

## Assessment of GammaGlutamyl Transferase and Lactate Dehydrogenase as Biochemical Markers of Preeclampsia Severity in Sudanese Pregnant Women's in Khartoum State

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### ABSTRACT

Preeclampsia is a pregnancy-specific disease with multisystem complications, it constantly associates with high blood pressure . There are very limited studies with conflicting data on GGT and LDH in preeclampsia. This study aimed to assess of Gamma Glutamyl Transferase and Lactate Dehydrogenase as Biochemical Markers of Severity of Preeclampsia in Sudanese pregnant women in Khartoum state and comparison with healthy normotensive pregnant controls. The glutamyl transferase and lactate de-hydrogenase was estimated in 100Sudanese pregnant women by spectrophotometer method. The mean values of plasma gamma glutamyl transferase in mild preeclamptic pregnant women were insignificant difference when compared to control Pvalue=0.346. The mean values of plasma gamma- glutamyltransferase in mild preeclamptic pregnant women were the insignificant difference when compared to control P value=0.089. The mean values of plasma lactate dehydrogenase in mild preeclamptic pregnant women were significant increase when compared to control Pvalue =0.008. The mean values of plasma lactate dehydrogenase in severe preeclamptic pregnant women were significant increase when compared to control P value =0.001. Result showed significant positive moderate correlation between lactate dehydrogenase and diastolic blood pressure in sever preeclampsia(p value = 0.006 and r = .851) and significant positive moderate correlation between lactate dehydrogenase and diastolic blood pressure in mild preeclampsia (p value = 0.013 and r = .782) and insignificant correlation between gamma glutamyltransferase and diastolic blood pressure in sever preeclampsia (p value = 0.359 and r = .215) and insignificant correlation between gamma glutamyltransferase and diastolic blood pressure in mild preeclampsia(p value = 0.652 and r = -.189).

From the result of this study, it is concluded that: levels of LDH is raised in Sudanese pregnant women with hypertensive preeclampsia and level of GGT level normal in Sudanese pregnant women with hypertensive preeclampsia.And showed a significant positive moderate correlation between lactate dehydrogenase and

**diastolic blood pressure in Sudanese pregnant women with hypertensive preeclampsia disease and showed an insignificant correlation between gamma-glutamyltransferase and diastolic blood pressure in Sudanese pregnant women with hypertensive preeclampsia disease.**

**Keywords:** Gamma GlutamylTransferase, Lactate Dehydrogenase, normotensive, Preeclampsia.

## INTRODUCTION

Preeclampsia is one of the most common medical complications of pregnancy and it is characterized by hypertension, proteinuria and/or edema, usually occurring after 20 weeks of gestation. It is an important cause of maternal, perinatal morbidity and mortality worldwide, especially in developing countries. In India, the incidence of preeclampsia amongst the hospital patients is about 7-10% of all antenatal admissions, although the precise etiology of preeclampsia is not clear, defective placentation and endothelial dysfunction are considered the core features of preeclampsia(1).

It is a multisystem disorder that affects the maternal kidneys, liver, brain, clotting system and primarily the placenta. Hepatic dysfunction with preeclampsia has long been recognized. Several studies have suggested that liver involvement in preeclampsia is serious and frequently accompanied by evidence of other organs involvement, especially the kidney and brain along with hemolysis and thrombocytopenia. This is commonly referred to as HELLP syndrome (hemolysis, elevated liver enzymes and low platelets) (2).

The enzyme  $\gamma$ -glutamyltransferase (GGT) is widely distributed throughout the body in many tissues, particularly the liver. At the cellular level, significant activity occurs in both endothelium and epithelium. Association between serum GGT concentration and blood pressure in non-pregnant hypertensive patients have been reported in some population surveys. Also raised levels of serum GGT have been reported in stroke patients, which were assumed to be due to vascular endothelial damage (Yamada, et- al.,1990). Lactate dehydrogenase (LDH) is an intracellular enzyme which converts lactic acid to pyruvic acid and its elevated levels indicate cellular death and leakage of the enzyme from the cell. Increased levels of LDH were found in association with preeclampsia in a limited numbers of studies.

This is the first study that examines the frequency symptoms occurring in severely preeclamptic patients according to the levels of GGT and LDH, indicating multiorgan involvement and severity of the disease. As severe preeclampsia causes numerous multisystem complications, we hypothesize that elevated levels of serum GGT and LDH may reflect the severity of preeclampsia and the occurrence of complications (Beyer, 2004). Studies have consistently shown an association between the preeclampsia and gamma-glutamyltransferase and lactate dehydrogenase. There is an extremely high maternal mortality in Sudan with preeclampsia accounting for 4.2% of the obstetric complications and 18.1% of maternal deaths(3) (4). Use of more investigations as biochemical markers which reflects reflect the severity of preeclampsia for the management

of preeclampsia will decrease maternal and fetal morbidity and mortality.

No published data of gamma-glutamyltransferase and lactate dehydrogenase in preeclampsia in Sudan. So This study was conducted to evaluate gamma-glutamyltransferase and lactate dehydrogenase as a marker for severity of preeclampsia. This study aimed to assess the effect of preeclampsia on the level of gamma-glutamyltransferase and lactate dehydrogenase among Sudanese at Khartoum state during march o June 2015 and to determine the level of gamma-glutamyltransferase and lactate dehydrogenase in Sudanese preeclamptic patients. It also aims to determine the association of specific type of preeclampsia (mild and severe) with gamma glutamyltransferase and lactate dehydrogenase.

## MATERIALS AND METHODS

This is case-control hospitalize base study, and was conducted in preeclamptic pregnant women in Omdurman maternity hospital and medical military hospital in Khartoum state from March to June 2015.

In this study 100 pregnant women were chosen for determination of plasma gamma-glutamyltransferase and lactate dehydrogenase, 50 of them were diagnosed with preeclampsia 27 from this is severe preeclampsia and 23 is mild preeclampsia was matched in age. Classify severe and mild preeclampsia according to blood pressure Mild preeclampsia was defined as onset of hypertension after 20 weeks of gestation with diastolic blood pressure (DBP)  $>90$  and  $\leq 110$  mmHg with or without proteinuria. When diastolic blood pressure (DBP)  $>110$  mmHg with significant proteinuria Preeclampsia was considered as severe. And 50 are normal pregnancy women in the third trimester in Omdurman city hospital during March to June 2015.

Pregnant women with kidney diseases, heart diseases, diabetes mellitus, gestational diabetes, liver diseases, muscle diseases and hemolytic anemia were excluded.

About 3ml of venous blood were collected from each pregnant woman in the heparinized container. The samples collected under aseptic conditions. Centrifuged for 3 minutes at 3000 RPM to obtain plasma, and analyzed by Spectrophotometer, model Model=BTS.310 Serial NO. =801560278

The precision and accuracy of all method used in this study were checked each time a batch was analyzed by including commercially prepared control sera. The data were recorded and analyzed using statistical package for social sciences (SPS –version 16) on a programmed computer. The mean standard deviations of the variable were calculated for both the test group and the control group and P value for comparison was obtained. P value  $\leq$

0.05 was considered significant. Pearson's correlation and linear regression were used to access the relationship between different variable.

## RESULT

In this study 100 pregnant women were chosen for determination of plasma gamma-glutamyltransferase and lactate dehydrogenase, 50 of them were diagnosed with preeclampsia 27 from this are severe preeclampsia and 23 are mild preeclampsia was matched in age. And 50 are normal pregnancy women in the third trimester. During the period from March to June 2015. The results obtained were statistically analyzed, using SPSS T. test. The level of significance was expressed as P value  $\leq 0.05$  for a significant result. Table 4.1 shows the mean values of plasma gamma-glutamyltransferase in mild preeclamptic pregnant women when compared to control ( $14.50 \pm 7.83$ ) ( $11.64 \pm 2.335$ ) IU/L respectively with P value = 0.346 .

Table 4.1 shows the mean values of plasma gamma-glutamyltransferase in severe preeclamptic pregnant women when compared to control ( $16.25 \pm 8.28$ ) ( $11.64 \pm 2.335$ ) IU/L respectively with P value = 0.089.

Table 4.1 shows the mean values of plasma lactate dehydrogenase in mild preeclamptic pregnant women when compared to control ( $458.25 \pm 157.29$ ) ( $254.09 \pm 35.02$ ) IU/L respectively with P value = 0.008.

Table 4.1 shows the mean values of plasma lactate dehydrogenase in severe preeclamptic pregnant women when compared to control ( $615.83 \pm 278.92$ ) ( $254.09 \pm 35.02$ ) IU/L respectively with P value = 0.001.

Figure 4.1 shows a positive moderate correlation between lactate dehydrogenase and diastolic blood pressure of Sudanese pregnant women in severe hypertensive preeclampsia p-value = 0.006 and Pearson correlation = .851.

Figure 4.2 shows a positive moderate correlation between lactate dehydrogenase and diastolic blood pressure of Sudanese pregnant women in mild hypertensive preeclampsia p-value = 0.013 and Pearson correlation = .782.

Figure 4.3 shows an insignificant correlation between gamma-glutamyltransferase and diastolic blood pressure in severe preeclampsia p-value = 0.359 and Pearson correlation = .215.

Figure 4.4 shows an insignificant correlation between gamma-glutamyltransferase and diastolic blood pressure in mild preeclampsia p-value = 0.652 and Pearson correlation = - .

## DISCUSSIONS

Preeclampsia is a pregnancy-specific disease with multisystem complications. Several potential markers have been proposed to predict the severity of preeclampsia. Most useful among these are GGT and LDH. There are very limited studies with conflicting data on GGT and LDH in preeclampsia. This study was undertaken to investigate the possible role of GGT and LDH in the prediction of the severity of preeclampsia to prevent further complications. Our data support this hypothesis suggesting an association between serum LDH levels and preeclampsia

it was found that 80% of preeclamptic women had abnormal levels of LDH  $> 600$  IU/L. In agreement with the prospective study was conducted in the Department of Biochemistry, S.R.T.R. Medical College and Hospital, Ambajogai during the period of 2006 -2007. A total of 40 preeclampsia women (22 with mild and 18 with severe Preeclampsia) and 40 healthy normotensive pregnant women (controls) were enrolled in the study the mean level of LDH  $> 800$  IU/L (5).

We propose that the multiorgan dysfunction in severe preeclampsia caused by vascular endothelial damage, including maternal liver, kidney, lungs and coagulation system; will lead to excessive LDH leakage and elevated levels in serum due to cellular dysfunction (6) (7) (8).

The level of LDH increase in severe preeclampsia 615.83 IU/L, P value .001 rather than mild preeclampsia 458.25 IU/L, P value .008 that is agreement with previous findings.

In our study, it was found that 90% of preeclamptic women had normal levels of GGT  $< 25$  IU/L. In not agreement with previous findings mean level of GGT  $> 70$  IU/L (5). The level of GGT increase in severe preeclampsia 16.25 IU/L, P value .089 rather than mild preeclampsia 14.50 IU/L, P value .346 but this different of increase within normal value that is no agreement with previous findings (5).

Also our result there is showed significant positive moderate correlation between lactate dehydrogenase and blood pressure of Sudanese pregnant women with severe and mild hypertensive preeclampsia disease. Use of LDH as biochemical markers which reflects the severity of preeclampsia and useful for the management of preeclampsia to decrease maternal and fetal morbidity and mortality. Further explorations of the effect of preeclampsia on other parameters. More studies to determine the specific cause of the increase level of Lactate dehydrogenase and how to manage it. Periodically check the lactate dehydrogenase and blood pressure for pregnant women infected with preeclampsia so recommended to be done. Comparison of the result with more data collected from pregnant women such as the larger size of the sample to determine the exactly exact association of preeclampsia and level of Lactate dehydrogenase should be carefully analyzed and interpreted.

### **From the result of this study it is concluded that**

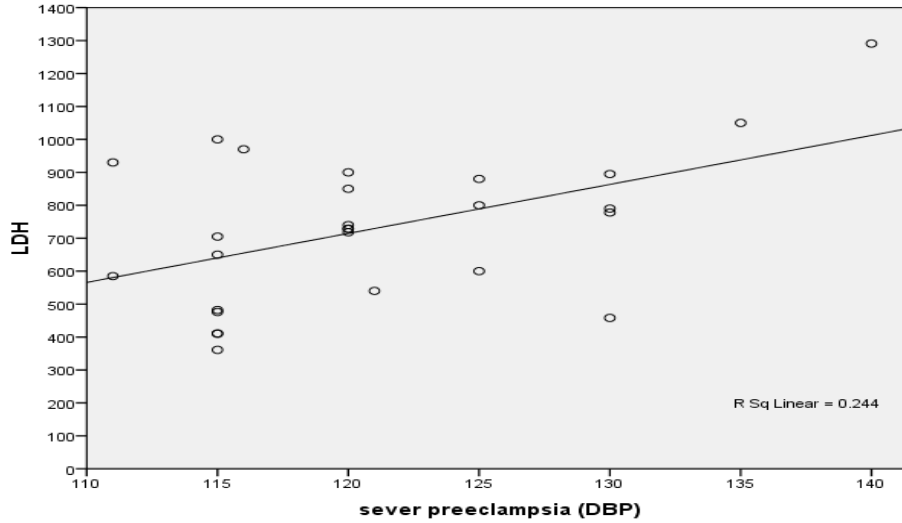
Levels of LDH are raised in Sudanese pregnant women with hypertensive preeclampsia disease. Levels of GGT are normal in Sudanese pregnant women with hypertensive preeclampsia disease. Show positive moderate correlation between LDH and diastolic blood pressure of Sudanese pregnant women in severe or mild hypertensive preeclampsia disease.

Show insignificant correlation between gamma-glutamyltransferase and diastolic blood pressure in Sudanese pregnant women with hypertensive preeclampsia disease.

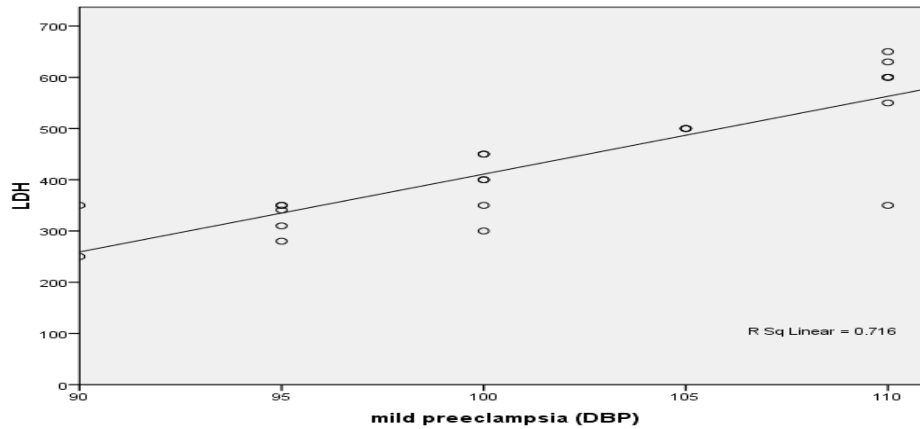
**Table 4.1:** The mean and SD of plasma gamma-glutamyltransferase and lactate dehydrogenase between cases and control groups:

parameter	mild preeclampsia Mean $\pm$ SD	Severe preeclampsia Mean $\pm$ SD	Control Mean $\pm$ SD	P value
GGT	14.50 $\pm$ 7.83*	16.25 $\pm$ 8.28**	11.64 $\pm$ 2.335	P=0.346* P=0.089**
LDH	458.25 $\pm$ 157.2*	615.83 $\pm$ 278.92**	254.09 $\pm$ 35.02	P=0.008* P=0.001**

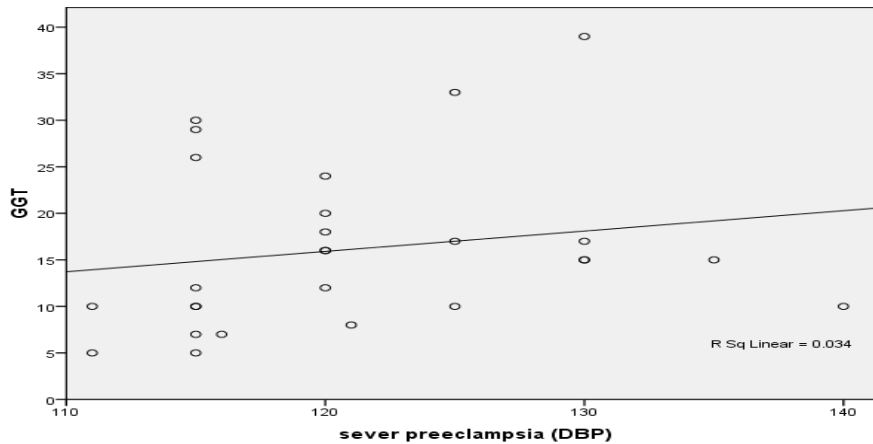
Independent T. test the mean difference is significant at the  $\leq 0.05$  level



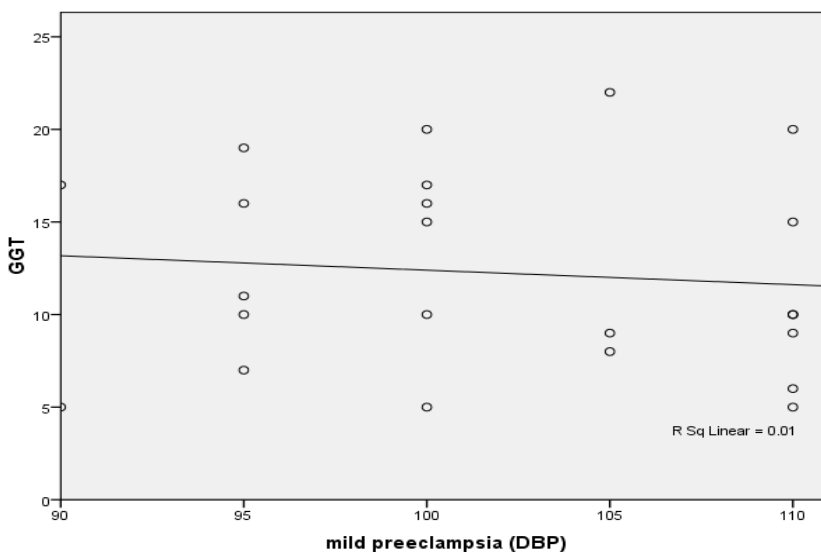
**Figure 4.1:** Scatter plot shows a significant positive moderate correlation between lactate dehydrogenase and diastolic blood pressure in severe preeclampsia **p-value = 0.006** and **Pearson correlation r = .851**. Correlation is significant at the 0.01 level (2-tailed).



**Figure 4.2:** Scatter plot shows a significant positive moderate correlation between lactate dehydrogenase and diastolic blood pressure in mild preeclampsia **p-value = 0.013** and **Pearson correlation r = .782**. Correlation is significant at the 0.05 level (2-tailed).



**Figure 4.3:** Scatter plot showed an **insignificant correlation** between gamma-glutamyltransferase and diastolic blood pressure in severe preeclampsia **p-value = 0.359** and **Pearson correlation  $r = .215$** . Correlation is significant at the 0.05 level (2-tailed).



**Figure 4.4:** Scatter plot showed **insignificant correlation** between gamma-glutamyltransferase and diastolic blood pressure in mild preeclampsia **p-value = 0.652** and **Pearson correlation  $r = -.189$** . Correlation is significant at the 0.05 level (2-tailed).

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