

DOI: <http://dx.doi.org/10.18203/2320-1770.ijrcog20183294>

Original Research Article

Gamma glutamyl transferase and lactate dehydrogenase as biochemical markers of severity of preeclampsia among Sudanese pregnant women

Salih Ezzaldein Salih Elias¹, Abdelgadir Eltom^{*2}, Ahmed L. Osman², Asaad MA. Babker²

¹Department of Chemical Pathology, Faculty of Medical Laboratory Sciences, Sudan University of Science and Technology, Khartoum, Sudan

²Department of Medical Laboratory Sciences, College of Health Sciences, Gulf Medical University, Ajman, UAE

Received: 04 June 2018

Accepted: 28 June 2018

***Correspondence:**

Dr. Abdelgadir Eltom,

E-mail: gadoora1977@live.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Preeclampsia is a disorder of widespread vascular endothelial malfunction and vasospasm that occurs after 20 weeks' gestation and can present as late as 4-6 weeks post-partum. Pre-eclampsia is a syndrome with multiple aetiologies which has made it difficult to develop adequate screening tests and treatments. Objective of this study to assess the level of gamma glutamyl transferase and lactate dehydrogenase as biochemical markers of severity of preeclampsia in Sudanese pregnant women.

Methods: This is a case control hospitalize base study. The study was conducted in preeclamptic pregnant women in Omdurman maternity hospital and medical military hospital in Khartoum state. In this study glutamyl transferase and lactate de-hydrogenase was estimation in 100 Sudanese pregnant women by spectrophotometer method, 50 of them were diagnosed with preeclampsia 27 from this is severe preeclampsia and 23 is mild preeclampsia was matched in aged. Serum samples of all the cases were assayed for GGT and LDH. The data was recorded and analyzed using statistical package for social sciences (SPS –version 16) on programmed computer. The mean standard deviations of variable were calculated for both the test group and the control group and P value for comparison was obtained.

Results: The mean values of plasma gamma glutamyl transferase in mild and severe preeclamptic pregnant women were insignificant difference when compared to control P value (0.346 - 0.089) respectively. The mean values of plasma lactate dehydrogenase in mild and severe preeclamptic pregnant women were significant increase when compared to control P value (0.008 - 0.001) respectively.

Conclusions: The levels of LDH is raised in Sudanese pregnant women with hypertensive also can be useful biochemical marker that reflects the severity of and the occurrence of complications of pre-eclampsia. GGT levels were normal in Sudanese pregnant women with hypertensive preeclampsia.

Keywords: Gamma glutamyl transferase, Lactate dehydrogenase, Preeclampsia, Sudanese pregnant women

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 and perinatal morbidity and mortality

worldwide, especially in developing countries.¹ Preeclampsia 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.² In 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.³ The enzyme γ -glutamyl transferase (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.⁴ Lactate dehydrogenase (LDH) is an intracellular enzyme which converts lactic acid to pyruvic acid and its elevated levels indicates cellular death and leakage of enzyme from the cell. Increased levels of LDH were found in association with preeclampsia in a limited numbers of studies.⁵ In Sudan there are many studies conducted among pregnant women suffering from pregnancy complication.⁶⁻⁹ Present study is first one conducted among Sudanese women to examine the frequency symptoms occurring in severe preeclamptic patients according to the levels of GGT and LDH, indicating multiorgan involvement and severity of the disease.

METHODS

This is case control hospitalize base study conducted in preeclamptic pregnant women's in Omdurman maternity hospital and medical military hospital in Khartoum state during March to June 2015. In this study 100 pregnant women were selected for determination of plasma gamma glutamyl transferase and lactate dehydrogenase, 50 of them were diagnose 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 third trimester in Omdurman city hospital during March to June 2015.

About 3ml of venous blood were collected from each pregnant woman's in heparinized container. The samples collected under aseptic conditions. Centrifuged for 3 minutes at 3000 RPM to obtain plasma and analyzed. - Estimation of gamma Glutamyl Transferase concentration method Gamma-glutamyl transferase (g-GT) catalyzes the transfer of the g-glutamyl group from g-glutamyl-3-carboxy-4-nitroanilide to glycylglycine, liberating 3-carboxy-4 nitroaniline. The catalytic concentration is determined from the rate of 3-carboxy-4-nitroaniline formation. Lactate dehydrogenase (LD or LDH) catalyzes the reduction of pyruvate by NADH, to form lactate and NAD⁺. The catalytic concentration is determined from the rate of decrease of NADH, measured at 340 nm.^{10,11} The study was approved of the hospital administration conducts scientific research within the hospital. Pregnant women are who voluntarily accepted to participate in the study were included.

Statistical analysis

The data was recorded and analyzed using statistical package for social sciences (SPS-version 16) on programmed computer. The mean standard deviations of 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.

RESULTS

In this study 100 pregnant women were chosen for determination of plasma gamma glutamyl transferase and lactate dehydrogenase, 50 of them were diagnose with preeclampsia 27 from this are severe preeclampsia and 23 are mild preeclampsia was matched in age. And 50 are normal pregnancy women in third trimester.

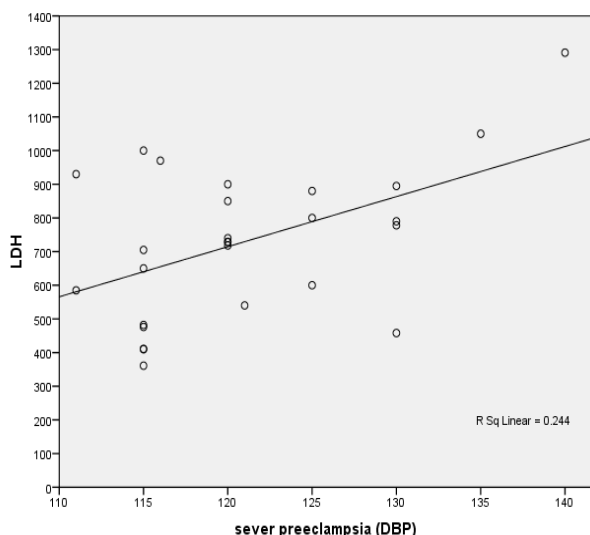
The mean values of plasma gamma glutamyl transferase in mild and severe preeclamptic pregnant women were insignificant difference when compared to control P value (0.346-0.089) respectively.

The mean values of plasma lactate dehydrogenase in mild and severe preeclamptic pregnant women were significant increase when compared to control P value (0.008-0.001) respectively (Table 1).

Table 1: Comparison of the means of blood parameters between the case 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**

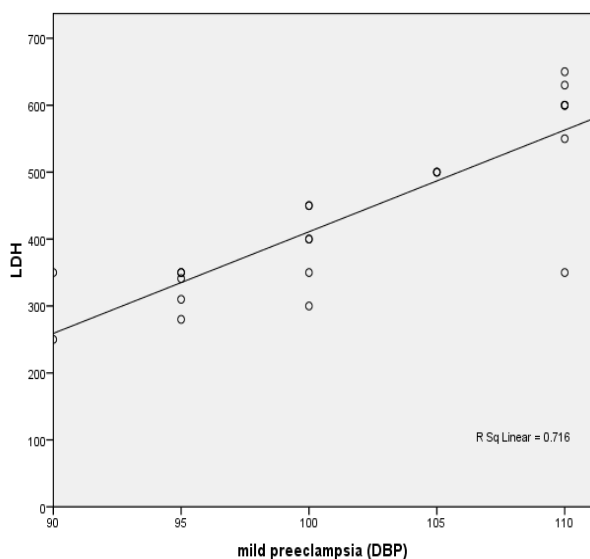
Independent T. test: the mean difference is significant at the \leq 0.05 level.



It shows significant positive moderate correlation between lactate dehydrogenase and diastolic blood pressure in severe preeclampsia p value=0.006 and Pearson correlation $r=0.851$.

Figure 1: Scatter plot in severe preeclampsia.

Figure 1 shows positive moderate correlation between lactate dehydrogenase and diastolic blood pressure of Sudanese pregnant women in sever hypertensive preeclampsia p value=0.006 and Pearson correlation = 0.851.



It shows significant positive moderate correlation between lactate dehydrogenase and diastolic blood pressure in mild preeclampsia p value=0.013 and Pearson correlation $r=0.782$.

Figure 2: Scatter plot in mild preeclampsia.

Figure 2 shows 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=0.782.

DISCUSSION

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 severity of preeclampsia to prevent further complications. Present 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 previous findings.^{4,12} Also present result supported by many studies concluded that elevated high serum LDH levels significantly correlate with the severity of preeclampsia.¹³⁻¹⁵ But some studies did not find significant difference of serum LDH level between preeclamptic women and healthy pregnant women.^{16,17} In the present study we found that 90% of preeclamptic women had normal levels of GGT <25 IU/L. Present finding disagrees with many studies conducted that elevated serum GGT level is associated with severity of preeclampsia.^{18,19} Present finding is supported by the study given by Sumathi et al.²⁰ Present study showed significant positive moderate correlation between LDH, GGT and blood pressure among Sudanese pregnant women's with severe and mild hypertensive preeclampsia disease. These findings are in agreement with the previously reported studies.^{21, 22}

CONCLUSION

The levels of LDH is raised in Sudanese pregnant women with hypertensive also can be useful and is the better biochemical marker that reflects the severity of and the occurrence of complications of pre-eclampsia when compared to serum GGT.

ACKNOWLEDGMENTS

Authors are grateful to all for participating in present study. Moreover, special thanks to the staff of Omdurman maternity hospital and medical military hospital in Sudan.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Jeyabalan A. Epidemiology of preeclampsia: impact of obesity. *Nutr Rev.* 2013 Oct 1;71(S1):S18-25.
2. Eastabrook G, Brown M, Sargent I. The origins and end-organ consequence of pre-eclampsia. *Best Pract Res Clinical Obstet Gynaecol.* 2011 Aug 1;25(4):435-47.

3. Wu J, Zhou W, Li Q, Yuan R, Li H, Cui S. Combined use of serum gamma glutamyl transferase level and ultrasonography improves prediction of perinatal outcomes associated with preeclamptic pregnancy. *Clinica Chimica Acta.* 2017 Dec 1;475:97-101.
4. Munde SM, Hazari NR, Thorat AP, Gaikwad SB, Hatolkar VS. Gamma glutamyl transferase and Lactate dehydrogenase as biochemical markers of severity of preeclampsia. *Platelets.* 2014 Feb;5:6.
5. Dave A, Maru L, Jain A. Ldh (lactate dehydrogenase): A biochemical marker for the prediction of adverse outcomes in pre-eclampsia and eclampsia. *J Obstet Gynecol India.* 2016 Feb 1;66(1):23-9.
6. Babker AM, Gameel FE. Methylenetetrahydrofolate reductase c677t polymorphism in Sudanese women with recurrent spontaneous abortions. *Kuwait Med J.* 2016;48(2):100-4.
7. Awad-Elkareem A, Elzaki SG, Khalid H, Abdallah MS, Adam I. A low rate of factor V Leiden mutation among Sudanese women with deep venous thrombosis during pregnancy and puerperium. *J Obstet Gynaecol.* 2017 Oct 3;37(7):963-4.
8. Babker AM, Gameel FE. The frequency of factor V Leiden mutation among Sudanese pregnant women with recurrent miscarriage. *J Am Sci.* 2014;10(9).
9. Babker AM, Elzaki SG, Dafallah SE. An observational study of causes of recurrent spontaneous abortion among Sudanese women. *Int J Sci Res.* 2013;4:1435-8.
10. Scientific Committee. Recommendations for the measurement of the catalytic concentration of lactate dehydrogenase in human serum at 30 ° C. *Ann Biol Clin.* 1982;40:87-164.
11. IFCC Primary reference Procedures for the measurement of catalytic activity concentrations of enzymes at 37°C. Part 6. Reference procedure for the measurement of catalytic concentration of γ -Glutamyl transferase. *Clin Chem Lab Med.* 2002; 40:734-38.
12. Peralta Pedrero MI, Basavilvazo. Clinical significance of laboratory determination in preeclamptic patients. *Gynecol Obstet Mex.* 2004;72:57-62.
13. Dev SV, Hemalatha CR. Evaluation of lactate dehydrogenase-a biochemical marker of preeclampsia. *J Evol Med Dental Sci.* 2017 Oct 2;6(79):5572-5.
14. Talwar P, Kondareddy T. LDH as a prognostic marker in hypertensive pregnancy. *Int J Reprod, Contracept, Obstet Gynecol.* 2017 May 25;6(6):2444-6.
15. Afroz R, Akhter QS, Sadia H, Sultana S. Serum Lactate Dehydrogenase (LDH) level in severe preeclampsia. *J Bangladesh Soc Physiol.* 2016 Mar 31;10(2):71-5.
16. Gruccio S, Di Carlo MB, Pandolfo M, Cruza GS, Touzouza MS, Negria G, et al. Biochemical profiling study in umbilical cord blood as predictors of neonatal damage. *Int J Clin Pediatr.* 2014;3(1):5-11.
17. Nosrat BS, Azarhoosh R, Borghai A, Sedaghati M, Besharat S, Ghaemi E. Serum level of lactate dehydrogenase, homocystein, hemoglobin and platelet in preeclampsia. *Pak J Med Sci.* 2011;27(5):1014-7.
18. Churchill D, Kilby MD, Bignell A, Whittle MJ, Beevers DG. Gamma-glutamyl transferase activity in gestational hypertension. *BJOG: An Int J Obstet Gynaecol.* 1994 Mar 1;101(3):251-3.
19. Beyer C. Lactate dehydrogenase isoenzymes in serum of patients with preeclampsia/eclampsia complicated by the HELLP syndrome. *Clinica Chimica Acta; Int J Clinical Chem.* 1991 Oct 14;202(1-2):119.
20. Sumathi ME, Ruta UJ, Gomathy E, Shashidhar KN. Usefulness of serum gamma glutamyl transferase in assessing severity of preeclampsia. *Int J Clinical Biochem Res.* 2016;3(2):245-9.
21. Sarkar PD, Sogani S. Evaluation of serum lactate dehydrogenase and gamma glutamyl transferase in preeclamptic pregnancy and its comparison with normal pregnancy in third trimester. *Int J Res Med Sci.* 2017 Jan 28;1(4):365-8.
22. Talwar P, Kondareddy T. LDH as a prognostic marker in hypertensive pregnancy. *Int J Reprod Contracept Obstet Gynecol.* 2017 May 25;6(6):2444-6.

Cite this article as: Elias SES, Eltom A, Osman AL, Babker AMA. Gamma glutamyl transferase and lactate dehydrogenase as biochemical markers of severity of preeclampsia among Sudanese pregnant women. *Int J Reprod Contracept Obstet Gynecol* 2018;7:3020-3.