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Biochemical and hematological investigations in pregnancy induced hypertension

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Abstract
To compare the biochemical and haematological markers in pre¬ eclampsia and eclampsia patients with normal pregnancies. Standard antenatal follow up should be carried out for the early detection and prevention of PIH. Tests like serum LDH, uric acid and alkaline phosphatase could help to predict and to deal with the adverse complications of PIH, which are considered as cost effective as these tests are routinely done in most of the laboratories. The fact that hypertension in pregnancy is largely a preventable condition is established by observing the negligible incidence of pre eclampsia and eclampsia with the institution of early management. In present study, we observed a specific pattern of disease and its related variation with these markers. Simple markers like LDH, Uric acid, Platelet count, Alkaline phosphatase, PTT and aPTT are the early predictors of the maternal and fetal outcome .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 the morbidity and mortality of both mother and fetus.

Keywords: Preeclampsia, LDH, Platelet, uric acid, alkaline phosphatase

Introduction
Preeclampsia is defined as a multisystem disorder occurring in pregnancy and the puerperium which is characterized by development of hypertension of 140/90 mmHg and above after the 20th week in a previously normotensive patient [1].
It is a global problem and complicates approximately 10-17% of pregnancies. The incidence of PIH in India ranges from 5% to 15% [2].
PIH is responsible for 14% of maternal deaths in the world [3].
Some biochemical parameters have been proposed like angiogenic markers, placental tissue protein 13(PP-13), soluble endoglin and soluble fms-like tyrosine kinase1 by some investigators [4, 5]. However, these techniques are not suitable for simple, low cost and rapid routine screening, therefore, there is a need to develop simple methods specifically designed for use in a hospital environment [4].
Early assessment of severity of pre-eclampsia and eclampsia is necessary to prevent complications like HELLP syndrome and increased maternal and fetal morbidity and mortality.

Aim of the study
To compare the biochemical and haematological markers in preeclampsia and eclampsia patients with normal pregnancies.

Study design
Study site: JSS Medical College and Hospital, Mysore.

Study period: January 2015 to January 2016

Source of data: Antenatal cases, JSS Hospital, Mysore.

Type of study: This was prospective observational analytical case control study.

Materials and Methods
Healthy normotensive pregnant females in the third trimester of pregnancy, without any signs and symptoms of pregnancy induced hypertension were considered as controls. Pregnant females in the third trimester with symptoms and signs of pregnancy induced hypertension, admitted in Antenatal care ward were selected and grouped as per the criteria described in classification of hypertensive disorders of pregnancy according to the American College of Obstetricians and Gynaecologists [6].

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Methodology of study
Total 500 cases were included in the study
The study groups were divided as follows- The study groups were divided as follows

1. Healthy normotensive pregnant controls-200
2. Patients with mild preeclampsia- 180
3. Patients with severe preeclampsia-90
4. Patients with eclampsia-30

The history of all patients was taken and blood samples were collected in plain, EDTA and citrate tubes. All recent methods for the various tests were followed.

Results
Platelet and LDH

	Normotensive (Controls)	Mild	Severe	Eclampsia
Mean Platelet count(lakh/cumm)	2.42 ± 0.54	2.31 ± 0.58	1.68 ± 0.72 ↓**	1.27 ± 0.62 ↓**
p value <0.001				
LDH	191.5000 ±23.5322	413.7000 ± 61.5534	565.8800 ±60.0182 ↓**	863.6000 ±287.4130 ↓**
p value <0.001				

Uric acid and alkaline phosphotase

	Normotensive (controls)	Mild	severe	Eclampsia
Uric acid	3.5244± 0.24	5.5040 ±0.3404	6.2590± 0.34 ↓**	7.43± 1.16 ↓**
p value <0.001				
Alkaline phosphatase	191.5000 ±23.5322	413.7000 ± 61.5534	565.8800 ±60.0182 ↓**	863.6000 ±287.4130 ↓**
p value <0.001				

Discussion
In our study, the platelet count was very significantly lower in severe preeclampsia ($P<0.01$) and eclampsia ($P<0.01$) than that in normal healthy pregnant controls. Whereas the platelet count in mild preeclampsia was not significantly lower than the healthy pregnant control.

In our study, trend of lowering of platelet count with increasing severity of pregnancy induced hypertension is consistent with Srivastava (1995) [7], Jambhulkar (2001) [8], Joshi et al. (2004) [9], J. Davies et al. (2007) [10] and Ellora Devi et al. (2012) [11].

Platelet count

Authors	Control (lac/cmm)	Mild PE (lac/cmm)	Severe PE (lac/cmm)	Eclampsia (lac/cmm)
Jambhulkar et al. (2001) [8]	2.38	2.30	1.70↓*	1.51↓**
Joshi et al. (2004) [9]	2.2	2.0	1.40↓*	1.30↓**
J. Davies et al. 2007 [10]	2.57	2.30	1.77↓**	--
Ellora Devi et at (2012) [11]	2.44	1.82	1.42↓**	---
Srivastava (1995) [7]	1.94	1.79	1.64↓*	1.52↓*
Present study				
	*P<0.05---	Significantly low	**P<0.01---	Very significantly low

LDH levels in relation to severity of hypertension in pregnancy

Authors	Control (IU/L)	Mild Pre eclampsia (IU/L)	Severe pre eclampsia (IU/L)	Eclampsia (IU/L)
Qublan et al. [12]	299± 79	348 ± 76	774 ± 69.61 ↓**	-
Jaiswer SP, et al. [13]	278.3 ± 119.2	400.45 + 145.21	646.95 ± 01.64↓**	1648.10 ± 1992.29↓**
Present study.	191.5±23.53	413.7±61.5	565.88±60.81↓**	863.60±287.41↓**

Uric acid levels in relation to severity of hypertension in pregnancy

Authors	Control (mg/dl)	Mild pre eclampsia(mg/dl)	Severe pre eclampsia(mg/dl)	Eclampsia (mg/dl)
Lim and Fridedman [14]	3.5± 0.6	6.4± 1.7mg↓**		--
Mustaphi and Gopalan [15]	4.65 ± 0.33	5.42± 0.55↓*	6.65± 0.60↓**	--
Present study	3.52±0.23	5.50±5.50↓*	6.25±0.33↓**	7.43±1.16↓**

Alkaline phosphatase levels in relation to severity of pre-eclampsia
Serum alkaline phosphatase showed statistically higher levels in eclamptic women (350.5000 ±62.6494 ↓**) in comparison to mild PIH (244.140 ±13.0666), severe PIH (296.8200 ± 35.2297) and normal pregnant women (150.0600 ±16.9458) ($P<0.001$) which is compared to other studies.

In agreement with the studies of Makuyana D et al. [16]. and H.Y. Wong et al. [17] our findings demonstrate a significant increase in ALP activity in preeclampsia. The activity of ALP in severe preeclampsia was higher than mild preeclampsia.

Conclusion
Standard antenatal follow up should be carried out for the early detection and prevention of PIH. Tests like serum LDH, uric acid and alkaline phosphatase could help to predict and to deal with the adverse complications of PIH, which are considered as cost effective as these tests are routinely done in most of the laboratories.

The fact that hypertension in pregnancy is largely a preventable condition is established by observing the negligible incidence of pre eclampsia and eclampsia with the institution of early management.

In present study, we observed a specific pattern of disease and its related variation with these markers. Simple markers like LDH, Uric acid, Platelet count, Alkaline phosphatase, PTT and aPTT are the early predictors of the maternal and fetal outcome. 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 the morbidity and mortality of both mother and fetus.

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