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ORGINAL ARTICLE

Comparative Study of Liver and Kidney Biochemical Parameters in Normal and Pre-Eclamptic Gestation

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ABSTRACT

Pre-eclampsia is an idopathic multisystem disorder specific to pregnancy characterized by hypertension (systolic blood pressure >140 mmHg and diastolic blood pressure >90mm Hg), proteinuria(>300mg/24hr), edema and frequent disturbances to other organ systems. Pre-eclampsia is the most common cause of abnormal liver function and alteration in renal structure and function. The main aim of the study is to compare the liver function and kidney function in pre-eclamptic gestation. 25 cases of pre eclamptic gestation as test group and 25 cases of normotensive healthy pregnant women as control. The liver function tests (Total Bilirubin, AST, ALT, ALP, GGT, Albumin) and kidney function tests (Urea,Creatinine, Uric Acid) in blood are performed by using Nicholas (piramal company) kit's done in Prathima Institute of Medical Sciences, Clinical Biochemistry Laboratory, Nagnoor, Karimnagar, Andhrapradesh. The mean and SD of Bilirubin of Controls and Test group are (0.7±0.12) and (0.83±0.16) and that of serum ALT are (22.48±4.29) and (27.2±4.4) with $p>0.05$ and there is a significance of AST with $p<0.001$, ALP with $p<0.01$,GGT with $p<0.001$, Albumin do not show any significance between control and test group. All the kidney function tests i.e. Urea,Creatinine and Uric acid levels in serum showed significant. In pre-eclampsia ALP, GGT, Urea, Uric Acid and Creatinine levels are raised compared to normotensive gestation. These increased levels can help to early diagnosis of pre-eclampsia which inturn increase the life expectancy of mother and foetus.

KEY WORDS : Pre-eclampsia, Liver function, Kidney function, Hypertension, Proteinuria

Introduction

Hypertensive disorders are the most common medical complications of the pregnancy[1]. Pre-eclampsia is a syndrome of pregnancy induced hypertension accompanied by proteinuria, edema and frequently disturbances in other organ systems[2]. Pre-eclampsia is a syndrome of generalized endothelial dysfunction initiated by abnormal placentation & consequent placental under perfusion, release of cytokines, peroxidants, vasoconstriction and platelet activation[3]. Pre-eclampsia occurs with increased frequency among young, nulliparous women after 20 weeks of gestation and in multiparous women greater than 35 years of age. Pre-eclampsia complicates 5-7% and it is dangerous to both mother and baby[4]. It is a major direct cause of both maternal and fetal morbidity and mortality. Pre-eclampsia may progress rapidly without warning to the

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convulsive phase, termed eclampsia which is life threatening complication of pregnancy [5].

Despite considerable research, the cause or causes of pre-eclampsia remain unclear and there are no clinically useful screening tests to identify women in whom it will develop[6]. Early pregnancy dyslipidemia is associated with an increased risk of pre-eclampsia[7]. Alterations in renal structure and function are consistently present in pre-eclampsia [8]. The Renal manifestations include functional loss & proteinuria[9]. Pre-eclampsia is the most common cause of abnormal liver chemistry. Liver dysfunction is present in some patients with mild pre-eclampsia and the findings are more common in patients with the loss of maternal and infant lives due to hypertension induced or aggravated by pregnancy. And it is most often be prevented with improved prenatal mortality[10]. Finally early detection & appropriate treatment may prolong pregnancy to ensure a satisfactory outcome for mother and foetus.

Incidence And Risk Factors:

The incidence varies widely from 5 to 15%. The incidence in primigravidae is about 10% and in multigravidae 5% [11]. The incidence is markedly influenced by parity, it is related to race and ethnicity and thus to genetic predisposition; and environmental factory may also have a role. Other risk factors associated with pre-eclampsia include multiple pregnancy, history of chronic hypertension, maternal age over 35 years, obesity.

Aim of The Study

To know the diagnostic efficacy of Liver and Kidney Function Tests in pre-eclampsia and normal pregnancy.

Materials and Methods

This study was carried in the department of Biochemistry in collaboration with department of Gynecology and obstetrics, at Prathima Institute of Medical Sciences, Nagnoor, Karimnagar. This study has been undertaken to compare liver and kidney function tests in pre-eclampsia and in normal pregnancy. The selected cases were in the age group of 18-30 years and in their third trimester with singleton foetus.Twenty-five women who had absolute normal pregnancy served the control group and the other twenty-five patients were pre-eclamptic with systolic Blood Pressure > 140 mmHg and Diastolic Blood Pressure > 90 mmHg served the test group. Both the systolic and diastolic Blood Pressure were recorded on two occasions separated by an interval of six hours. Pre-eclampsia was regarded as a systolic blood pressure of 140-150 mmHg & diastolic of 90-100 mmHg on two separate occasions.

Selection Criteria

Inclusion Criteria:

Control Group : This group consist of Twenty Five healthy pregnant women between 30-36 weeks of gestation with normal blood pressure with singleton foetus under the age group of 18-30 years.

Test Group: This group consists of Twenty-Five pregnant women with 30-36 weeks gestational age. These have increased blood pressure and suffering with pre-eclampsia.

Exclusion Criteria:

Both the control and test groups were abstained from smoking and alcoholism. The women who were suffering from any acute or chronic illness during the study were excluded. The women with any past history of cardiac, renal, hepatic dysfunction and dyslipidemia are also not included in the study.

Sample Collection:

5 ml of venous blood was collected from ante cubital vein and drawn into sterile clean and dry container, which was allowed to clot for 30 minutes. Then centrifuged at 3000 rpm for 10 minutes, thus formed serum is separated and assay performed. The following parameters were studied in this study,

Results

Liver Function Tests:

Table No. 1 shows Mean & SD values of Total Bilirubin, ALT, AST, ALP, GGT and Albumin in both control group and test group with the p values.

Total Bilirubin : The normal range of Serum total Bilirubin in pregnant women is 0.20 ± 1.0 mg/dl . Table 1 shows the means value of total bilirubin in controls is 0.7 ± 0.12 and in test group is 0.83 ± 0.16 . There was no much difference found in the Total Bilirubin levels in both control group and test group. The normal range of serum ALT in Pregnant women is 0-35 IU/L. Normal range of AST 0-35 IU/L. The mean value of Serum ALT is 22.48 ± 4.29 in control group and 27.2 ± 4.4 in test group. We found only a little difference in ALT with a p value of more than 0.05 where as we observed significant increase in AST levels in test group compared to control group with a 'p' value of < 0.01. The normal range of Serum ALP in Pregnant women is 60 –120 IU/L . The Mean ALP values in controls is 136 ± 9.81 and in test group 228 ± 156. Almost all cases in test group showed significantly increased levels of ALP with a 'p' Value of <0.01 compared to the control group.The normal range of GGT in Pregnant women is 1 to 45 IU/L . The Mean GGT values in controls is 13.8± 2.39 in controls and 45.68 ± 4.7 in test group. All the cases in the test group showed significantly elevated GGT levels with the 'p' value of <0.001. Normal range of serum albumin is 2.5 to 4.5 g/dl . The Mean Albumin levels in control group is 3.03 ± 0.34 and in test group is 3.29 ± 0.39. There is no much difference found in the Albumin levels in between both the group and the 'p' value showed >0.05 which is not much significant .

Kidney Function Test:

Table No.2 shows the Mean & SD values of Urea Creatinine and Uric acid in both control group and test group. Both were compared against each other and p-value was indicated in the same table.The normal range of urea in pregnant women is 520 mg /dl . The mean value of Urea in control group is 12.8 ± 1.9 and in test group is 23.56 ± 4.42. Significant elevation in the urea levels was observed in the test group compared to the control group with the 'p' value of <0.01.The normal range of creatinine in Pregnant women is 0.04 ± 0.8 mg / dl. The Mean Creatinine values is 0.59 ± 0.10 in control group and 1.94 ± 0.32 in the test group. All most all the cases in the test group showed increased creatinine levels compared to the control group with a 'p' value of < 0.01. The normal range of Uric Acid in pregnant women is 2.52 to 4.5 mg/dl. The Mean value of Uric Acid in the control group is 2.2 ± 0.49 and in the test group 5.24 ± 0.79. We found significantly increased values of Uric Acid observed in the test group with the 'p' value of < 0.01 which is statistically significant when compared against the control group.

Parameters	Control group	Test group	p Value
	MEAN ± SD	MEAN ± SD	
Total Bilirubin	0.70 ± 0.12	0.83 ± 0.16	>0.05
ALT	22.48 ± 4.29	27.2 ± 4.4	>0.05
AST	20 ± 2.82	45.64 ± 4.8	<0.001
ALP	136 ± 9.81	228 ± 15.6	<0.01
GGT	13.8 ± 2.39	45.68 ± 4.7	<0.01
Albumin	3.03 ± 0.34	3.29 ± 0.39	>0.05

TABLE 1: The Mean ± SD Values of Total Bilirubin, ALT, AST, ALP, GGT & Albumin

Parameters	Control group	Test group	p Value
	MEAN ± SD	MEAN ± SD	
Urea	12.8 ±1.9	23.56 ± 4.42	<0.01
Creatinine	0.59 ± 0.10	1.94 ± 0.32	<0.01
Uric acid	2.2 ± 0.49	5.24 ± 0.79	<0.01

TABLE 2: The Mean± SD Values of Urea, Creatinine, Uricacid

Discussion

Liver function parameters and kidney function parameters were studied in both the control group i.e. normal healthy pregnant women and in test group which includes pre-eclampsia women. This present study was conducted in the population of local Karimnagar District people. Abnormal liver function tests were observed in pregnancies complicated by pre-eclamsia [12] Makunyana and colleagues showed Albumin, Bilirubin and ALT did not show much difference in their levels between the test group and the control group. Our study also correlates well with the above study. We found no much difference between these parameters when compared between test group and control group.

In our study, AST levels were comparatively increased in test group than from control group. Makunyana and colleagues also showed in their study that AST levels significantly increased in test group from the control [13].Frederic B. Walker and colleagues [14], Marshall M. Kaplan[15] showed in their study both ALP and GGT were significantly raised in pre-eclamptic patients than from normal pregnant women. In normal persons, serum ALP is derived from liver, bone and intestines. But during pregnancy, placental ALP will be increased which contributes to the increased ALP levels in Pregnant women. Francis A. Adeniyi & David [16] in their study described elevation of ALP was reported in Pre-eclamptic pregnancies which is due to reduced synthesis of the enzyme in the placenta. Kaplan suggested that elevated serum ALP levels originate in tissues whose metabolism was either functionally disturbed (eg: the obstructed Liver) or greatly stimulated (eg: the placenta). Our study closely correlates well with the above findings that increased ALP observed in pre-eclamptic gestation[13]. Makuyana and co-workers Churchill et al [17] showed increased GGT levels in pre-eclamptic pregnancy from normotensive pregnant women. Churchill reported that in pre-eclampsia, local platelet endothelial interaction is postulated as being secondary to abnormal placentation. It is possible that endothelial cell destruction within the uteroplacental circulation leads to systemic release of GGT. Our data in the present study support this hypothesis suggesting an association between serum GGT concentration and gestational hypertension. Thus our study correlates well with the above workers. According to Makuyana[13], the renal indices Creatinine, Urea and Uric Acid were significantly raised in Pre-eclampsia compared to normotensive pregnancy.

Redmann & Colleagues [20], showed increased Uric Acid and Urea levels. Barbara and co-workers [19], showed higher Uric acid and serum Creatinine levels in pre-eclamptic group than from normotensive people. The elevated Uric Acid level is a classical feature of pre-eclamptic state which predicts the severity of the disease. This increased Uric acid levels in Pre-eclampsia are thought to be the result of a decreased in uric acid clearance i.e. disproportionate to the fall in glomerular filtration rate. In our study we also found increased urea, uric acid and creatinine levels in pre-eclamptic pregnancy compared to the normotensive gestation. Thus our study correlates well with the above workers. In pre-eclamptic cases, we observed raised ALP, GGT, Urea, Uric Acid and Creatinine levels compared to normotensive gestation. These increased levels can give a clue to the clinician regarding pre-eclampsia.

Conclusion

The serum AST, ALP, GGT were increased in pre-eclamptic cases. Among the Kidney function parameters all the three i.e. Urea, Uric acid and Creatinine were increased to a marked extent in pre-eclamptic cases than from control group. In our study, we found no much differences in Albumin, ALT and Bilirubin in both test and control groups. Based on the above findings the following conclusions were drawn:

1) Serum AST, ALP and GGT increased in Pre-eclampsia.

2) Urea, Uric Acid and Creatinine also increased in pre-eclampsia.

3) Other Liver function parameters like Total Bilirubin, ALT and Albumin does not show much difference between pre-eclamptic gestations.

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