bacterial or viral infections, autoimmune disease) were excluded after a thorough evaluation of clinical and laboratory findings. Pregnancy-induced hypertension was defined as systolic blood pressure greater than 130 mmHg or diastolic blood pressure ≥ 90 mmHg that occur after 20 weeks of pregnancy in women previously normal blood pressure[11]. Normal platelet count was taken as more than 150000/micro liter.

A blood sample of 4.5 ml was taken from each person 0.5 ml citrate was added to it and a sample was sent to the clinical laboratory of the Hospital. Results thus obtained were recorded in each patient's performance. All the procedure was performed by the researcher himself. The following variables were calculated and assessed, age, gravidity, Parity, gestational age, diagnosis of eclampsia or preeclampsia, platelet count, TLC (total leukocyte count), Hb (hemoglobin), PT, aPTT, serum fibrinogen and serum albumin.

SPSS version 27 was used, and after calculating numerical means and categorical frequencies chi-square test was applied to assess the association among variables. P value ≤0.05 was taken as significant.

RESULTS

Overall, 370 patients were enrolled, 175 (47.3%) normotensive pregnant women, considered as Group A whereas 195 (52.7%) patients were gestational hypertension, considered as Group B. The mean age of Group A and Group B was 26.75±5.86 years and 28.79±4.54 years, respectively. The majority of the patients in Group A and Group B had primigravida 48 (67.6%) and 52 (62.7%), respectively. (p=0.823). (Figure. I).

The mean platelet count of Group A and Group B was 2.59±0.63 and 2.55±0.55, respectively. The distribution of platelet count in both groups was almost equal, and the p-value was not significant, (p>0.050). The mean platelet volume of groups was 8.89±0.88 and 8.68±0.75, respectively. The distribution of platelet volume in both groups was almost equal, and the p-value was not significant, (p>0.050). The mean prothrombin time of Group B was greater than Group A, 19.33±3.59 minutes, and 14.45±2.42 minutes, respectively. Most of the patients of Group B had a prolonged prothrombin time of 146 (74.9%) versus 35 (20.0%) for Group A, and the p-value was significant, (p<0.0001). The mean aPTT of Group B was greater than Group A, 39.61±7.78 and 31.40±6.52, respectively. In most of the patients, 124 (63.6%) in Group B had prolonged aPTT, and the p-value was significant, (p<0.0001). (Table. 1).

The bleeding and clotting times of both groups are shown in the table. 2. The mean bleeding time of Group A and Group B was 5.05±1.98 minutes and 4.47±1.82 minutes, and the p-value was not significant, (p>0.050). The mean clotting time of Group A and Group B was 7.07±3.11 minutes and 8.55±3.55 minutes, and the p-value was not significant, (p>0.050). (Table. 2).

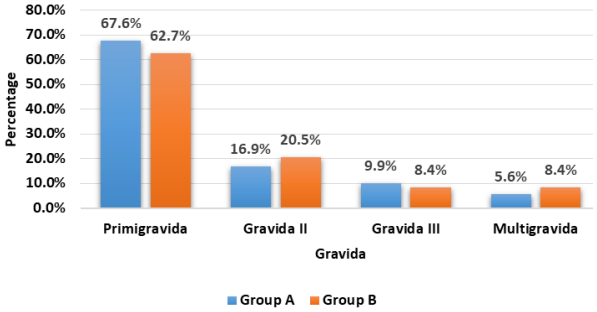

Figure No. 1: Distribution of gravida in the groups

Table No. 1: Comparison of platelet count, platelet volume, and prothrombin time between two groups

Variable	Group A	Group B	p-value
Platelet count			
Mean ± S.D	2.59±0.63	2.55±0.55	0.423
< 1 lac	83 (47.4)	100 (51.3)	0.459
1 – 2.5 lac	92 (52.6)	95 (48.7)	
Platelet volume			
Mean ± S.D	8.89±0.88	8.68±0.75	0.808
Normal (8-10)	158 (90.3)	183 (93.8)	0.203
Increased (10-12)	17 (9.7)	12 (6.2)	
Prothrombin time (minutes)			
Mean ± S.D	14.45±2.42	19.33±3.59	<0.0001
Normal (11-16)	140 (80.0)	49 (25.1)	<0.0001

Prolonged (>16)	35 (20.0)	146 (74.9)	
aPTT			
Mean ± S.D	31.40±6.52	39.61±7.78	<0.0001
Normal (25-37)	138 (78.9)	71 (36.4)	<0.0001
Prolonged (>37)	37 (21.1)	124 (63.6)	
N (%)			

Table No. 2: Comparison of bleeding and clotting time between two groups

Variable	Group A	Group B	p-value
Bleeding time (minutes)			
Mean ± S.D	5.05±1.98	4.47±1.82	0.051
≤5	133 (76.0)	158 (81.0)	0.239
>5	42 (24.0)	37 (19.0)	
Clotting time (minutes)			
Mean ± S.D	7.07±3.11	8.55±3.55	0.165
≤5	56 (32.0)	61 (31.3)	0.882
>5	119 (68.0)	134 (68.7)	
N (%)			

DISCUSSION

Hypertensive disorders are a significant cause of maternal and fetal mortality and morbidity in the world. These conditions frequently lead to various hematological changes, with thrombocytopenia being the most common[12]. Additionally, pregnant patients may experience disruptions in the coagulation and fibrinolytic systems, resulting in a hypercoagulable state. To differentiate between conditions such as disseminated intravascular coagulation (DIC) and HELLP syndrome, it is important to perform a coagulation profile in these patients.

In the study, the mean ages were 26.75±5.86 years for Group A and 28.79±4.54 years for Group B, with most participants being primigravida. Bhutani et al[13] found gestational hypertension in 23.8%. Our age-related data showed a strong correlation with the study conducted by Chaware et al[14] which found that the highest prevalence of gestational hypertension occurred in primigravida women, at approximately 23%.

In a study conducted by Mohapatra et al[15], platelet counts were observed across different groups of pregnant women with varying severities of pregnancy-induced hypertension (PIH). The control group had an average platelet count of 2.38 lakhs/mm³ with a standard deviation of ±0.33. In women with mild PIH, the average platelet count decreased to 2.23±0.19 lakhs/mm³. This data illustrates an indirect association between coagulation profile and PIH and platelet numbers, indicating that as the condition becomes more severe, the platelet count tends to decrease.

A study conducted by Shete et al[16] found that the platelet count in pregnant women with normotensive status was 347,000 ± 84,000 per cubic millimeter. They found a progressive decline in platelet counts with progression of pregnancy. Similar findings were reported by a researcher, who indicated that the decrease in platelet count could be attributed to the over-destruction of platelets in pregnancy. This decline, combined with platelet trapping and hemodilution, results in a reduced platelet count.

The bleeding time showed an increase, although this increase was not statistically significant. This observed increase might be attributed to generalized vasoconstriction. Zhang et al[17] reported that an increase in bleeding time is typically associated with thrombocytopenia. Similarly, Dundy et al[18] found that the increase could be due to impaired synthesis of thromboxane and it was concluded that thrombocytopenia and prolonged bleeding time may alter the process of coagulation.

In the study conducted by Chawan et al[19], it was observed that the clotting time exceeded 5 minutes in 35.71% of patients with gestational hypertension. Additionally, in the gestational hypertension study group, the majority of cases, specifically 64.29%, exhibited normal bleeding time.

CONCLUSION

Platelet counts exhibited an inverse relationship with pregnancy-induced hypertension (PIH), while prothrombin time (PT) and activated partial thromboplastin time (APTT) showed a direct relationship with increasing severity of PIH as it increased with an increase in blood pressure.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Shazia Rafiq, Madeeha Riaz, Sadia Bashir
Drafting or Revising Critically:	Muhammad Zubair, Amtul Mateen
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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