

To Study the Levels of Serum GGT in Prediabetics and Newly Diagnosed Type 2 Diabetics

Deepa Thadani¹, Pooja², Ajay Jain³, G.G. Kaushik⁴

¹Senior Professor, Department of Biochemistry, J.L.N. Medical College, Ajmer (Rajasthan), India. Rajasthan University of Health Sciences, Jaipur

²M.Sc. (Med.) Student, Department of Biochemistry, J.L.N. Medical College, Ajmer (Rajasthan), Rajasthan University of Health Sciences, Jaipur

³Assistant Professor, Department of Biochemistry, J.L.N. Medical College, Ajmer (Rajasthan), Rajasthan University of Health Sciences, Jaipur

⁴Senior Professor, Department of Biochemistry, J.L.N. Medical College, Ajmer (Rajasthan), India Rajasthan University of Health Sciences, Jaipur

Corresponding Author: Pooja

DOI: <https://doi.org/10.52403/ijhsr.20230125>

ABSTRACT

The aim of the study was to measure serum levels of GGT in impaired glucose tolerance (IGT) and newly diagnosed type 2 diabetics (NDT2D) and compare with healthy control subjects. In this study 61 IGT, 61 NDT2D and 61 healthy subjects (age and gender matched) were enrolled. HOMA-IR and GGT were assessed. Serum GGT levels were higher in IGT and NDT2D subjects compared with healthy controls (9.16 ± 3.06 ng/ml, 14.5 ± 5.31 ng/ml vs 5.11 ± 1.56 ng/ml, respectively, $p < 0.0001$). Increased serum GGT levels in IGT and NDT2D over healthy subjects.

Keywords: GGT, IGT, NDT2D

1. INTRODUCTION

Prediabetes is an intermediate state of hyperglycemia with glycemic parameters above normal but below the diabetes threshold. It usually does not cause symptoms but people with prediabetes often have obesity (especially abdominal or visceral obesity), dyslipidemia with high triglycerides and/or low HDL cholesterol, and hypertension.

Type 2 DM (T2DM) is characterized by insulin insensitivity as a result of insulin resistance, declining insulin production, and eventual pancreatic beta-cell failure. This leads to a decrease in glucose transport into the liver, muscle cells, and fat cells. There is an increase in the breakdown of fat with hyperglycemia. It is difficult to diagnose early, as it is mostly asymptomatic and usually presents with complications like

nephropathy, cardiovascular disease, retinopathy, neuropathy, cerebrovascular disease and peripheral vascular disease.

Gamma-glutamyl transferase (GGT) is commonly recognized as the enzyme, which indicates liver disease and alcohol misuse. GGT is a heterodimeric protein, which is bound on the extracellular surface of membranes of secretory cells. It is critical to glutathione homeostasis as it is the first major enzyme of the gamma-glutamyl cycle that regulates the metabolism of the antioxidant glutathione (GSH, γ -glutamyl-cysteinyl-glycine). Glutathione is one of the most abundant proteins in vivo involved in maintaining cellular homeostasis. GGT was significantly associated with an increased risk of development of type 2 diabetes in adults

particularly those with alcohol and smoking habits, obesity and sedentary lifestyle.

Higher serum GGT levels were associated with greater risk of prediabetes [Jie Wu et al.(2013)]. GGT appears to be a predictor of risk of developing type 2 diabetes [Lynn Blythe et al., P. Andr ew et al.(2006), Noriyuki Nakanishi et al.(2004)]. There are studies which do not support a causal role of GGT on the risk of prediabetes or diabetes [Jana Nano et al.(2017)].

2. MATERIAL AND METHOD

The present study has been conducted on 61 diagnosed IGT and 61 NDT2D patients attending Department of General Medicine, J.L.N. Medical College, Ajmer. 61 healthy subjects of similar age group and BMI have been included in the study as control group.

Anthropometric parameter and other variables i.e. Age, weight, Height, Body mass index (BMI), Serum Resistin, Fasting Serum Glucose, Serum Insulin were Measured.

HOMA-IR was calculated according to the formula: fasting insulin(μ U/ml) \times fasting glucose(nmol/L)/22.5.

Venous fasting, post-prandial blood sample was collected by aseptic technique and sample collected in both plain vial. Samples were processed for serum Glucose and Remaining samples were separated into labeled tubes and kept frozen until assayed.

3.RESULTS AND OBSERVATION

In this study, 61 cases of IGT and 61 NDT2D were compared with 61 healthy controls.

Table 1: Anthropometric parameters of IGT, NDT2D subjects and Healthy subjects (controls)

Parameters	IGT Cases (Mean \pm SD)	NDT2D Cases (Mean \pm SD)	Healthy Cases (Mean \pm SD)
AGE(yrs)	41.44 \pm 4.43	40.94 \pm 4.60	40.94 \pm 5.60
WEIGHT(Kg)	82.56 \pm 15.2	81.00 \pm 8.21	68.75 \pm 7.66
HEIGHT(cm)	166 \pm 8.29	167 \pm 7.59	169 \pm 6.62
BMI (Kg/m ²)	30.07 \pm 6.45	29.26 \pm 2.86	24.09 \pm 2.41

Table 2: Biochemical parameters of IGT subjects, NDT2D subjects and Healthy subjects (controls)

Parameters	IGT cases (Mean \pm SD)	NDT2D Cases (Mean \pm SD)	Healthy Control (Mean \pm SD)	P- Value
GGT (mg/dl)	46.4 \pm 22.3	44.5 \pm 15.4	18.8 \pm 5.2	<0.0001(HS)
Serum Glucose (mg/dl)	117.2 \pm 5.1	176.9 \pm 37.6	87.6 \pm 12.2	<0.0001(HS)
Serum Insulin (μ U/ml)	12.3 \pm 8.8	17.2 \pm 11.8	10.5 \pm 8.4	<0.0001(HS)
HOMA-IR (n)	2.78 \pm 1.57	3.07 \pm 1.57	0.99 \pm 1.21	<0.0001(HS)

P Value <0.0001 is considered highly significant.

Basic anthropometric parameters of IGT, NDT2D subjects and healthy subjects are summarized in table -1. There was no significant difference between IGT, NDT2D and healthy subjects regarding mean age (41.44 \pm 4.43, 40.94 \pm 4.60 vs 40.94 \pm 5.60yrs). BMI mean \pm SD in kg/m² in IGT, NDT2D and healthy subjects was (30.07 \pm 6.45, 29.26 \pm 2.86 vs 24.09 \pm 2.41) and it was highly significant. Biochemical parameter of IGT, NDT2D and healthy subjects are presented in table-2. IGT, NDT2D subjects had higher GGT levels compared to healthy subjects (46.4 \pm 22.3, 44.5 \pm 15.4 vs 18.8 \pm 5.2, P<0.0001).

4.DISCUSSION

In the present study, IGT and NDT2D subjects have significantly higher levels of GGT as compared to healthy control subjects. D.H. Lee et al.(2003) suggest that an increase in GGT concentration within its physiological range is sensitive and early biomarker for the development of diabetes. Haghghi S et al.(2011) selected the first-degree relatives (FDR) of pre-diabetes and type 2 diabetes patients. Insulin resistance and β -cell function were the main determinant of developing prediabetes and T2DM, respectively. The status of insulin resistance maybe a key point in the

development of NGT to prediabetes, and that in the status of prediabetes, it is of great importance to reserve the β -cell function to prevent further deterioration. The researchers found that was a positive association in the GGT levels and the development of full blown diabetes disease which was confirmed by the glucose intolerance curve of the subjects. Results of this study suggest that serum levels of GGT are increased in patient with diabetes.

Limitations of Study

Our sample size was relatively small.

CONCLUSION

From the present study it is concluded that serum GGT levels gets increase prior to onset of Diabetes. It could be considered among therapeutic agents used in the prevention of diabetes and in the prevention or reduction of its critical complications.

Declaration by Authors

Ethical Approval: Approved

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Bansal N. Prediabetes diagnosis and treatment: A review. *World J Diabetes* 2015; 6(2): 296-303.
2. "Classification and Diagnosis of Diabetes": *Diabetes Care*. 2017 January; 40 (Suppl 1): S11–S24.

3. Fujioka K: Pathophysiology of type 2 diabetes and the role of incretin hormones and beta-cell dysfunction. *JAAPA*.2007; suppl 3-8.
4. Sassan Haghghia, Massoud Amini , Zahra Pournaghshbandc , Peyvand Aminia , Silva Hovsepiana: Relationship between gamma-glutamyl transferase and glucose intolerance in first degree relatives of type 2 diabetics patients. *JRMS*. 2011; 16 (2): 123-129.
5. P. André & B. Balkau & C. Born & M. A. Charles & E. Eschwège & D.E.S.I.R. study group: Three-year increase of gamma-glutamyltransferase level and development of type 2 diabetes in middle-aged men and women: the D.E.S.I.R. cohort. *Diabetologia*. 2006; 49:2599–2603.
6. Noriyuki nakanishi, drph1 kenji suzuki, scd2 kozo tatara: Serum - glutamyltransferase and risk of metabolic syndrome and type 2 diabetes. *Diabetes care*. 2004; 27:1427–1432.
7. Jana Nano, Taulant Muka, Symen Ligthart, Albert Hofman, Sarwa Darwish Murad, Harry LA Janssen, Oscar H Franco and Abbas Dehghan: Gamma-glutamyltransferase levels, prediabetes and type 2 diabetes. *International Journal of Epidemiology*. 2017; 1400–1409.

How to cite this article: Deepa Thadani, Pooja, Ajay Jain et.al. To study the levels of serum GGT in prediabetics and newly diagnosed type 2 diabetics. *Int J Health Sci Res*. 2023; 13(1):184-186.
DOI: <https://doi.org/10.52403/ijhsr.20230125>
