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RESEARCH ARTICLE

A retrospective study to see the correlation between platelet count and coagulation profile in pregnancy induced hypertension

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ABSTRACT

Background: Many of the haemostatic abnormalities occur in hypertensive disorders of pregnancy of which thrombocytopenia being the most common complication which accounts for 20% of patients who have pre-eclampsia. Coagulation failure being one of the most dreaded complications of severe preeclampsia and eclampsia. The Platelet count is one of the simple and costeffective means of assessing haemostatic status compared to a complete coagulation profile. **Objective:** This study was done to see the correlation between platelet count and coagulation profile in pregnancy induced hypertension. **Materials and methods:** This was a retrospective study done over a period of 1 year. All the women who were admitted to labour room with diagnosis of hypertensive disorder of pregnancy, details like complete blood count with platelet count and the coagulation profile were all collected from the case records. The data collected is analysed using statistical package for social sciences version 12-0. **Results:** A total of 150 women were included in the study. Platelets were above 1.5 lakhs (normal) in 84.7% women and in only 15.3% women had platelets less than 1.5lakhs. The prothrombin time was found to be normal in most of the patients (93.3%) and was deranged in about 6.7% women. There was a significant association between thrombocytopenia and prothrombin time. **Conclusion**: Assessment of only platetet count is sufficient and other coagulation parameters like PT, aPTT and fibrinogen level are recommended in women who have thrombocytopenia which can be cost effective.

Keywords: Hypertensive disorders of pregnancy, platelet count, coagulation profile.

Hypertensive disorders of pregnancy is associated with various kinds of haemostatic abnormalities of which thrombocytopenia being the most common complication which accounts for 20% of patients who have pre-eclampsia[1]. Thrombocytopenia in hypertensive disorders of pregnancy occur due to the thrombotic microangiopathy which is characterized by endothelial injury, followed by platelet aggregation and thrombus formation in the small vessels.

Coagulation failure being one of the most dreaded complications of severe preeclampsia and eclampsia. This may be due to primary disease itself or sometime may also arise from its complications such as intrauterine fetal death, abruptio placentae or primary postpartum haemorrhage. Coagulopathy may affect up to 15% of severe preeclampsia cases, and is believed to account for approximately 15% of maternal deaths from the condition [2].

In most of the developed countries it is advocated to do more sophisticated tests such as determinations of antithrombin III, thrombin-antithrombin III complex, D-dimer, factor VIII antigen/activity ratio and beta-thromboglobulin to detect compensated coagulopathy in hypertensive disorders of pregnancy. Despite this, the routine laboratory indicators of disseminated intravascular

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coagulation have remained thrombocytopenia, prolonged prothrombin time, prolonged activated partial thromboplastin time and reduction in the concentration of fibrinogen levels [2].

In many institutions, it is common practice to monitor platelet count, PT, PTT, fibrinogen levels, and fibrin degradation products closely when a patient is admitted to labor and delivery with the diagnosis of a hypertensive disorder of pregnancy. The patient thus is evaluated continuously for development of coagulopathy. In this study we would like to know if intial assessment of all patients with hypertensive disorders of pregnancy can be done with platelets count alone and only those women with thrombocytopenia will be subjected to further testing for coagulation abnormalities. This method can be cost-effective in low resource setting.

Materials and methods

This was a retrospective study done in the department of obstetrics and gynaecology over a period of 1 year from October 2019 to September 2020 after obtaining institutional ethical committee clearance. All the women who were admitted to labour room at Vydehi institute of medical sciences and research centre with blood pressure of systolic more than 140mm of Hg and diastolic more than 90 mm of Hg with or without proteinuria after 20 weeks of gestation during the study period were all included in the study. Women with preexsisting hypertension, history of hepatic, renal disorders, overt diabetes mellitus, auto immune disorders, idiopathic thrombocytopenic purpura and other bleeding disorders, recurrent miscarriage, haemoglobinpathies and women on drugs like aspirin and anticoagulants were excluded from the study. Thrombocytopenia was defined as platelet count < 1.5 lakh/microlitre. Prothrombin time (PT) and activated partial thromboplastin time (aPTT) were considered abnormal if they were >12.9 seconds and >37 seconds respectively according to our laboratory standards. The details like sociodemographic characteristics of mothers, obstetric history signs and symptoms of mother at the time admission and laboratory details like complete blood count with platelet count and the coagulation profile which includes prothrombin time, activated partial thromboplastin time, international normalized ratio were all collected from the case records.

The data collected analysed using statistical package for social sciences version 12-0. Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on mean ± SD (Min-Max) and results on categorical measurements are presented in number (%). Significance is assessed at 5 % level of significance. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups, non-parametric setting for qualitative data analysis. Fisher exact test used when cell samples are very small.

Results

A total of 150 women were included in the study. Out of 150, 55 were diagnosed with gestational hypertension, 45 women were nonsevere preeclamptic, 31 were severe preeclamptic and 19 women were eclamptic. Majority of women were primigravida (60%), in the age group between 21-30 years (77.3%) all the demographic details are depicted in table 1.

Table 1: Demographic details

Variables		No. of patients	%
Age in years			
•	18-20	16	10.6
•	21-30	116	77.3
•	31-40	18	12.0
Mean ± SD		25.88±4.55	
Obstetric score			
•	Primigravida	90	60.0
•	Multigravida	60	40.0
Period of gestation			
•	≤28.0	2	1.3
•	28.1-32.0	11	7.3
•	32.1-36.9	22	14.6
•	37-40.0	46	30.6
•	40-42	69	46.0

Table 2: Frequency distribution of platelet count, PT, INR, aPTT according to outcome of women

Variables	Outcome				Total	P Value
	Gestational hypertension	Pre-eclampsia	Severe pre-eclampsia	Eclampsia		
Platelet count						
<150.0	2(3.6%)	10(22.2%)	9(29%)	2(10.5%)	23(15.3%)	0.003**
>150.0	53(96.4%)	35(77.8%)	22(71%)	17(89.5%)	127(84.7%)	
PT						
Normal (<12.98)	54(98.2%)	41(91.1%)	27(87.1%)	18(94.7%)	140(93.3%)	0.163
Abnormal (>12.98)	1(1.8%)	4(8.9%)	4(12.9%)	1(5.3%)	10(6.7%)	
INR 2						
Normal (<1.2)	55(100%)	44(97.8%)	29(93.5%)	18(94.7%)	146(97.3%)	0.143
Abnormal (>1.2)	0(0%)	1(2.2%)	2(6.5%)	1(5.3%)	4(2.7%)	
APTT						
Normal (<37)	55(100%)	45(100%)	31(100%)	19(100%)	150(100%)	1.000
Abnormal (>37)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	

The platelet distribution and coagulation profile among the various women with pregnancy induced hypertension is as shown in table 2. Platelets were above 1.5lakhs (normal) in 84.7% women and in only 15.3% women had platelets less than 1.5lakhs. The prothrombin time was found to be normal in most of the patients (93.3%) and was deranged in about 6.7% women.

Table 3: comparison of PT, INR and aPTT according to platelet count of patients studied

Variables	Platelet count		Total	P value
	<150	>150		
PT				
Normal (<12.98)	16(69.6%)	124(97.6%)	140(93.3%)	<0.001**
Abnormal (>12.98)	7(30.4%)	3(2.4%)	10(6.7%)	
INR				
Normal (<1.2)	19(82.6%)	127(100%)	146(97.3%)	<0.001**
Abnormal (>1.2)	4(17.4%)	0(0%)	4(2.7%)	
APTT				
Normal (<37)	23(100%)	127(100%)	150(100%)	1.000
Abnormal (>37)	0(0%)	0(0%)	0(0%)	
Total	23(100%)	127(100%)	150(100%)	-

In the present study, PT was prolonged in 30.4% women when platelet count was <1.5 lac/cumm and aPTT was normal in all women irrespective of platelet count. This signifies that with increase in severity, there occurs prolongation of PT. However, 16 women had normal PT with platelet count less than 1.5 lac/cumm. The correlation between the platelet count and the coagulation profile is shown in table 3. In the present study it showed a significant association between thrombocytopenia and prothrombin time which was prolonged in patients with platelet less than 1.5 lac/cumm (p value < 0.001).

Overall 17.9% cases of PIH showed thrombocytopenia, 6.6% had prolonged PT and none had prolonged APTT.

Discussion

Preeclampsia is an idiopathic multisystem disorder. Many hematological abnormalities occur in preeclamptic women of which thrombocytopenia is common accounting for 5-21% and there are subtle changes seen in intravascular coagulation system. Some of these changes like there is increase infactor VIII consumption, elevated fibropeptide levels A and B and d-Dimer and there is decreased levels of antithrombin III and protein C and S [3,4]. Clinical hemorrhage is uncommon unless the women develop disseminated intravascular coagulopathy (DIC). Coagulation testing is to be done in women with preeclampsia to rule out DIC and HELLP (hemolysis, enzyme elevation and low platelet) syndrome which are the complications which can occur. It was observed that abnormal PT, aPTT and fibrinogen levels were seen in preeclamptic women with platelet counts of less than 100,000/cumm [5]. So the physician can safely follow the platelet counts of the patients with severe preeclampsia. The NICE guidelines 2010 and latest FOGSI guidelines of 2019 also concludes that coagulation tests can be reserved for women with platelet count less than 1 lakh/cumm [6,7].

In the present study, maximum numbers of cases (77.3%) were between 21 to 30 years of age which is comparable with the studies of Mishra et al (88%), Kanika Singh et al (79%) and Lakshmi CV et al (84%) [8-10]. The findings of the present study (60%) and many other studies such as Chaudhary S et al (64%) and Chaware SA et al (62.5%) also confirm that PIH is more prevalent in primigravidae [11,12]. This increased incidence of hypertensive disorders in pregnancy in younger age group in these studies may be attributed to early age of marriage and first pregnancy in developing countries like India.

In the present study we assessed the coagulation parameters (PT and aPTT) in relation to platelet count, it was observed that there was prolongation of PT in women (30.4%) in whom platelet count was less than 1.5 lakh/cumm which was statistically significant. This was in correlation with studies done by Mishra et al (6.8%) and Priyamvada Singhal et al (11.25%) which were statistically significant [8, 13].

The aPTT was found to be normal in all women irrespective of platelet count in the present study which was not in concordance with studies done by Mishra et al (1.7%) and Priyamvada Singhal et al (20%) wherein they had abnormal aPTT in women with platelet count less than 1.5 lakh/cumm [8,13].

Studies have shown that the platelet function may be altered in women with preeclampsia even with platelet count being normal. It is evident that the platelet count may decrease even before the other clinical manifestations of preeclampsia become apparent [14]. In this study the thrombocytopenia was used as the prediction of the risk of coagulopathy in preeclamptic women. Biochemical coagulopathy was unlikely at platelet count above 1.5 lakh/cumm.

It has been postulated that lower platelet count is associated with abnormal activation of coagulation system and is believed to reflect increased platelet consumption [5]. Hence it is suggested to do the PT, aPTT and fibrinogen levels in women with hypertensive disorders with pregnancy in whom platelet count is less than 1.5 lakh/cumm.

Conclusion

A baseline complete blood cell count including platelet count is probably sufficient in women admitted with

hypertensive disorder of pregnancy. The coagulation parameters like PT, aPTT and fibrinogen level are recommended in women who have thrombocytopenia which can also be cost effective.

Conflict of interest: None. **Disclaimer:** Nil.

References

1. Ciobanu AM, Colibaba S, Cimpoca B, Peltecu G, Panaitescu AM. Thrombocytopenia in Pregnancy. Maedica (Bucur). 2016 Mar; 11(1): 55-60.
2. Awolola OO, Enaruna NO. Determination of coagulopathy complicating severe preeclampsia and eclampsia with platelet count in a University Hospital, South-South, Nigeria. Trop J Obstet Gynaecol. 2016; 33:179-84
3. Thrombocytopenia in pregnancy. ACOG practice bulletin No. 207. American college of Obstetricians and Gynaecologists. Obstet Gynecol. 2019; 133: e181-93.
4. Cunningham G, Leveno KJ, Bloom SL, Dashe JS, Spong CY, Hoffman BL, et al. Williams Obstetrics. 25th edition. New York: McGraw-Hill Education; March 22; 2018.
5. Kenny LC, Mccrae KR, Cunningham FG. Platelets, Coagulation, and the Liver. In: Taylor RN, Roberts JM, editors. Chesley's Hypertensive Disorders in Pregnancy. Fourth Edition. London: Elsevier; 2015. pp 379-96.
6. Fogsi-Gestosis-Icog. Hypertensive Disorders in Pregnancy (HDP). Good Clinical Practice Recommendations; 2019. Available from: https://www.fogsi.org/wp-content/uploads/gcpr/ hdp-fogsi-gestosis-icog-gcpr-2019.
7. Hypertension in pregnancy: diagnosis and management.NICE guideline [NG133]; 25 June 2019.
8. Mishra DP, Choudhury S, Tudu B. Evaluation of coagulation indices in preeclampsia and eclampsia. J Evid Based Med Healthc. 2019; 6(17): 1316-20.
9. Thalor N, Singh K, Pujani M, Chauhan V, Agarwal C, Ahuja R. A correlation between platelet indices and preeclampsia. Hematol Transfus Cell Ther. 2019 Apr-Jun; 41(2):129-33.
10. Lakshmi CV. Comparative Study of Coagulation Profile in Mild Pre-eclampsia, Severe Pre-eclampsia, and Eclampsia. Int J Sci Stud 2016; 4(4):180-83.
11. Chaudhary S, Baxi S. Study of Coagulation Profile in Patients of Pregnancy Induced Hypertension - A Single Centric Prospective Study. Journal of medical science and clinical research. 2016; 4(10): 13456-62.
12. Chaware SA, Dhake R, Ingole AS, Bahattare VN, Bhopale KS. Study of coagulation profile in preeclampsia and eclampsia. MedPulse – International Medical Journal. March 2015;2(3): 164-70.
13. Singhal P, Agrawal V, Ingole N, Gangane N. Study of Coagulation Profile and Platelet Counts in Pre Eclamptic and Eclamptic Patients. Journal of medical science and clinical research. 2019; 7(1), 579-87.
14. Romero R, Mazor M, Lockwood CJ, Emamian M, Belanger KP, Hobbins JC, et al. Clinical significance, prevalence, and natural history of thrombocytopenia in pregnancy-induced hypertension. Am J Perinatol 1989; 6: 32-8.

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