

## ORIGINAL ARTICLE

# EVALUATION OF ACTIVITIES OF SERUM GAMMA GLUTAMYL TRANSFERASE AND ADENOSINE DEAMINASE IN PRE-ECLAMPSIA-A CASE CONTROL STUDY

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## ABSTRACT

**Introduction:** Preeclampsia is a Pregnancy Specific Syndrome characterised by Hypertension with BP 140/90 mm Hg or more, Proteinuria and Oedema 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). The activity of Serum Adenosine Deaminase (ADA) is also increased due to possible role of enhanced Cell Mediated Immunity during Preeclampsia. In the developing Countries with inadequately cared Pregnancy, Preeclampsia on many occasions remains undetected till major complications supervene. So this Study is undertaken at providing some of the Promising Enzyme Markers as GGT and ADA.

**Methodology:** Present study comprised Fifty Women with Pre-eclampsia as Cases and Fifty age matched normal pregnant Women as Controls. The Parameters were estimated by Standard Biochemical Methods. Statistical Analysis of the Data was done by Student's t Test and ANOVA.

**Results:** The activity of Serum GGT was significantly increased in Pre-eclampsia Patients compared to Normal Pregnant Women with a  $p < 0.001$ , and there was a highly significant increase in Serum ADA with  $p < 0.000$

**Conclusion:** The Study concludes that Enzyme Markers like Serum GGT and ADA could be Sensitive, Accurate and Cost effective Biomarkers in aiding the Diagnosis and to assess the severity of Preeclampsia.

**Keywords:** Adenosine Deaminase, Enzyme Markers, Gamma Glutamyl Transferase, Preeclampsia

## INTRODUCTION

Preeclampsia is a Pregnancy specific Syndrome characterized by Hypertension with BP 140/90 mm Hg or more, Proteinuria and Oedema contributing significantly to Maternal & Foetal morbidity & mortality, the incidence of preeclampsia in hospital practice varies widely from 5-15%.<sup>1</sup>

The aetiology of Preeclampsia is unknown but thought to be related to hypoxia in placenta & endothelial dysfunction.<sup>2</sup> Recent studies revealed that excessive placental secretion of soluble forms like Tyrosine kinase (SF1t-I) may contribute to Endothelial dysfunction, Hypertension and Proteinuria in Preeclampsia.<sup>3</sup> Endothelial cell dysfunction & intense vasospasm play an important role in the pathogenesis of Preeclampsia. Endothelial cell dysfunction within the uteroplacental circulation leads to systemic release of gamma glutamyl transferase-GGT.<sup>2,4</sup>

The activity of serum Adenosine deaminase (ADA)-A Purine metabolising enzyme is also increased due to possible role of enhanced cell mediated immunity during Preeclampsia.<sup>5</sup> Preeclampsia if untreated may lead to Liver and Renal failure, Disseminated Intravascular

Coagulation and Central Nervous System abnormalities including Seizures.<sup>6</sup> In the developing countries with inadequately cared Pregnancy, Preeclampsia on many occasions remains undetected till major complications supervene. So the present study is under taken at providing some of the promising enzyme markers as GGT and ADA which are cost effective accurate & identified by easy method of detection that are approachable for general population.

## METHODOLOGY

The present study comprised of 50 women with Preeclampsia in the age group of 20-40 years as Cases and 50 Normal Pregnant women as Controls. The study was conducted over a period of one year and it is an unmatched case control study.

Ethical clearance was obtained from the Institutional Ethical Committee. An informed consent was obtained from all the Participants for conducting the study and another separate consent was taken before collecting the blood samples.

## Criteria for selecting Patients with Preeclampsia

**Inclusion criteria:** Patients diagnosed with Preeclampsia & Patients with an onset of Hypertension more than 140/90mm Hg during the second or third trimester of Pregnancy were included in the study.

**Exclusion criteria:** Patients with Multiple foetuses, Chronic Hypertension, Diabetes mellitus, Renal diseases, Tuberculosis, Hepatobiliary disease and Thyroid disease were excluded

**Sample collection:** About 2 ml of Venous Blood was collected from Antecubital vein under all aseptic precaution & was allowed to clot. Serum was separated by centrifugation to estimate GGT and ADA. The estimation of parameters was carried out immediately.

Serum GGT was estimated by Szacz & Rosalki method.<sup>7</sup> using kit supplied by Erba diagnostics. Serum ADA by colorimetric method of Galanti & Giusti,<sup>8</sup> using ADA –MTB microexpress Tulip Diagnostics(p) Ltd, kit. The estimations were carried out on Semi Auto Analyser ERBA CHEM-7

The above mentioned parameters were recorded as Mean & Std deviation. Statistical analysis of all the obtained parameters were done by student's 't' test & ANOVA. The observations were tabulated & conclusions were obtained by biochemical data.

## RESULTS

In our study a basic parameters were tabulated as shown in Table 1.

**Table 1: Basic Parameters in Pre-eclampsia Cases and Controls**

Parameter	Cases	Controls
Age (In years)	25.54±4.24	24.96±4.63
Gestational age(In weeks)	32.56±4.85	30.86±4.52
SBP (In mmHg)	154.42±16.54	116.56±8.0
DBP (In mmHg)	96.80±13.99	82.6±2.68

SBP=Systolic blood pressure DBP=Diastolic blood pressure

**Table 2: Comparison of serum levels of GGT and ADA between controls and Pre eclampsia cases and their p values**

Parameter	Cases	Controls	p-Value
GGT(IU/L)	28.82±2.65	10.23 ±4.31	<0.001
ADA(U/L)	41.07±5.29	16.78±2.22	<0.0001

In our study a significant increase in mean Serum GGT was observed in Preeclampsia Patients when compared to Controls (with a p<0.001) as shown in the Table 2. It is also documented in our study that a highly significant increase in mean Serum ADA level in Preeclampsia Patients when compared to controls with a p<0.000 as shown in the Table 2.

## DISCUSSION

Hypertension is one of the common medical complications of pregnancy & contributes significantly to maternal & perinatal morbidity & mortality. The identification of this clinical entity and effective management play a significant role in the outcome of pregnancy both for the mother and the baby[1]. Preeclampsia is considered as idiopathic multisystem disorder that is specific to human pregnancy.<sup>9</sup>

Pre eclampsia is a syndrome of generalised endothelial dysfunction initiated by abnormal placentation and consequent placental under-perfusion, release of cytokines, peroxidants, vasoconstriction and platelet activation.<sup>10</sup>

Several potential biochemical markers have been proposed to predict the severity of preeclampsia. Enzymes are one among them which are known as markers of cellular damage.

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.<sup>11</sup>

Endothelial cell dysfunction within the uteroplacental circulation leads to systemic release of GGT.<sup>2</sup> In our study serum GGT level was significantly increased in preeclampsia patients when compared to controls. Similar results were documented by Churchill D<sup>2</sup>, Hazari R<sup>4</sup>, Sarkar PD<sup>12</sup>, Babu R<sup>13</sup> and Portelinha A et al.<sup>14</sup>

ADA is the major enzyme of purine salvage pathway & catalyses the irreversible deamination & hydrolytic cleavage of adenosine & deoxyadenosine to inosine & doxionosine respectively with liberation of ammonia.<sup>15,16</sup> It is present in all human tissues with the highest levels in the lymphoid system and is regarded as a cellular inflammatory indicator. ADA activity has been detected on the surface of hematopoietic cells and ADA binding to the surface of T Lymphocytes has been reported.<sup>17,18</sup>

In our study a highly significant increase in serum ADA was observed in preeclampsia patients compared to controls which is due to possible role of enhanced cell mediated immunity during preeclampsia. Similar results were documented by Yoneyama,<sup>5,19</sup> Oladipo O<sup>20</sup> Kafkasli A.<sup>21</sup>

## CONCLUSION

The study concludes that enzyme markers like serum ADA & GGT could be sensitive, accurate & cost effective. Biomarkers in adding the diagnosis & assess the severity of preeclampsia.

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