

Research Article

Evaluation of serum lactate dehydrogenase and gamma glutamyl transferase in preeclamptic pregnancy and its comparison with normal pregnancy in third trimester

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ABSTRACT

Background: Preeclampsia affects about 5-8% of all pregnancies and is a major cause of maternal, fetal and neonatal mortality and morbidity. Evidences prove that endothelial cell and altered endothelial cell function play an important role in the pathogenesis of preeclampsia. Therefore serum lactate dehydrogenase (LDH) and serum gamma glutamyl transferase (GGT) are the useful biochemical markers reflecting the severity of the occurrence of preeclampsia. The objective was to determine serum lactate dehydrogenase (LDH) and serum gamma glutamyl transferase (GGT) as biochemical markers in preeclamptic pregnant women and its comparison with normal pregnant women in third trimester.

Methods: This is the case-control hospital based study carried in the Department of Biochemistry M.G.M. Medical College and associated M.Y. Hospital. Indore (M.P.). Normal pregnant women (n=48), women with preeclampsia (n=53) were included in the study. Both the groups were in their third trimester and of same age and same gestational age. Preeclamptic group was further divided into two subgroups mild (n=36) and severe (n=17) preeclampsia.

Results: There were no significant differences among the three groups in age and body mass index but significantly higher differences in gestational age, systolic and diastolic blood pressure was observed. Higher values of serum lactate dehydrogenase (LDH) were found in mild and severe preeclamptic women than those of normal pregnant women in third trimester but the values of serum LDH was significantly elevated in severe preeclamptic women when comparison was done between mild and severe preeclamptic women. Serum GGT was significantly higher among all the groups.

Conclusion: Elevated levels of serum LDH and serum GGT indicates the tissue damage related to endothelial vascular damage and are the main cause of the occurrence of preeclampsia.

Keywords: Preeclampsia, LDH, GGT, Endothelial dysfunction

INTRODUCTION

Preeclampsia is a clinical manifestation characterized by hypertension, proteinuria and edema that occurs after 20th week of pregnancy. It is a multisystem disorder of pregnancy with potentially severe consequences for

both mother and child.¹ It affects about 5-8% of all pregnancies and is a major cause of maternal, fetal and neonatal mortality and morbidity.^{2,3} The etiology of preeclampsia is unknown but thought to be related to hypoxia in the placenta and endothelial dysfunction.⁴ The various causes that leads to these abnormalities

are genetic and dietary causes, immunological causes, race, increased oxidative stress etc.⁵ Since preeclampsia is a syndrome virtually affecting all maternal organ systems, it is associated with different clinical characteristics, prevention, diagnosis and therapy where a disease requires a close interdisciplinary cooperation.⁶

There is increasing evidence that endothelial cell and altered endothelial cell function play an important role in the pathogenesis of preeclampsia. Serum lactate dehydrogenase (LDH) and serum gamma glutamyl transferase (GGT) are most often measured to evaluate the presence of tissue damage associated with endothelial damage. Dysfunction of endothelial cells can contribute to inappropriate vasoconstriction and platelet aggregation which are early signs of hypertension.⁷

METHODS

This case control study was conducted in the Department of Biochemistry, M.G.M. Medical College and associated M.Y. Hospital, Indore. The subjects were pregnant women clinically diagnosed as preeclampsia during third trimester (28-40 weeks) with the age 18-35 years (GROUP-B) visiting obstetrics OPD and wards of MY Hospital, The study group was further divided into two subgroups. It comprised of 36 mild preeclamptic pregnant women (SUBGROUP B1) and 17 severe preeclamptic pregnant women (SUBGROUP B2) on the basis of blood pressure, (both systolic and diastolic) proteinuria and pathological edema, which is the diagnostic criteria of preeclampsia. As a control group 48 normal pregnant women (GROUP-A) were taken. The normal pregnant women were also in the third trimester (28-40 weeks) of their pregnancy with the age 18-35 years. Inclusion criteria for women included in the study were: should not be using any kind of oral contraceptives, anticoagulant drugs, should be non-smokers and non alcoholics and

exclusion criteria were: past history of diabetes, systemic or endocrine disorder, chronic infection, chronic renal disease and hypertension (in group A only), women in the labour pains, were excluded from the study.

Preeclampsia was diagnosed according to American College of Obstetrics and Gynecology (ACOG) criteria: a blood pressure higher than 140/90 mm Hg and proteinuria more than 300mg/24hr were observed on at least two occasions more than 6hrs apart after the 20th weeks of pregnancy. Preeclampsia were classified as severe if diastolic blood pressure increased to at least 110mmHg, proteinuria >5000mg per day and the presence of headache, visual disturbances, epigastric pain, oliguria, elevated LFT, elevated RFT, thrombocytopenia.

Blood samples were collected in the morning in a plain bulb with aseptic conditions. In the preeclampsia group, blood samples were collected when the patients presented for evaluation and before initiation of medical therapy. Serum LDH levels were measured by continuous spectrophotometric pyruvate method where the reduction of pyruvate to lactate takes place in the presence of NADH by the action of lactate dehydrogenase. Serum GGT levels was measured by continuous spectrophotometric IFCC method where GGT catalyzes the transfer of the γ -glutamyl group from γ -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. The results were expressed as mean \pm SD and groups were compared using ANOVA.

Statistical analysis was carried out by using SPSS software, version 20. The level of significance was set at <0.05.

RESULTS

Table 1: Comparison of anthropometric factors of study subjects.

Anthropometric factors	Group A		Group B1		Group B2		p value
	Mean	\pm SD	Mean	\pm SD	mean	\pm SD	
Age (yrs)	23.27	2.77	23.13	3.46	23.94	2.3	0.644
BMI (Kg/m ²)	24.17	1.75	24.69	1.41	24.31	2.17	0.389
Gestational age (wks)	38.58	3.64	36.11	1.86	33.64	6.17	<0.0001
Systolic blood pressure (mm of Hg)	115.62	5.42	139.44	5.82	167	16.78	<0.0001
Diastolic blood pressure (mm of Hg)	75.41	5.81	92.05	8.55	112.35	10.91	<0.0001

Table 2: Comparison of LDH and GGT of study subjects.

Clinical parameters	Group A		Group B1		Group B2		p value
	Mean	±SD	Mean	±SD	mean	±SD	
LDH	261.14	78.47	513.37	203.44	687.40	207.6	<0.0001
GGT	14.66	6.1	18.65	5.94	23.91	5.8	<0.0001

The Anthropometric factors of the study groups are summarized in table 1.

Maternal age and body mass index (BMI) were not significantly different between the groups ($p>0.05$, Table 1). Gestational age, systolic and diastolic blood pressures were significantly higher in preeclamptic groups as compared to normal pregnant women ($p<0.0001$, Table 1). The same when compared between mild and severe preeclamptic groups, it was found to be significantly higher in severe preeclamptic group ($p<0.0001$, Table 1).

Serum LDH was found to be highest in preeclamptic women as compared to normal pregnant women ($p<0.0001$, Table 2). When serum LDH in mild preeclamptic women was compared with severe preeclamptic women, the difference was found to be significant between the two ($p<0.05$). Serum GGT was found to be significantly higher among all the groups ($p<0.0001$, Table 2).

DISCUSSION

Preeclampsia is considered an idiopathic multisystem disorder that is specific to human pregnancy.⁸ Several potential candidate biochemical markers have been proposed to predict the severity of preeclampsia.^{5,9} The multi organ dysfunction in preeclampsia caused by vascular endothelial damage, including maternal liver, kidney, lungs, nervous system, coagulation system will leads to excessive LDH leakage and elevated levels in serum due to cellular dysfunction, which may cause the occurrence of preeclampsia. These results are also supported by HS Qublan.¹⁰

Lactate dehydrogenase (LDH) is an intracellular enzyme that converts lactic acid to pyruvic acid and elevated levels indicate cellular death and leakage of enzyme from the cell.¹¹ The results from our study showed that the levels of serum LDH was significantly higher in preeclamptic women as compared to normal pregnant women as shown in table 2 and was also supported by several other studies.^{10,12}

Gamma-glutamyl transferase or gamma-glutamyl transpeptidase (also γ -glutamyl transferase, GGT, GGTP, gamma-GT) is a microsomal enzyme that transfers gamma-glutamyl functional groups. It is found in highest

concentration in liver, the renal tubules and intestine,¹³ although it is also present in other tissues such as the pancreas, salivary glands, brain, heart and hepatobiliary system etc.¹⁴ It is possible that GGT is not of hepatic origin and may be elevated in relation to preeclampsia by endothelial damage.¹⁵ The results of serum GGT levels in our study showed the significantly higher values in preeclamptic women as compared to normal pregnant women (Table 2) as supported by the study given by Churchill D.¹⁵

CONCLUSION

Preeclampsia is a pregnancy specific disease, and the elevated levels of serum LDH and GGT indicates the cellular damage and dysfunction and can be used as a biochemical marker because it reflect the severity of the disease.

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