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COMBINATION OF PLATELET & URIC ACID ESTIMATION CAN PREDICT SEVERITY OF PIH BETTER

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ABSTRACT

Individual predictive tests for Pregnancy Induced Hypertension (PIH) are yet to be reliable, valid, and economical. Therefore a combination of tests like platelet count & uric acid estimation was studied for assessing the severity of PIH. Platelet count and uric acid estimation are not only affordable but can be done even in rural setup. Present study focussed on platelet count and uric acid estimation together as indicator for severity of PIH. A total of 76 cases including 60 cases of PIH of varying severity were studied. Platelet count and serum Uric acid estimations were done throughout pregnancy. The mean platelet counts (Lacs/cmm): 244.12±11.44 control group, 182.93±19.37-mild PIH, 142.26±23.35-Moderate to severe PIH. The mean uric acid level (mg/dL): 3.88±0.51 in control group, 5.32±0.70- mild PIH, 6.85±0.97- Moderate to severe PIH. The platelet count fell while serum uric acid increased with increasing severity of PIH significantly ($p < 0.05$). Thus, it is concluded that platelet count and uric acid estimation together can be used as a good indicator of severity of PIH.

KEYWORDS: **Platelet, Uric acid, PIH, Pregnancy**

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INTRODUCTION

Pregnancy is a physiological condition. However pregnancy can induce hypertension in normo-tensive women or aggravate existing hypertension. Hypertensive disorders complicating pregnancy are common and form one of the deadly triad along with haemorrhage and infection that contribute greatly to maternal morbidity and mortality. [1]Pregnancy Induced Hypertension can be classified as with increasing order of severity:

1. Gestational Hypertension: BP ≥140/90 mm Hg for first time during pregnancy, No proteinuria, BP returns to normal < 12 weeks' postpartum.
2.Pre-eclampsia: BP ≥ 140/90 mm Hg after 20 weeks' gestation, Proteinuria- 300 mg/24 hours or 1+ dipstick.
3. Eclampsia: Seizures that cannot be attributed to other causes in a woman with pre-eclampsia.

[1]Measurement in early pregnancy—or across pregnancy—of a variety of biological, biochemical, and biophysical markers implicated in the pathophysiology of preeclampsia has been proposed to predict its development. Attempts have been made to identify early markers of faulty placentation, impaired placental perfusion, endothelial cell activation and dysfunction, renal dysfunction and activation of coagulation i.e. Human chorionic gonadotropin (hCG), alpha-fetoprotein (AFP), pregnancy-associated protein A (PAPP A), placental growth factor (PlGF), vascular endothelial growth factor (VEGF), fms-like tyrosine kinase receptor-1 (sFlt-1), free fetal DNA.[2]For the most, these have resulted in testing strategies with poor sensitivity and with poor positive-predictive value for preeclampsia. Moreover, tests for above markers are expensive, time consuming, and require hi-tech lab facility in the hospital. Currently there are no individual screening tests that are reliable, valid, and economical.[3] There are, however, combinations of tests that may be promising. In our study platelet and uric acid estimation in blood was evaluated as a combination of tests which can be easily conducted at any hospital including rural setup and relatively inexpensive for assessing the prognosis in PIH.

Thrombocytopenia & hyperuricemia are two most common findings indicating varying degree of severity of the disease process.[4,5]The frequency and intensity of maternal thrombocytopenia varies and is dependent on the intensity of the disease process, duration of preeclampsia syndrome as well as the frequency with which platelet counts are performed. Overt thrombocytopenia, defined by a platelet count less than 100,000/L, indicates severe disease. [6]In general, the lower the platelet counts, the higher the maternal and fetal morbidity and mortality. In most cases, delivery is indicated because the platelet count continues to decrease. [1]On the other hand elevated serum uric acid levels due to decreased renal urate excretion are frequently found in women with preeclampsia.[7,8]Measurement of Serum uric acid as a marker of preeclampsia has been well documented.[9]One of the earliest laboratory manifestations of preeclampsia is hyperuricemia. [10]It likely results from reduced uric acid clearance from diminished glomerular filtration, increased tubular reabsorption, and decreased secretion. [11]It is used by some to define preeclampsia & its sensitivity ranged from 0 to 55 percent and specificity from 77 to 95 percent.

Early assessment of PIH is essential to prevent serious complications like preterm labour, abruptio-placentae, post-partum haemorrhage, intrauterine growth retardation, DIC, HELLP syndrome (Hemolysis, elevated liver enzymes, low platelet count). This study aimed to establish a method of assessing the severity of PIH by a combination of two tests e.g. platelet and uric acid estimation.

MATERIALS & METHODS

The study group of 76 women included 16 normo-tensive and rest 60 with pregnancy-induced hypertension of different severity.

Table-I
Comparative data of three study groups

	CONTROL	MILD PIH	MOD.TO SEVERE PIH
AGE	24.87±5.13	23.8±4.0	24.30 ± 3.89
GESTATION PERIOD IN WKS	29.75 ± 4.49	31.46 ±4.23	33.30 ± 2.89
MEAN SYST PR (mmHg)	124.75±4.55	146.13±5.70	171.26±13.83
MEAN DIAST PR (mmHg)	82.25±2.72	92.46±3.88	112.40±4.40
PLATELET ESTIMATION (Lacs/cmm)	2.44±0.11	1.82±0.19*	1.42±0.23*
URIC ACID (mg %)	3.88±0.51	5.32±0.70*	6.85±0.97*

***p<0.05**

Thirty women of mean age 23.8±5.13 yrs. and duration of pregnancy 31.46 ±4.23 wks had mild PIH. Thirty women of mean age- 24.30 ± 3.89 and duration of pregnancy 33.30 ± 2.89 wks had moderate to severe hypertension. The control group included 16 pregnant women having mean age of 24.87±5.13 yrs and duration of pregnancy 29.75 ± 4.49 wks. All the cases were selected from OPD, Indoor & Labour room of O&G department of IMS & SUM Hospital. Cases having previous history of hypertension, renal disease, and idiopathic thrombocytopenic purpura during non-pregnant state were excluded from the study. All the three groups were gestational age matched. Blood pressures were measured by sphygmomanometer. The patients were examined during 2nd, 3rd trimester. Blood samples were collected from fingertips by pricking with a sterile needle after placing a drop of 14% Magnesium Sulphate solution on the fingertips, which prevented agglutination and disintegration of platelets. A thin blood film was drawn and stained with Leishman's stain. The film was examined under oil immersion fields. The total number of platelets in Lacs/ cmm = Avg. No. of Platelet/oil immersion field × 20,000. Quantitative method of URIC acid estimation in serum was made in the present study by using LIQUIZONE URIC ACID- MR KITS.

CALCULATIONS: Serum Uric Acid in mg/dl= $\frac{\text{Abs of } T}{\text{Abs of } S} \times 10$

Statistical analysis was done by calculating the significance of difference between means. The formula used was Standard Error of deviation

S.E (d)= $\sqrt{\frac{\sigma_1^2}{n_1}+\frac{\sigma_2^2}{n_2}}$

Significance of observations was calculated using statistical analysis of ANOVA and applying SPSS software. This study has been approved by Institution ethical committee.

RESULTS

When the value of platelet estimation was compared between control and study groups, a significant decrease in platelet number was observed with increasing severity of PIH (P<0.05). Comparison between average B.P. of different groups and platelet estimation shows an inverse relation between systolic blood pressure and number of platelets and direct relation between B.P and uric acid.

Table-II
Comparison between Control & Mild PIH group

Parameters		Levene's Test for Equality of Variances		T-test for Equality of Means		
Control Vs Mild PIH group		F	Sig.	T	df	Sig. (2-tailed)
SBP	Equal variances assumed	2.010	.163	-12.936*	44	.000
DBP	Equal variances assumed	1.375	.247	-9.348*	44	.000
Platelets	Equal variances assumed	4.736	.035	11.564*	44	.000
UA	Equal variances assumed	1.691	.200	-7.243*	44	.000

**** Statistically Significant at 5% level i.e., P < 0.05 .***

DISCUSSION

We compared the estimation of platelets and serum uric acid with varying degree of severity of PIH. Thrombocytopenia and hyperuricemia indicate involvement of two different organ systems e.g. blood coagulation and renal system out of many systems affected in the pathogenesis of PIH. The degree of thrombocytopenia and hyperuricemia correlated well with the severity of PIH.

Table-III
Comparison between control & Moderate to severe PIH group

Parameters		Levene's Test for Equality of Variances		T-test for Equality of Means		
Control Vs Moderate to Severe PIH group		F	Sig.	T	df	Sig. (2-tailed)
SBP	Equal variances assumed	11.680	.001	-13.022*	44	.000
DBP	Equal variances assumed	3.550	.066	-24.881*	44	.000
Platelets	Equal variances assumed	6.760	.013	16.366*	44	.000
UA	Equal variances assumed	5.290	.026	-11.308*	44	.000

**** Statistically Significant at 5% level i.e., P < 0.05 .***

Our observations of platelet series are: Control group 2.44±0.11 L/cmm, Mild PIH 1.82±0.19 L/cmm, Moderate to severe PIH group 1.42±0.23 L/cmm. Similarly uric acid series are: Control group 3.88±0.51 mg/dL, Mild PIH 5.32±0.70 mg/dL, Moderate to severe PIH group 6.85±0.97 mg/dl. When value of platelet and uric acid estimation were compared between the control and study groups, significant decrease in platelet number ($p<0.05$) and rise in uric acid ($p<0.05$) were observed as the severity of disease process increased from mild to moderate-severe in study groups (Table I). Thus, estimation of platelets and uric acid taken together is a better indicator of the severity of PIH.

Various markers like pregnancy-associated protein A (PAPP A), placental protein 13, urinary calcium or kallikrein, microtransferrinuria, N-acetyl—glucosaminidase, serum

Table-IV
Comparison between Mild PIH and Moderate to severe PIH Group

Parameters		Levene's Test for Equality of Variances		T-test for Equality of Means		
Mild PIH Vs Moderate to Severe PIH group		F	Sig.	T	df	Sig. (2-tailed)
SBP	Equal variances assumed	15.345	.000	-9.201*	58	.000
DBP	Equal variances assumed	.696	.407	-18.586*	58	.000
Platelets	Equal variances assumed	.833	.365	7.339*	58	.000
UA	Equal variances assumed	2.544	.116	-6.964*	58	.000

**** Statistically Significant at 5% level i.e., P < 0.05 .***

fibronectin, prostaglandin, thromboxane, C-reactive protein, cytokines, endothelin, neurokinin B, plasminogen activator-inhibitor (PAI), leptin, p-selectin, placental growth factor (PlGF), vascular endothelial growth factor (VEGF), fms-like tyrosine kinase receptor-1 (sFlt-1), endoglin, Antithrombin-III(AT-3), free fetal DNA are though more sensitive but expensive, time consuming and require hi-tech lab and not suitable for routine purpose. On the other hand platelet and uric acid estimation is rapid, cheaper, and easier and does not require any expensive materials.

CONCLUSION

A simple battery of haematological tests of platelet and uric acid estimation which are accurate and cost effective can be used as a rapid procedure of assessment of severity of PIH cases for their management even in rural hospitals with minimum facility. Further study is suggested for other ideal and clinically useful battery of tests for the early diagnosis of PIH and prediction of its severity.

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