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## Research article

### SERUM GAMMA-GLUTAMYL TRANSPEPTIDASE AND LIPIDS IN YOUNG ADULTS WITH UNCOMPLICATED ESSENTIAL HYPERTENSION

\*Rajarajeswari D<sup>1</sup>, Ramalingam<sup>2</sup>, Sharmila T<sup>3</sup>, Prasad Naidu M<sup>4</sup>, Naidu JN<sup>5</sup>

Dept of Biochemistry, Narayana Medical College and Hospital, Chinthareddy Palem, Nellore, Andhra Pradesh, India.524003

\*Corresponding author email: bio.rajeswari@gmail.com

#### ABSTRACT

**Introduction:** Gamma-glutamyl transpeptidase initially used as an indicator of alcohol ingestion is now viewed as a sensitive marker of sub clinical inflammation. Recent clinical studies have shown its association with blood pressure and lipid profile. As GGT degrades glutathione, an antioxidant GGT can be considered as a pro inflammatory marker playing a role in atherogenesis and hypertension. **Materials and methods:** 65 subjects with Essential hypertension and 50 age and sex matched healthy controls both male and female between 18-50 years of age were recruited from General Medicine department of Narayana Medical college and Hospital, Nellore, A.P. Serum GGT was measured by calorimetric kinetic assay. Fasting Serum Triglycerides, Total Cholesterol and HDL cholesterol by standard enzymatic procedures and LDL cholesterol by Friedwald equation. **Results:** GGT is significantly elevated in hypertensive subjects (Mean±SD 64.2±18.62IU/L) compared to controls (Mean±SD 26.20±8.91IU/L) (*P value* <0.001). GGT is significantly correlated with systolic BP ( $r= 0.26$   $p<0.01$ ) and diastolic BP ( $r= 0.28$   $p<0.01$ ). **Conclusion:** Our findings suggest that elevated GGT in young adults may contribute to their susceptibility to hypertension and provide an additional evidence of novel role of GGT in cardiovascular risk evaluation.

**Keywords:** Serum -glutamyl transpeptidase, Lipid profile, Young adults, Essential Hypertension.

#### INTRODUCTION

Essential Hypertension is increasing rapidly among young generation due to changes in dietary habits and lifestyle modifications<sup>[1]</sup> Hypertension is one of the major risk factor for cardiovascular diseases<sup>[2]</sup>. Premature death in young adults is mainly due to cardiovascular diseases. Therefore it is very essential to diagnose and treat hypertension as early as possible<sup>[3]</sup>. Recent research has revealed that GGT is a proinflammatory marker involved in atherosclerosis and cardiovascular risk. Gamma-glutamyl transpeptidase, initially used as an indicator of liver function is now found to be elevated in other metabolic disorders like non-insulin diabetes

mellitus, Hypertension etc<sup>[4]</sup>. GGT is a glycoprotein consisting of two polypeptide chains<sup>[5,6]</sup>. GGT is mainly originated from liver but also seen in other organ tissues like kidney, lung, pancreas and blood vessels<sup>[7,8]</sup>. Glutathione is a tripeptide with Glutamic acid, Glycine and Cysteine in its structure<sup>[9,10]</sup>. Glutathione is an important anti oxidant and exists both in its reduced and oxidised forms within the cell. the main function of GGT is to degrade glutathione to form a dipeptide which act as a reducing agent and forms free radicals<sup>[11]</sup>. LDL in the vascular endothelium is oxidised by the action of free radicals and forms a plaque lining the blood vessels.

Progressive formation of plaque results in atherosclerosis leading to hypertension<sup>[12]</sup>.

## MATERIALS AND METHODS

Present study is a case control study, 65 subjects with Essential hypertension and 50 age and sex matched healthy controls both male and female between 25 and 60 years of age were recruited from General Medicine department of Narayana Medical College and Hospital, Nellore, A.P. The present study is approved by institutional ethical committee

Sample size: 65 subjects with Essential hypertension and 50 age and sex matched healthy controls both male and female between 25 and 60 years of age were recruited from General Medicine department of Narayana Medical college and Hospital, Nellore, A.P. were included in the study.

**Exclusion criteria:** Pregnant, lactating women and patients with diabetes, liver disease and patients on drugs which might influence the serum levels of lipids and GGT were excluded from the study.

**Methodology:** Blood pressure (BP) was measured by a physician. Patients who were found to have Systolic Blood Pressure (SBP) higher than 140 mmHg and/or Diastolic Blood Pressure (DBP) higher than 90 mmHg on three consecutive days were considered as hypertensive<sup>[13]</sup>. Blood samples 5ml were collected under aseptic conditions from all the study participants for estimation of serum GGT. All samples were centrifuged and analyzed within 3 hours of sample collection. Serum GGT was measured by calorimetric kinetic assay<sup>[16]</sup>. Serum total cholesterol, triglycerides, HDL and LDL cholesterol are analyzed by Friedwald equation<sup>[21]</sup> Statistical analysis: all data were analysed by SPSS-13 version. P< 0.01 were considered as significant

## RESULTS

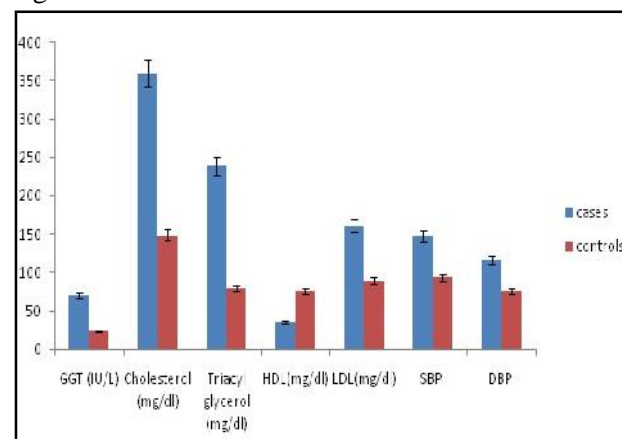
A total of 115 blood samples were collected and grouped into normal subjects and subjects with essential hypertension. Mean±SD of age for cases is 38.71 ± 8.48 years as compared with 32.72 ± 11.28

years for controls. Table 1 shows that GGT is significantly elevated in hypertensive subjects (Mean±SD 64.2±18.62 IU/L) compared to controls (Mean±SD 26.20±8.91IU/L) (P value <0.001). Fig1 illustrates the Mean±SD values of variables between cases and controls. Fig2 shows that GGT is significantly correlated with systolic BP (r= 0.26 p<0.001). Diastolic BP is also significantly correlated with serum GGT(r= 0.28 p<0.01). Serum total cholesterol, triglycerides and LDL cholesterol are significantly elevated in subjects with essential hypertension.HDL cholesterol is significantly decreased compared to controls (p<0.001).fig3 shows significant negative correlation is observed between serum GGT and HDL cholesterol (r=-0.29)

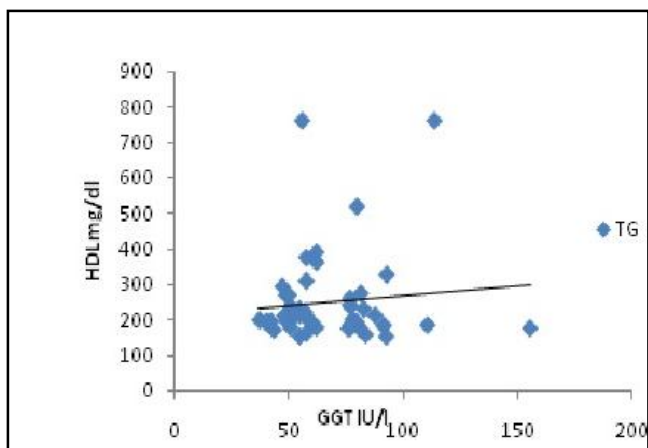
**Table 1: Main characteristics of hypertensive cases and controls**

Biochemical parameters	Cases n=65	Controls n=50	p-value
GGT (IU/L)	70.10±25.08	23.34±8.42	<0.0001
Cholesterol (mg/dl)	359.35±70.13	148.25±28.60	<0.0001
Triacyl glycerol (mg/dl)	238.87±110.15	79.13±28.88	<0.0001
HDL(mg/dl)	35.69±6.52	75.12±18.32	<0.0001
LDL(mg/dl)	160.39±15.48	89.26±20.34	<0.0001
SBP(mm/Hg)	148.06± 9.23	93.81±4.56	<0.0001
DBP(mm/Hg)	115.31± 7.61	75.29± 3.78	<0.0001

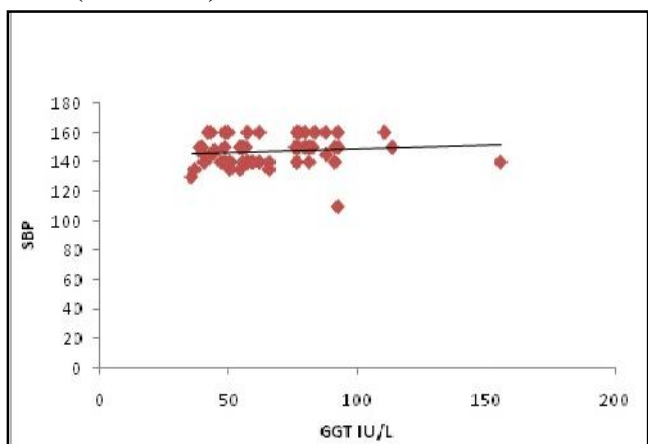
Data are expressed as Mean±SD. P<0.05 are significant.



**Fig 1: Shows main characteristics of hypertension cases and controls**



**Fig 2: Negative correlation between HDL and GGT levels( $r=0.29821$ )**



**Fig 3: Positive correlation between the systolic BP and GGT levels ( $r=0.120707$ )**

## DISCUSSION

The present study indicates that GGT level is elevated in hypertensive patients compared with their normotensive subjects. Our results demonstrated a positive association between higher serum GGT level and clinical hypertension. These results are in agreement with previous studies that reported a positive association between higher serum GGT level and clinical hypertension<sup>[13,14,15,16]</sup>. In the present study the age of the patients in hypertensive group was  $38.71 \pm 8.48$  years as compared with  $32.72 \pm 11.28$  years in the normotensive group. The male:female ratio between the two groups did not show any significant statistical difference. The present study suggests that serum GGT levels are elevated in hypertensive patients as compared with their age and sex matched normotensive subjects ( $P < 0.001$ ). Our results are in agreement with the current role of GGT in the development of hypertension<sup>[17,18]</sup>. Previous study conducted by Ruttman's et al in a

large Finnish group in both sexes, demonstrated that serum GGT is independently linked to alcohol ingestion and as a prognostic marker for myocardial ischemia. recent insights into the role of serum GGT in the development of hypertension and some metabolic disorders like type 2 diabetes increases our understanding of the evolution of these diseases and to stage the disease for better treatment of the disease [19, 20, 21]

## CONCLUSION

Our findings suggest that elevated GGT in young adults may contribute to their susceptibility to hypertension and provide an additional evidence of novel role of GGT in cardiovascular risk evaluation.

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**Conflict of Interest:** Nil

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