

STUDY OF PLATELET COUNT AND LIVER FUNCTION TEST IN PREGNANCY INDUCED HYPERTENSION WOMEN

M. Lavanya¹, A. Saritha²

¹Assistant Professor, Department of Physiology, Santhiram Medical College & General Hospital, Nandyal.

²Assistant Professor, Department of Obstetrics & Gynaecology, Santhiram Medical College & General Hospital, Nandyal.

ABSTRACT

The present study was undertaken to evaluate the changes of liver function tests and platelet count in different grades of PIH women. The study group included 90 PIH women divided into 3 groups based on the severity of PIH into 30 mild PIH, 30 pre-eclampsia and 30 eclampsia. The LFT parameters and platelet count were estimated.

CONCLUSIONS

LFT parameters like AST, ALT, ALP and Platelet estimation can be taken as an early interpretation for assessment of severity of PIH, so that early measures are taken to prevent the maternal and fetal complications.

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INTRODUCTION

Hypertensive disorders in pregnancy is one of the major cause of maternal, perinatal mortality and morbidity.⁽¹⁾ It is one of the commonest medical disorders diagnosed by obstetricians in clinical practice. Pre-eclampsia and eclampsia contribute to death of women every 3 min world-wide. Pregnancy induced hypertension is defined as hypertension that occurs in pregnancy for the first time after 20 weeks of gestation and disappears following delivery.

In PIH placental dysfunction initiate the systemic vasospasm, ischaemia and thrombosis that eventually damage the maternal organs. Thrombus formation or haemorrhage causes liver injury, form hepatocellular necrosis and causes elevation of liver enzymes. Out of all the haematological changes that occur in pre-eclampsia and eclampsia, thrombocytopenia is the most common haematological abnormality found. The degree of thrombocytopenia increases with the severity of disease. Lower the platelet count, greater the maternal and fetal morbidity and mortality.

Early assessment of PIH is necessary to prevent complications like HELLP syndrome (Haemolysis, Elevated Liver Enzymes and Low Platelet Count) and increased maternal and fetal mortality and morbidity.

AIMS AND OBJECTIVES

- Hypertensive disorders of pregnancy with spectrum of complications like HELLP syndrome- "Haemolysis, Elevated Liver Enzymes, and Low Platelet Count" is one among the leading cause of feto-maternal morbidity and mortality.

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Corresponding Author:

Dr. M. Lavanya,

Department of Physiology,

Santhiram Medical College,

NH-18, Nandyal-518502.

E-mail: srmcophthal@gmail.com

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- To study and compare the changes in liver function tests in different grades of PIH.
- To study and compare the platelet count changes in different grades of PIH.
- To determine whether the liver function tests and platelet count can be used to assess the severity of PIH.

MATERIALS AND METHODS

This study was conducted at Santhiram Medical College & General Hospital, Nandyal for 1-1/2 year from April 2009 to September 2010. Data for the study was collected from patients attending the Department of Obstetrics and Gynecology, Government General Hospital, Kurnool. Consent was obtained from the college ethical committee.

STUDY GROUP

A prospective clinical study consisting of 90 pregnancy induced hypertensive women, which are divided into 3 groups depending upon the severity.

- Thirty subjects with mild PIH or hypertension without proteinuria, gestational hypertension or edema.
- Thirty subjects with pre-eclampsia-hypertension with proteinuria.
- Thirty subjects with eclampsia-hypertension with convulsions and coma.

International Society for Study of Hypertension in Pregnancy (ISSHP) defined hypertension and proteinuria as:

HYPERTENSION

- Diastolic B.P of 110mm of Hg on any one occasion.
- Diastolic B.P of 90mm of Hg on any 2 or more consecutive occasions > 4hrs. apart.

ESTIMATION OF SERUM BILIRUBIN KIT METHOD JENDRASSIK AND GROF METHOD

REAGENTS

Reagent-1

Sodium nitrite -10mmol/lit.

Reagent-2

Sulphanilic acid- 23mmol/lit.

Reagent-3

Sodium acetate- 0.9mol/lit.
Sodium benzoate- 0.5mol/lit.
Caffeine- 0.25mol/lit.

Principle

Bilirubin reacts with diazotized sulfanilic acid to form an azo compound, the colour of which is measured at 546 nm and is proportional to the concentration of bilirubin. For total bilirubin, the reaction is accelerated by caffeine reagent. The readings for total bilirubin are taken after 5 min of incubation.

Specimen-Serum Sample

Procedure a. Bichromatic method.
Sample 50-III.
Solution I-100.
Solution 3-1.0ml.

Estimation of Aspartate Aminotransferase Kit

Method-RAICHEM diagnostics.
Reagent 2-Oxoglutarate.
L-Aspartate.
Lactate dehydrogenase.
Malate dehydrogenase.
NADH, buffers, stabilizers.

Principle

AST catalyzes the transfer of amino group from aspartate to oxoglutarate with formation of glutamate and oxaloacetate. Oxaloacetate is reduced to malate dehydrogenase. In this same reaction an equivalent amount of NADH is oxidized to NAD.

The resultant decrease in absorbance at 340 nm is followed spectrophotometrically and is directly proportional to activity of AST in serum.

Specimen

Serum sample

ESTIMATION OF PLATELET COUNT**Method**

Direct Method, Rees- Ecker Method.

Apparatus

Compound Microscope.
RBC Pipette.
Neubauer's Chamber with coverslip.
Petridish, Moist filter paper.
Reagent-Rees-Ecker Fluid.

Composition

Sodium citrate-3.8gm.
Prevents coagulation.
Preserves RBC.
Provides the necessary low specific.

Formalin-Acts as Fixative

Brilliant cresyl blue-0.1gm.
Distilled Water-100ml.

Principle

Blood is diluted with a solution of brilliant cresyl blue, which stains the platelets as light blue. The diluent also prevents coagulation. RBC are not lysed. Platelets are counted by hemocytometry.

Procedure

Diluting fluid is taken upto 0.5 in RBC Pipette. Blood is drawn now, so that diluent reaches the mark 1.0. Again the diluting fluid is taken upto the 101. This gives dilution of 1 in 200.

Data Analysis

All the data was tabulated and statistical analysis was done. The data was expressed as mean±standard deviation. Probability values-'P' values was derived from analysis of variants. 'P' value less than 0.05 was considered statistically significant. The results were then interpreted and tabulated.

Study Group	No. of Cases With		Mean	Standard Deviation	P Value
	Elevated	Not Elevated			
Mild PIH n=30	0	30	0.644828	0.190086835	0.823
Pre-eclampsia n=30	8	22	0.96333	0.359665964	0.09
Eclampsia n=30	12	18	1.1	0.557837132	<0.001

Table 1: Comparison of Serum Bilirubin in Mild PIH, Pre Eclampsia and Eclampsia

Table 1: Shows in mild PIH group, bilirubin was not elevated with mean 0.64±0.8. In pre-eclamptic group, bilirubin was elevated in 8 members (26%) with mean 0.96±0.3. In eclamptic group bilirubin was elevated in 12 members (40%) with mean 1.1±0.5. 'P' value (p<0.001) shows significant elevation of bilirubin in eclamptic group.

Study Group	No. of Cases With		Mean	Standard Deviation	P Value
	Elevated	Not Elevated			
Mild PIH n=30	3	27	19.93333	3.580920064	0.92
Pre-eclampsia n=30	14	16	33.66453	10.4171074	<0.001
Eclampsia n=30	17	13	43.1	21.04568102	<0.0001

Table 2: Comparison of Aspartate Transaminase in Mild PIH, Pre-Eclampsia and Eclampsia

Table 2: Shows in mild PIH group Aspartate transaminase was elevated in 3 members (10%) with mean 19.9 ± 3.5. In pre-eclampsia AST was elevated in 14 members (46%) with mean 33.6±10.4. In eclampsia AST was elevated in 17 members (56%) with mean 43.1±21.0. Mean values shows gradual increase of AST from mild PIH to eclampsia. "P" value shows significant elevation of AST in pre-eclampsia and eclampsia.

Study Group	No. of Cases With		Mean	Standard Deviation	P Value
	Elevated	Not Elevated			
Mild PIH n=30	2	28	21.4	6.060613375	0.98
Pre-eclampsia n=30	16	14	51.1	25.10440269	<0.001
Eclampsia n=30	21	9	71.2	38.30044566	<0.0001
Table 3: Comparison of Alanine Transaminase In Mild PIH, Pre-Eclampsia and Eclampsia					

Table 3: Shows in mild PIH, ALT was elevated in 2 members (6%) with mean 21.4±6.06. In pre-eclampsia, ALT was elevated in 16 members (53%) with mean 51.1±25.1. In eclampsia, ALT was elevated in 21 members (69%) with mean 71.2±38.3. Mean values show gradual increase of ALT from mild PIH to eclampsia. "P" value shows significant elevation of ALT in pre-eclampsia and eclampsia.

DISCUSSION

Hypertensive disorders complicating pregnancies are common and form one of the deadly triad along with infection and haemorrhage that contributes greatly to maternal morbidity and mortality.

Platelet count and liver function tests get deranged in pre-eclampsia and eclampsia, which can serve as predictors of degrading PIH.

In the present study, LFT and platelet count were estimated. The mean value for each parameter is considered for analysis. The reliable and feasible parameters were considered for interpretation.

The parameters chosen are:

1. Platelet count.
2. Serum bilirubin.
3. AST.
4. ALT.
5. ALP.

In the present study, 77% of study group were observed between the age group of 18-25 years with gestational with age of mean 36.3 weeks. There were 52 primigravida and 38 multigravida of the total 90 study group.

PLATELET COUNT

In the present study it was observed that the mean value of platelet count was found to be 2.12±0.5 in mild PIH group, 1.36±0.35 in pre-eclamptic group, and 0.96±0.19 in eclamptic group. There was gradual reduction of platelet count with increase in severity of PIH. This indicated thrombocytopenia is directly proportional to severity of PIH. The resulting thrombocytopenia is due to platelet activation, aggregation and consumption.

In a clinical trial conducted by Mohapatra and his associates observed that there is inverse relationship between the severity of PIH and platelet count. Platelet count was found to be 2.23±0.19 in mild PIH, 1.82±0.45 in pre-eclampsia and 1.21±0.49 in eclampsia.

PLATELET ESTIMATION-MEAN VALUES (Lakhs/cumm)

			Other Studies	
	Present Study	Mohapatra	Vrunda	Kulkarni
Mild PIH	2.12	2.23	2	1.8
Pre-eclampsia	1.36	1.82	1.4	1.19
Eclampsia	0.96	1.21	1.3	1.18

HEPATIC TRANSAMINASES-AST AND ALT

It has been observed that the mean value for AST and ALT has been progressively increasing with increase in severity of PIH.

In mild PIH AST was elevated in 10% with mean 19.9±3.5, ALT was elevated in 6% with mean 21.4±6.06. In pre-eclampsia AST was found to be elevated in 46% with mean 33.6±10.4, ALT elevated in 53% with mean 51.1±25.1. In eclampsia AST elevated in 56% with mean 43.1±21. ALT elevated in 69% with mean 71.2±8.3. 'pet value showed significant elevation in pre-eclamptic and eclamptic group indicating the liver enzymes elevate with increase in severity of PIH.

The elevated liver enzymes are thought to be secondary to obstruction of hepatic blood flow by fibrin deposits in the sinusoid. This obstruction leads to periportal necrosis and in severe cases intrahepatic haemorrhage and subcapsular haematoma formation.

In a clinical trial conducted by Seymour.⁽²⁾ including 85 patients with PIH, AST, ALT were elevated in 54% of patients with pre-eclampsia, whereas in cases of gestational hypertension they were raised only in 14% of cases.

He pointed out that patients with abnormal liver function tests had bad maternal and fetal outcomes.

In another study conducted by Ayala LC, Maqueo et al.⁽³⁾ serum transaminases were significantly elevated in 60% of 84 pre-eclamptic women. The levels of ALT raised to a greater degree than levels of AST. Similar observations were made by the Pritchard and Colleagues.⁽⁴⁾ about serum hepatic transaminases, which were significantly elevated in pre-eclampsia and eclampsia.

In a similar study conducted by Makuyana in Liver and Kidney Function Tests in normal and pre-eclamptic gestation, the activity of AST (P=0.001) was significantly elevated in pre-eclamptic and eclamptic women.

ALKALINE PHOSPHATASE

In the present study, it was observed that ALP was elevated in 13% in mild PIH with mean 151.6±19.3. In pre-eclampsia it was elevated in 56% with mean 196±41.2 and in eclampsia it was elevated in 70% with mean 217.1±31.5. ALP shows significant elevation with increase in severity of PIH (P<0.0001). Similar observations made by the Makunya Group, suggesting activity of ALP enzyme was significantly elevated in pre-eclamptic and eclamptic women (P<0.0001).

SERUM BILIRUBIN

With reference to serum bilirubin, it was not elevated in mild PIH group. In pre-eclampsia, it was elevated in 26% with mean 0.96±0.35.

In eclampsia, it was elevated in 33% with mean 1.1 ± 0.5 . "PH" value shows significant elevation only in eclamptic group. It was observed that bilirubin does not show significant changes except in eclamptic group.

In the study conducted by Makunya, similar observation was made where bilirubin did not show any significant elevation in pre-eclamptic and eclamptic group suggesting that bilirubin levels does not alter much with increase in severity of PIH.

SUMMARY AND CONCLUSIONS

The present study was undertaken to evaluate the changes of Liver function tests and platelet count in different grades of PIH women. The study group included 90 PIH women divided into 3 groups based on the severity of PIH into 30 mild PIH, 30 pre-eclampsia and 30 eclampsia. The LFT parameters and platelet count were estimated. Data was analysed by statistical method and the following conclusions are drawn:

- Platelet count was significantly reduced in pre-eclampsia and eclampsia. There is inverse relationship between the platelet count and severity of PIH.

- In liver function tests, AST, ALT and ALP were significantly elevated in pre-eclampsia and eclampsia suggesting elevation of these enzymes occurs with increasing severity of PIH. Bilirubin does not get much altered.
- LFT parameters like AST, ALT, ALP and Platelet estimation can be taken as an early interpretation for assessment of severity of PIH, so that early measures are taken to prevent the maternal and fetal complications.

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