# Gamma Glutamyl Transferase as A Marker of Metabolic Syndrome

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**ABSTRACT**

In an era of a cardiovascular epidemic an imminent search has been sought for more sensitive and specific markers of sub-clinical inflammation, thermogenesis, and increased adiposity. This study attempts to assess how serum Gamma Glutamyl Transferase [GGT] performed as an ideal endogenous substance for the diagnosis of metabolic syndrome and hence estimate cardiovascular risk.

**Keywords:** Gamma Glutamyl Transferase, Hypothyroidism, Malignant diseases

## Introduction

The metabolic syndrome (Syndrome X, insulin resistance syndrome) consists of a constellation of metabolic abnormalities that confer increased risk of cardiovascular disease (CVD) and cerebrovascular disease1. The criteria for metabolic syndrome have evolved since the original definition by WHO in 1998 thus reflecting growing clinical evidence & analysis by various consensus conferences and professional organizations. Major features of metabolic syndrome include central obesity, hypertriglyceridemia, low HDL cholesterol, hyperglycemia & hypertension. The rise in the prevalence of obesity in India is threatening to increase the burden of atherosclerotic cardiovascular disease (ASCVD). The prevalence of metabolic syndrome worldwide is 20 -25% as reported by International Diabetes Federation (IDF). Among the complications, cardiovascular events produce the greatest morbidity and mortality. To assess role of GGT as marker in the diagnosis of metabolic syndrome and to assess the sensitivity and specificity of GGT, in diagnosis of metabolic syndrome.

## Materials and Methods

A Hospital based cross sectional study conducted among patients attending the medicine outpatient and inpatient services of SREE BALAJI MEDICAL COLLEGE AND HOSPITAL over a period of one year from December 2018 – December2019.

## Inclusion Criteria

1. Patients aged above 18 years
2. Central obesity – waist circumference>=90cm for men and>=80 cm for women (Indian population)

Plus, any 2 of following 4 factors:

- Raised Triglyceride    level>=150mg/dl /treatment of lipid abnormality
- Reduced HDL cholesterol< 40mg/dl / treatment of lipid abnormality
- Raised Blood Pressure systolic>=130 diastolic >=85 / treatment for known HTN
- Raised Fastingplasma glucose        >=100mg/dl / previously diagnosed T2 DM

## Exclusion Criteria

- Hypothyroidism
- Malignant diseases
- Severe renal insufficiency

- Acute and chronic liver disease

- Chronic alcohol consumption

- Drugs - antiepileptics, Oral contraceptive agents, trimethoprim, sulphamethoxazole, erythromycin, cimetidine

The study will be done on a minimum total of 120 patients inclusive of two groups: 1) 60 cases fulfilling inclusion and exclusion criteria 2) An equal number of age group and sex matched normal controls shall be recruited to compare the GGT levels. ate was collected by pretested semi structured questionnaire, clinical examination & investigations. The subjects were classified as urban if the place has more than 5000 inhabitants and density not<1000 persons/square mile [or] 390 per square kilometer. An estimation of GGT will be done for all the study subjects including cases and controls. The 2 groups are compared to fulfill study objective.

**Discussion**

Clustering of CVD risk factors typifies Metabolic syndrome as a driving force behind the Cardiovascular Non communicable disease epidemic. A need for the early diagnosis of metabolic syndrome is essential to prevent and decrease morbidity and mortality due to CVS disease. However, studies are lacking in adult Indian population. The role of GGT as a diagnostic marker of MS has been critically evaluated in study. Our study comprised of 60 cases of metabolic syndrome & 60 controls. Mean age in study group was 51.7±6.3 and 53.5±13.84 in control group. Patients in study group were clustered in the fifth decade of life with 50% cases belonging to this category. There were 66.7% males and 33.3% females in study group whereas 53.3% males and 46.7% females in control group. In a similar study done by B Kasapgolu et al5, mean age was 51.3±3.2 and the gender distribution showed 62% females and 38% males in study group. This difference may suggest higher incidence of metabolic syndrome in males & in Indian sub-continent.

In our study 48(80%) patients were from the urban population while 12(20%) belonged to the rural setting. This finding due to selection of patients from a tertiary care center, but consistent with similar studies referring it to as the disease of urban society. The mean waist circumference in study group was 96±3.98 cm & 78.49±3.42 cm in the control group. The mean BMI was 30.31±2.84 in study group and 24.17±0.84 in the control group. The mean waist

- hip ratio was 1.06±0.07 in study group and 0.74±0.06 in controls. Mean SBP in cases was 131.2±13.7 mmHg & 116.2±4.8mmHg in controls. The mean DBP was 84.23±5mmHg and 73.92±3.7mmHg in cases & controls respectively. A total of 49 out of 60 patients satisfied IDF criteria of Diastolic BP>130 mmHg including 40 males and 20 females.

The mean duration of DM in study group was 6.33±4.73 years. A total 42 cases (70%) satisfied the IDF criteria of FPG>100 mg/dl inferring IFG or T2 DM. Mean FPG was 143±16.7 in study group. Distribution of cases indicating IFG (FPG 100 -125mg/dl) and diabetes (FPG≥126mg/dl) was 17% and 50% respectively. The mean PPBS was 190±38.8, 51% cases suggested IGT (PPBS 140 - 199mg/dl) and 32% inferred T2 DM (PPBS>200mg/dl). Mean HbA1C was 8.41±2.21, with 26% in the IGT group (HbA1C 5.7-6.4) and 74% in DM group (HbA1C>6.5). These observations suggest a high prevalence of T2 DM in people with Metabolic Syndrome (Grundy *et al.,* 2005).

The mean duration of dyslipidemia was 4.92±2.64 years in study group. The mean total cholesterol was 217.2±14.9, triglyceride was 189.9±25.7, HDL was 30.1±10, and LDL was 118.9±14.8. Total of 47 cases had TG>150 including 40 males & 20 females. Total of 42 cases had HDL <40mg/dl for males & <50mg/dl for females. 93% cases had higher GGT levels whereas another 7% were in the upper limit of normal in patients with metabolic syndrome. The sensitivity and specificity of GGT to diagnose patients with metabolic syndrome was found to be 87% and 100% respectively. (p<0 .001)

**Conclusion**

This study has critically evaluated the utility of GGT as a diagnostic marker of metabolic syndrome, with good inferences. An elevated level of GGT was found to be associated with metabolic syndrome and is a strong predictor of cardiovascular risk. GGT correlated well with all the parameters of metabolic syndrome especially with hypertriglyceridemia with which it was the highest. GGT was found to be significantly higher in patients with cardiovascular disease. It was also noted that clustering of patients in the range of upper limit of normal values for GGT indicated the possible need for considering even such values in the context of metabolic syndrome and CVD risk.

**Conflict of interest**: Nil

**Study significance**: This study has critically evaluated the utility of GGT as a diagnostic marker of metabolic syndrome, with good inferences. An elevated level of GGT was found to be associated with metabolic syndrome and is a strong predictor of cardiovascular risk.

**REFERENCES**

Grundy, S. M., Cleeman, J. I., Daniels, S. R., Donato, K. A., Eckel, R. H., Franklin, B. A., Costa, F. (2005). Diagnosis and management of the metabolic syndrome: an American Heart Association/National Heart, Lung, and Blood Institute scientific statement. Circulation, 112(17), 2735-2752. https://doi.org/10.1161/CIRCULATIONAHA.105.169404