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Original Research Article

Evaluation of Serum Gamma Glutamyl Transferase Levels in Pre Eclampsia Cases

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Conflict of interest: Nil

Abstract:

Background: Preeclampsia is a Pregnancy Specific Syndrome characterised by Hypertension with BP 140/90 mm Hg or more, Proteinuria and edema contributing significantly to Maternal and Foetal Morbidity and Mortality. Endothelial cell dysfunction within the Uteroplacental circulation leads to systemic release of Gamma Glutamyl Transferase (GGT) .

Aim and Objectives: The main aim of this study is to compare the levels of Serum Gamma Glutamyl Transferase (GGT) levels in pre eclampsia patients and normal pregnancy patients and also to predict the severity of pre eclampsia with GGT.

Materials and Method: This case control study was done from November 2017 to January 2018 at Mahatma Gandhi Memorial Government Hospital, Trichy, 30 pre eclampsia patients and 30 normal healthy normotensive pregnant women (controls) were enrolled in the study. All the cases were selected in the third trimester and belongs to the age group 19-35year. Cases with any medical history of hypertension, diabetes, renal disease, liver disease were excluded from the study. Controls were selected from the patients regularly attending the Antenatal clinic (ANC) and Preeclampsia cases were selected from the patients admitted in the ANC ward. The statistical analysis was performed using SPSS version 16.

Results and Conclusion: The results were presented as a mean ± SD and p value of less than 0.001 is considered as significant. In our present study, the Serum GGT levels is found to be significantly increased in Pre- eclampsia Patients compared to Normal Pregnant Women with a p value <0.001. GGT is also useful in predicting the severity of pre eclampsia.

Keywords: Pre-eclampsia, Serum Gamma Glutamyl Transferase, Proteinuria.

Introduction

Preeclampsia is a 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.

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. It is a multisystem disorder that affects the maternal kidneys, liver, brain, clotting system and primarily the placenta. Complications affecting the developing fetus include indicated Prematurity, Intrauterine fetal Growth restriction, Oligohydramnios, Broncho pulmonary dysplasia and increased risk of Perinatal death. In mother, Hepatic dysfunction with preeclampsia has long been recognized. Several studies have shown 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.

The enzyme gamma 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. Endothelial cell dysfunction within the uteroplacental circulation leads to systemic release of gamma glutamyl transferase (GGT). In this study we compare the GGT levels in pre eclampsia patients and healthy pregnancy patients and also the severity of pre eclampsia.

Aim and Objectives

The main aim of this study is to compare the levels of Serum Gamma Glutamyl Transferase levels in pre eclampsia patients and healthy pregnancy patients and also to find the severity of preeclampsia with GGT.

Materials and Methods

This case control study was done from November 2017 to January 2018 at Mahatma Gandhi Memorial Government Hospital, Trichy. 30 pre eclampsia patients and 30 normal healthy normotensive pregnant women (controls) from third trimester were enrolled in this study.

Informed consent was obtained. Blood samples were collected within 24 hours of admission in hospital. Totally 5 ml of Venous Blood was collected from Antecubital vein under all aseptic precaution. 4 ml is taken in a plain tube and was allowed to clot. Serum was separated by centrifugation to estimate GGT levels in semiauto analyser.

Other investigations like Blood Urea, Serum Glucose, Serum Creatinine, Serum Aspartate Transaminase, Serum Alanine Tranaminase, Serum Alkaline Phosphatase, Serum Bilirubin, Serum Uric Acid, Serum Protein, and Serum Albumin. 1 ml of blood is taken in an EDTA coated tube for Platelet count. Spot Urine Protein Creatinine Ratio, Micro Albuminuria, Proteinuria was also estimated from the fresh urine sample in a sterile container without any preservatives. Serum levels of GGT were measured by carboxy substrate kinetic liquid method. Statistical analysis was done. Student't' test was used to compare the difference between the two means.

Inclusion Criteria:

- Patients diagnosed with Pre eclamsia
- Patients with an onset of Hypertension more than 140/90mm Hg during the third trimester of Pregnancy
- Age group 19 - 35 years cases
- Controls were selected from the patients regularly attending the Antenatal clinic (ANC) without the features of pre eclampsia.

Exclusion Criteria:

Patients with - Multiple foetuses

- Chronic Hypertension
- Diabetes mellitus
- Renal diseases
- Hepatobiliary disease were excluded

Results and Statistical Analysis

In pre-eclampsia cases and controls, the Mean (Standard Deviation) for glucose - 97.2 (9.6) & 99.4(9.2), urea - 34.8(3.6) & 22.8(4.0), creatinine - 1.2 (1.4) & 0.6 (0.1), e GFR - 92.9(18.1) & 150.3(29.3), Total Bilirubin - 0.9 (0.2) & 0.7 (0.08), SGOT - 41.0 (6.2) & 23.4(2.2), SGPT- 36.9 (5.6) & 20.6 (2.5), Protein - 5.3 (0.2) & 5.9 (0.1), Albumin - 3.2 (0.4) & 3.5 (0.1), Alkaline Phosphatase - 146 (12.3) & 101(20.2) ,Gamma Glutamyl Transferase - 55.8 (10.5) & 10.8(1.6), Uric Acid 6.4 (0.6) & 3.6 (0.1), Urine PCR - 0.4 (0.06) & 0.2 (0.2), Microalbuminuria -167.3 (33.2) & 11.3 (2.2), Platelets - 20,6150 (21,559) & 25,7033 (41,036) respectively.

Table 1: Shows the Mean and Standard Deviation for Urea, Creatinine, Glucose

Variablesmg/dl	Patients (Mean±SD)	Control (Mean±SD)	P value
Urea	34.8 ± 3.6	22.8 ± 4.0	<0.001
Creatinine	1.2 ± 1.4	0.6 ± 0.1	0.03
Glucose	97.2 ± 9.6	99.4 ± 9.2	0.3

Table 2: Shows the Mean and Standard Deviation for Age, Weight, Systolic BP, Diastolic BP

Variables	Patients (Mean±SD)	Control (Mean±SD)	P value
Age in years	27.0 ± 2.9	22.5 ± 2.1	<0.001
Weight in kg	64.0 ± 5.4	66.8 ± 2.9	0.18
Systolic BP in mm/Hg	149.5 ± 8.5	113.2 ± 8.4	<0.001
Diastolic BP in mm/Hg	103.9 ± 8.1	74.1 ±6.9	<0.001

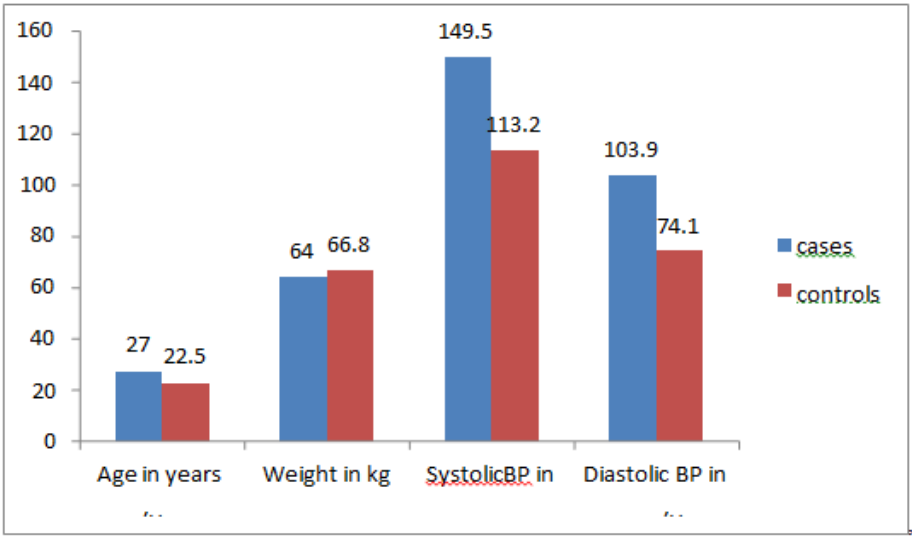

Figure 1: Shows the comparison of Age Weight, Systolic BP, Diastolic BP

Table 3: Shows the Mean and Standard Deviation for SGOT, SGPT, Alkaline Phosphatase GGT, Total Bilirubin, Protein, Albumin, Uric Acid, Platelets

Variables	Patients (Mean±SD)	Control (Mean±SD)	P value
SGOT (U/L)	41.0 ± 6.2	23.4 ± 2.2	<0.001
SGPT (U/L)	36.9 ± 5.6	20.6 ± 2.5	<0.001
Alkaline Phosphatase(U /L)	146 ± 12.3	101±20.2	<0.001
GGT (U/L)	55.8 ± 10.5	10.8 ± 1.6	<0.001
Total Bilirubin(mgs/dl)	0.9 ± 0.2	0.7 ± 0.08	<0.001
Protein (gms/dl)	5.3 ± 0.2	5.9 ± 0.1	<0.001
Albumin (gms/dl)	3.2 ± 0.4	3.5 ± 0.1	0.002
Uric Acid(mgs/dl)	6.4 ± 0.6	3.6 ± 0.1	<0.001
Platelets (×109/l)	20,6150 ± 21,559	25,7033 ± 41,036	<0.001

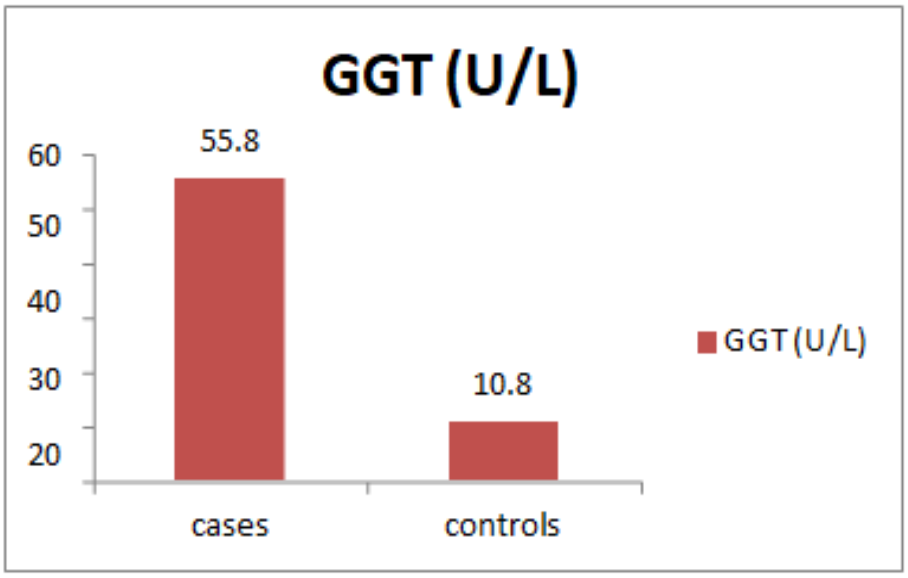

Figure 2: Shows the levels of GGT in cases and controls

Table 4: Shows the levels of GGT in mild and severe pre eclampsia

Variables	Mild preeclampsia(Mean±SD)	Severe preeclampsia(Mean±SD)	P value
GGT	52.3± 9.3	67.5 ± 3.4	<0.001

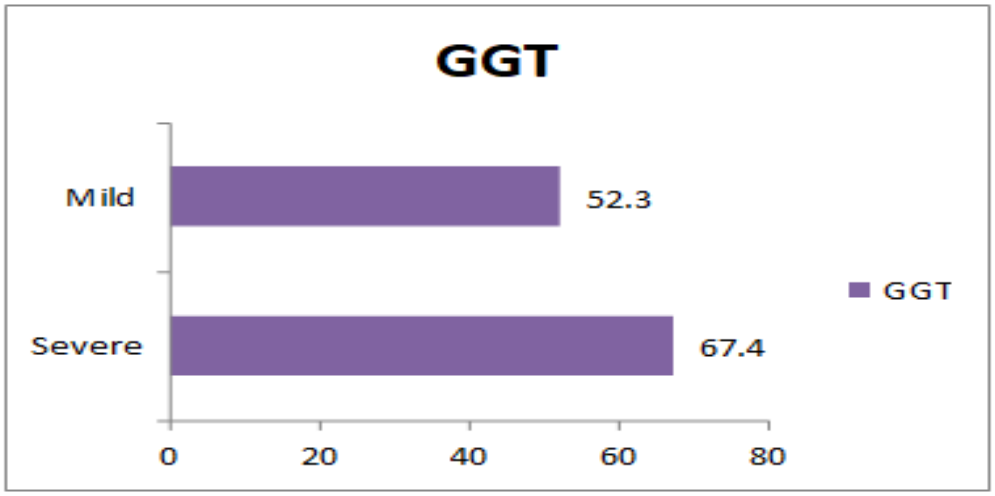

Figure 3: shows the levels of GGT in severity of pre eclampsia

Table 4: Shows the Mean and Standard Deviation for Urine PCR, Microalbuminuria

Variables	Patients (Mean±SD)	Control (Mean±SD)	P value
Urine PCR	0.4 ±0.06	0.3 ± 0.24	0.03
Microalbuminuria(mgs/L)	167.3 ± 33.2	11.3 ± 2.5	<0.001

Table 5: Shows the Proteinuria in cases and controls

	Proteinuria				Total
	2+	3+	4+	nil	
Cases	20	6	4	0	30
	(66.7%)	(20.0%)	(13.3%)	(0.0%)	(100.0%
Control	0	0	0	30	30
	(0.0%)	(0.0%)	(0.0%)	(100.0%	(100.0%

Discussion

Preeclampsia is defined as new onset of sustained elevated blood pressure (≥140mmHg systolic or ≥90mm Hg diastolic on at least two occasions 6 hours apart) and proteinuria (at least 1+ on dipstick or ≥300mg in a 24 hour urine collection) first occurring after 20 weeks of gestation [1, 2]. Worldwide, 10 % of all pregnancies are complicated by hypertension,with pre-eclampsia.

Preeclampsia is considered as multisystem disorder that is specific to human pregnancy [3]. A complex of endocrinological mechanisms is believed to be responsible for the multiorgan dysfunction. Several potential markers have been proposed to predict the severity of preeclampsia, among these GGT is one of the potential markers [4].

PIH is a major pregnancy complication associated with premature delivery, intra-uterine growth retardation (IUGR), abruptio placentae, and intra-uterine death [5]. sFlt1(Tyrosine kinase) and soluble endoglin (sEng) cause endothelial dysfunction by antagonizing vascular endothelial growth factor (VEGF) and transforming growth factor1 (TGF1) signaling. There is mounting evidence that VEGF and TGF1 are required to maintain endothelial health in several tissues including the kidney and perhaps the placenta. During normal pregnancy, vascular homeostasis is maintained by physiological levels of VEGF and TGF1 signaling in the vasculature [6]. In preeclampsia, excess placental secretion of sFlt1 and sEng (2 endogenous circulating antiangiogenic proteins) inhibits VEGF and TGF1 signaling, respectively, in the vasculature. This results in endothelial cell dysfunction, including decreased prostacyclin, nitric oxide production, and release of procoagulant proteins [7, 8].

GGT is a microsomal glycoprotein enzyme that catalyzes the transfer of gamma-glutamyl group from a peptide to an acceptor peptide or an L-Amino acid. It is found in highest concentration in liver, the renal tubules and intestine, it is also present in other tissues such as the pancreas, salivary glands, brain, heart and hepatobiliary system etc. It is possible that GGTis not of hepatic origin and may be elevated in relation to preeclampsia by endothelial damage. Endothelial cell dysfunction within the uteroplacental circulation leads to increased levels of systemic release of GGT. Elevated levels of GGT is found in our present study which is in concordance with the article munde et al [9] whose p value is < 0.001, statistically significant . Mild preeclampsia was defined as onset of hypertension after 20 weeks of gestation with diastolic blood pressure (DBP) >90

and ≤ 110 mmHg with or without proteinuria. When diastolic blood pressure (DBP) > 110 mmHg was measured on two occasions 6 hours apart with significant proteinuria (>500mg / 24hrs or ≥2+ on dipstick), Preeclampsia was considered as severe. Increase in GGT levels about 5 folds more than that of the normal show that GGT other than Liver origin i.e., uteroplacental origin due to endothelial damage is seen in pre eclampsia cases and also significant rise is seen in severe pre eclampsia cases when compared to mild pre-eclampsia cases, whose p value is < 0.001.

In correlation with the article of T. Ilenchezhiyan et al [10], it is found that renal parameters like urea and creatinine were found to be increased in pre eclampsia cases than controls; p value is < 0.001, statistically significant

This study shows that liver enzymes SGOT, SGPT were increased in pre eclampsia cases when compared to controls whose p value is <0.001, statistically significant which is in inconcordance to the article of Ramadan et al [11], Girling et al [12]. The increase of SGOT and SGPT is minimal when compared to that of the GGT. In concordance with the Abou Senna et al [13], Salako BL et al [14] article, this study also shows increased levels of MicroAlbuminuria levels in pre-eclampsia cases than controls, whose p value is <0.001, statistically significant.

Conclusion

Elevated levels of Gamma Glutamyl Transferase are found in pre eclampsia cases than controls GGT is also useful in predicting the severity of pre eclampsia.

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