European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 09, Issue 03, 2022

Original Research Article

A Study Of Liver Function In Normal Pregnancy And Pregnancy Induced Hypertension

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Abstract:

Background: Hypertensive disorders of pregnancy are one of the commonest complications of pregnancy which accounts for 12% of the maternal and perinatal mortality and morbidity and affects 3% to 10% of all pregnancies worldwide. Liver function Test (LFT) abnormalities occur in 3% of the pregnancies and probably the lesion that causes elevated serum liver enzymes. Hence, this study was done to assess and correlate liver function in the development of pregnancy induced hypertension.

Method: This Case Control study was done to correlate liver function in pregnancy induced hypertension and normal pregnancy. In the present study 140 subjects, 70 women with diagnosed pregnancy induced hypertension at gestational age of > 20 weeks as a case and 70 normotensive pregnant women at gestational age of > 20 weeks as a control were included after applying inclusion & exclusion criteria. Distribution of subject according to Gestational Hypertension is Group A, Pre-Eclampsia is Group B and Eclampsia is Group C of case and control.

Result: Mean Difference in SGOT, SGPT were observed in subjects with Pre-Eclampsia and Eclampsia as compare to Gestational Hypertension. However, no significant difference between case and control group were noted.

Conclusion: Our study shows that there is no significant difference in Gestational Hypertension,Pre-Eclampsiaand Eclampsia of case and control group.

Keywords: Hypertension, Pre-Eclampsia& Eclampsia
Study Design: Observational Study.

1. INTRODUCTION:

Hypertensive disorders of pregnancy are the most common maternal and perinatal mortality and morbidity[1]. 20% to 30% of pregnancies shows abnormal liver function test (LFT) which is complicated by Pre-eclampsia and are linked with deprived maternal and fetal outcomes[2,3]. Pre-eclampsia and eclampsia are pregnancy induced hypertensive disease[4]. Pregnancy Induce Hypertension (PIH) is blood pressure raised without proteinuria during the second half of pregnancy. Pre-eclampsia is a multisystem disorder that is usually associated with raised blood pressure and proteinuria after 20 weeks of gestation. Eclampsia is one or more convulsions in connection with syndrome of pre-eclampsia[5,6]. In preeclampsia the systolic BP is ≥140 mm Hg and diastolic BP ≥90 mm Hg in a woman with previously normal blood pressure and with proteinuria ≥0.3g in a 24 hour urine collection. The main reason of pre-eclampsia is vasoconstriction and thicken vascular media that decreases vascular capacity and increases peripheral resistance[5]. The cellular cause of preeclampsia lies within the placenta and resolution ofpreeclampsia starts with removal of placenta at delivery[6]. The increase in peripheral vascular resistance is likely to be a cause of hypertension in these women. Women with preeclampsia have persistent vasoconstriction due to an increased vascular responsiveness to physiologic vasoconstrictive agents like angiotensin-II or an increase in vascular tone or reactivity[7,8].

Liver dysfunction during pre-eclampsia has serious consequences. In pre- eclampsia accompanied by HELLP syndrome, an elevation in liver function test result is noted. Alanine aminotransferase (ALT) and Aspartate aminofransferase (AST) may also be elevated and hyper-bilirubinemia may occur, especially in the presence of haemolysis[9].Liver damage accompanying preeclampsia may range from mild hepatocellular necrosis with serum enzyme abnormalities (aminotransferase and lactate dehydrogenase) to the ominous hemolysis, elevated liver enzymes, and low platelet count (HELLP) syndrome, with markedly elevated enzyme levels and even subcapsular bleeding or hepatic rupture. The latter syndrome represents serious disease and is associated with significant maternal morbidity[10] .

Previous studies have shown varying results for the ability of liver function tests to predict adverse maternal outcomes. While some studies have found strong associations between levels of AST, ALT, LDH, bilirubin, and adverse outcomes, others have found only weak associations or none at all. No consensus on reproducible predictive parameters has been reached. Some authors suggest that analytes such as LDH, bilirubin, and possibly AST may prove to be more predictive because they reflect multiple organ dysfunction[11]. The objective of this study was to compare Serum Glutamate Oxaloacetate Transaminase (SGOT) and SerumGlutamate Pyruvate Transaminase (SGPT) in pregnancy induced hypertension and normalpregnancy.

2. MATERIAL & METHOD:

The present Observational study was conducted in Department of Physiology and Department of obstetrics and gynecology Rohilkhand Medical College and Hospital Bareilly. Study includes140 subjects, 70 cases of pregnancy induced hypertension at gestational age of

> 20 weeks as case and 70 normal Pregnancy at gestational age of > 20 weeks as controls were included in this study. The entire subject (n=140, case=70 and control=70) are divide into group A, B and C respectively according to gestational hypertension. Group A contain 30, Group B contain 22 and Group C contain 18 subject of case and control.

The Study group including control group with the history of Chronic Hypertension, Diabetes Mellitus, Liver Disorder, Gestational Diabetes, Severe anaemia (Hb<6gm %), Impaired Renal Function, Coronary Heart Disease, Coronary Heart Disease, Hypothyroidism, Any other systemic disorder, Smoking , Tobacco addiction & alcoholism were excluded from the study:

Anthropometric measurements:

After giving informed consent, anthropometric measurements such as height and weight were taken. Height was measured to the nearest 0.1 cm with the subject standing barefoot. Body weight was measured to the nearest 0.1 kg on a balanced scale. Blood pressure was measured using standard mercury sphygmomanometer, with the participant in sitting position for at least 10 min.

Measurement of Blood Pressure:

Blood pressure was measured in the right arm with the subject sitting quietly by use auscultation with a mercury-column sphygmomanometer and a cuff appropriately sized for the arm size of the subject. The onset of the first Korotkoff phase was used to determine systolic blood pressure, and the onset of the fifth Korotkoff phase was used to determine diastolic blood pressure. Three blood pressure measurements were taken. The average of the 3 measurements was used in the analysis.

Serum Glutamate Oxaloacetate Transaminase

SGOT (AST) Reagent Kit is usedfor the in vitro quantitative estimation of Glutamate Oxaloacetate Transaminase activity in serum.

Method: - (Modified Reitman Frankel's Method) Without Graph

Test PrincipleL-Asparlate +2- Oxoglutarate SGOT Oxaloacetate + LGlitamateSGOT (AST) Catalyses the transfer of amino goup from aspartic acie to 2-Oxoglutarate to form oxaloacetare and L-Glutamate. The Oxatoacetate thus-formed-reacts with2,4 - dinitrophennydrazine to form a corresponding hydrazone, a brownish red colored complex in an alkline medium. The color intensity is measured photometrically at 505 nm orwith GREEN FILTER

Reagent Provided For 50 Tests

R1 Substrate Reagent

R2 SGOT Colour Reagent

R3 Alkali Reagent

R4 Calibrater (150 U//L)

Reagent Preparation and Storage

Dilute reagent R-3 (ALKALI Regent 1:10) 1 part ALKALI Reagent with 9 part of Deionised water (1m1 ALKALI Reagent with 9 m! of Deionised water) R1, R2 & R4 are ready to use. The reagents are stable up to expiry date stated on the lable when stored at 2-8°C.

Specimen

Clear, unhaemolysed serum is recommended for use. Serum should be remo-ved from clott as soon as possible after collection because of the approximately 10- fold greater concentration of GOT in erythrocytes than in serum. for similar reason, heamolysis of the specimen must be avoided.

Test Procedure

Pipette in to test tube labelled as	Blank	Calibrator	Control	Test
Substrate Reagent	250u1/0.25m1	2150u1/0.25m1	250u1/0.25m1	250u1/0.25m1
Deionised Water	50ul/0.05m1			
Sample				50u1/0.05m1
Calibrator(R-4)		50ul/0.05m1		

Mix and incubate at 37 c for 60 minute

SGOT Colour Reagent (R2)	250ul/0.25ml	250ul/0.25ml	250ul/0.25ml	250ul/0.25ml
SAMPLE			50ul/0.05m1	

Mix and incubate for 20 minutes at room Temperature

Alkali Reagent (R-3) (Diluted)	1.5 ml	1.5 ml	1.5 ml	1.5 ml

Read absorbance of all tubes against distilled water at 520 nm or with Green filter

Calculation

$$\textbf{SGOT (AST) = Activity in U/L} = \frac{\text{O D OF TEST- O.D. OF CONTROL}}{\text{O.D. OF CALIBRETOR - O.D. OF BLANK}} \times 150$$

Linearity

Up to 300 U/L, For samples above the linearitylimit, dilute suitable with saline & reassay. Multiply by the dilution factor to calculate the end result.

SerumGlutamate Pyruvate Transaminase

SGPT (ALT) Reagent Kit Is UsedFor the in vitro quantitative estimation of Glutamate Pyruvate Transaminase activity in serum.

Method: - Modified Reitman Frankel's Method (Without Graph)

Test Principle:-Transformation is the process by which an ammino group of an amino acid is transferred to an keto acid with the formation of a keto acid corresponding to the original amino acid. The oxaloacetic acid formed is spontaneously converted in to pyruvic acid and L-Glutamate the thus formed reacts with 2,4 DNPH to form a corresponding hydro zone. The yellow colour is modified to a brownish red colour complex, in an alkaline medium and

colorimetrically measured at 520 nm

Reagent Provided For 50 Tests

R1 Substrate Reagent

R2 SGPT Colour Reagent

R3 Alkali Reagent

R4 Calibrater (170 U//L)

Reagent Preparation and Storage

Dilute reagent R-3 (ALKALI Regent 1:10) 1 part ALKALI Reagent with 9 part of Deionised water (1m1 ALKALI Reagent with 9 m! of Deionised water) R1, R2 & R4 are ready to use. The reagents are stable up to expiry date stated on the lable when stored at 2-8°C.

Specimen

Clear, unhaemolysed serum is recommended for use.

Test Procedure

Pipette in to test tube labelled as	Blank	Calibrator	Control	Test
Substrate Reagent	250u1/0.25m1	2150u1/0.25m1	250u1/0.25m1	250u1/0.25m1
Deionised Water	50ul/0.05m1			
Sample				50u1/0.05m1
Calibrator(R-4)		50ul/0.05m1		

Mix and incubate at 37 c for 30 minute

SGOT Colour Reagent (R2)	250ul/0.25ml	250ul/0.25ml	250ul/0.25ml	250ul/0.25ml
SAMPLE			50ul/0.05m1	

Mix and incubate for 20 minutes at room Temperature

Alkali Reagent (R-3) (Diluted)	1.5 ml	1.5 ml	1.5 ml	1.5 ml

Read absorbance of all tubes against distilled water at 520 nm or with Green filter

Calculation

$$\textbf{SGOT (AST) = Activity in U/L} = \frac{\text{O D OF TEST- O.D. OF CONTROL}}{\text{O.D. OF CALIBRETOR - O.D. OF BLANK}} \times 170$$

Normal Range:-5-40 u/l

Linearity

Up to 300 U/L, For samples above the linearitylimit, dilute suitable with saline & reassay. Multiply by the dilution factor to calculate the end result.

3. RESULTS:

Table No.1:- Distribution of control subject according to Gestational Hypertension is Group A, Pre-Eclampsia is Group B and Eclampsia is Group C of case and control.

Groups	**Case**	**Control**
Group A	30	30
Group B	22	22
Group C	18	18
Total	70	70

Table No.1:- Show that the distribution of number of subject of cases is corresponds to the number of subject of control. Group Acontain number of subject of cases is 30 which is equal to number of subject of control i.e. 30. Group B contain number of subject of cases is 22 which is equal to number of subject of control i.e. 22. Group Ccontain number of subject of cases is 18 which is equal to number of subject of control i.e. 18

Table No.2:- Compression of blood pressure parameter between the case and control with in Group A, Group B and Group C.

Parameters	**Groups**		**Case**		**Control**		T-Test	P-Value
		N	Mean	SD	Mean	SD		
SBP	Group A	30	143.67	5.59	119.73	8.33	11.61	0.00
	Group B	22	144.55	6.42	120.73	8.11	9.57	0.00
	Group C	18	166.44	9.14	120.78	7.49	14.94	0.00
DBP	Group A	30	91.67	2.88	79.93	6.51	8.27	0.00
	Group B	22	92.27	4.06	78.91	5.91	8.42	0.00
	Group C	18	101.22	5.75	79.78	6.32	10.21	0.00

Table No.2:- Shows that the significant mean value difference in SBP and DBP of case and control of group A ($p < 0.01$). Mean of SBP and DBP of case and control of group B is significant at the level of $p < 0.01$. Similarly the results shows significant difference mean values of SBP and DBP of case and control of group C at the level of $p < 0.01$.

Table No.3:- Compression of SGPT and SGOT between the case and control with in Group A, Group B andGroup C

Parameters	**Groups**		**Case**		**Control**		T-Test	P-Value
		N	Mean	SD	Mean	SD		
SGPT	**Group A**	30	26.53	6.03	23.27	10.18	1.89	0.07
	Group B	22	21.82	10.20	20.05	10.31	0.53	0.60
	Group C	18	22.28	7.17	27.83	6.50	-2.32	0.03
SGOT	**Group A**	30	25.93	6.64	23.21	6.16	1.72	0.10
	Group B	22	23.32	7.94	23.36	7.15	-0.03	0.98
	Group C	18	22.11	7.71	23.50	8.68	-0.55	0.59

Table No.3:- Show that Mean ± SD of SGPT of case and control of group A is 26.53±6.03 and 23.27±10.18 respectively, which is not significant at the level of $p > 0.01$. Mean ± SD of SGPT of case and control of group B is 21.82±10.20 and 20.05±10.31 respectively, which is not significant at the level of $p > 0.01$. Mean ± SD of SGPT of case and control of group C is 22.28±7.17and 27.83±6.50 respectively. Which is not significant at the level of $p > 0.01$ Mean ± SD of SGOT of case and control of group A is 25.93±6.64and 23.21±6.16 respectively. Which is not significant at the level of $p > 0.01$ Mean ± SD of SGOT of case and control of group B is 23.32±7.94and 23.36±7.15 respectively. Which is not significant at the level of $p > 0.01$ Mean ± SD of SGOT of case and control of group C is 22.11±7.71and 23.50±8.68 respectively. This is not significant at the level of $p > 0.01$

4. DISCUSSION:

The present study demonstrates that blood pressure, and liver function has different values in Hypertension and Normotensive Pregnant Women. The hepatic dysfunction in preeclampsia ranges from the presence of mild hepatic enzyme elevations in the serum to the more extreme HELLP syndrome, sub capsular bleeding or even hepatic rupture[12].

The mean SGOT levels among the subjects with gestational hypertension were 25.93 IU, Subjects with preeclampsia was 23.32 IU and eclampsia was 22.11 IU in case group. Similarly the mean SGOT levels among the normal pregnant women subjects with gestational hypertension were 23.21 IU, Subjects with preeclampsia was 23.36 IU and eclampsia was 23.50 IU. In a study by Aref et al[13] the mean SGOT level among the patients with pregnancy induced hypertension was 97.3 IU. In a study by Munazza et al[14], the mean SGOT level was 41.34 IU among the cases. The mean SGPT levels of the case group with gestational hypertension was 26.53, the subjects with preeclampsia was 21.82 and patients with eclampsia was 22.28 IU. In normal Pregnancy, the mean SGPT levels with gestational

hypertension was 23.27, the subjects with preeclampsia was 20.05 IU, and patients with eclampsia was 27.83 IU. In a study by R. Anuradha et al[15], the mean SGPT level was 39.3IU among the cases. In a study by Patil et al1[16], the mean SGPT level was 42.5 IU in milder preeclampsia group and 60.51 IU in severe preeclampsia group. Discrepancy in mean value of SGOT in other studies to present study may be due to large difference in study in regard of no. of cases and inclusion of study subjects.

None of the patients with gestational hypertension, 89.2% of the patients with preeclampsia and all the patients with eclampsia had the elevated SGPT levels.

In a study by Aref et al[13], the mean SGPT levels among the patients with pregnancy induced hypertension was 65.3IU, 32.5 IU among the patients with late normal pregnancy. Munazza et al.[14] studied that mean SGPT level was 55.81 IU among the cases and 15.22 among the controls. In a study by R. Anuradha et al[15], the mean SGPT level was 30.5IU among the cases and 11.4IUamong normal pregnant females. In a study by Patil et al[16], the mean SGPT level was 36.6 IU in milder preeclampsia group and 51.94 IU in severe preeclampsia group and 27.31IU in control group30. Discrepancy in mean value of SGPT of present study to some other reviewed studies ex. Aref et al[13] and R. Anuradha et al[15] may be due to different sample size and sample subjects.

Serum ALT of preeclamptic women in this study was not significantly elevated from their normotensive pregnant counterparts. Several research workers also had found an elevated level of ALT in their study populations which does not line with the findings of the present study[17].

5. CONCLUSION:

Routine investigations with Inclusion of LFTs leads to early prediction of severity of PIH and subsequent complications. The primary aim of antepartum monitoring is timely detection of maternal & fetal complications by special investigation (LFT); and to take appropriate in time intervention to prevent further serious complications to both mother and fetus.A clinically useful means for predicting disease severity based on change or rate of change was not achieved by this study. However, as our knowledge of the underlying pathophysiology of the hypertensive disorders of pregnancy increases and further research in the area is undertaken, it is likely that the relationship between change or rate of change in test results and maternal outcomes will be clarified.

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