ISSN : 2949 - 9100

International Journal of Health and Dentistry Care (IJHDC)

IJHDC : Health and Dental Publication
Available Online at: www.ijhdc.com
Volume – 4, Issue – 1, January – February – 2025, Page No. : 01 – 03

A Relationship of Triglyceride Glucose Index (TyG Index) with HbA1c in Type 2 Diabetes Mellitus

[1]Boride P A, Department of Endocrinology and Metabolism, Faculty of Medicine

[2]Ceyhan E D, Department of Endocrinology and Metabolism, Faculty of Medicine

Corresponding Author: Boride P A, Department of Endocrinology and Metabolism, Faculty of Medicine

Citation This Article: Boride P A, Ceyhan E D, "A Relationship of Triglyceride Glucose Index (TyG Index) with HbA1c in Type 2 Diabetes Mellitus", IJHDC – January – February – 2025, Volume. – 4, Issue – 1, P. No. 01 – 03.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Introduction: This study aims to determine the relationship between the Triglyceride Glucose Index (TyG Index) and HbA1c in Type 2 Diabetes Mellitus patients. It has been shown that the higher the TyG index, the higher the HbA1c, indicating poor glycemic control. It is also an indicator of insulin resistance.

Methodology

A total of 50 patients with Type 2 Diabetes were included in this cross-sectional study and divided into two groups according to HbA1c levels. HbA1c < 7.0% was defined as good glycemic control, and HbA1c > 7.0% was defined as poor glycemic control. Anthropometric and biochemical parameters were measured, and values of the triglyceride-to-HDL ratio and TyG index were calculated.

Results

Fasting blood glucose and HbA1c were significantly higher in diabetic patients with poor glycemic control. The TyG index was significantly correlated with HbA1c.

Conclusion

The TyG index is a useful tool for assessing glycemic control in Type 2 Diabetes Mellitus patients and is positively correlated with HbA1c. The TyG index can be used as a simple and inexpensive tool to assess glycemic control in patients with diabetes.

Keywords: Cardiovascular, Diabetes mellitus, Triglyceride Glucose Index

Introduction

Diabetes mellitus has become a global health problem and has been increasing at an alarming rate. Persistent hyperglycemia and insulin resistance are associated with long term damage to organs that is eyes, kidney, nerves and heart. Patients with type 2 diabetes display an atherogenic dyslipidemia and obesity which increases the risk of cardiovascular diseases. Prevalence of lipid abnormalities in diabetes is attributed to insulin resistance. Effective glycemic control and enhancing insulin sensitivity are essential to reduce the risk of developing diabetic complications.

Glycated hemoglobin (Hba1C) is commonly used to assess long term blood glucose concentration and insulin resistance also found to predict micro and macrovascular complications of diabetes mellitus.

Evidence shows that Triglyceride-Glucose index (TyG index) which is derived from triglycerides and fasting glucose levels correlate with glycemic control and insulin resistance. Since increased TG level is an important risk factor for cardiovascular disease and metabolic syndrome, measuring product of triglycerides and glucose as TyG index represents glycemic control and cardiovascular status simultaneously.

This study aims to determine the relationship between the Triglyceride Glucose Index (TyG Index) and HbA1c in Type 2 Diabetes Mellitus patients. It has been shown that the higher the TyG index, the higher the HbA1c, indicating poor glycemic control. It is also an indicator of insulin resistance.

Aims and Objectives

1. To assess Hba1C levels and lipid profile in patients with type 2 diabetes mellitus.
2. To calculate Triglyceride-Glucose index (TyG index).
3. To assess association of Triglyceride-Glucose index (TyG index) with Hba1C levels in type 2 diabetes mellitus patients.

Subject and Methods

1. **Study Area:** Department of general medicine KIMS Bangalore.
2. **Study Subjects:** Patients with type 2 diabetes mellitus in KIMS hospital.
3. **Study Period:** 12 Months.
4. **Study Design:** Cross sectional study.
5. **Sample Size:** 50.

Statistical Analysis

Statistical Package for Social Sciences [SPSS] for Windows Version 22.0 Released 2013. Armonk, NY: IBM Corp., will be used to perform statistical analyses.

Inclusion Criteria

1. Age >18 years.
2. Patients diagnosed with type 2 diabetes mellitus according to ADA criteria.

Exclusion Criteria

1. Type 1 diabetes mellitus.
2. Previous history of hypo or hyperthyroidism.
3. Patients with Cardiovascular diseases.
4. Patients with liver diseases.
5. Pregnancy.

Methods and Procedure

The study will be conducted after getting written informed consent from the study subjects. Elaborate history and thorough clinical examination of study subjects will be done.

Subjects will be divided into two subgroups: Hba1C < 7.0% (that is good glycemic control) and Hba1C > 7.0% (poor glycemic control).

Following parameters will be assessed in the patients: FBS, PPBS, Hba1C, lipid profile, RFT, LFT.

Triglyceride-Glucose index (TyG index) is calculated using the formula: log [(fasting triglycerides) *(fasting plasma glucose)/2].

Association between Triglyceride-Glucose index (TyG index) and Hba1C studied.

Discussion

Type 2 diabetes mellitus is a major global health problem and maintaining good glycemic control in T2DM remains a challenge. Dyslipidemia and insulin resistance plays a major role in development of micro and macrovascular complications.

The diabetes complications and control trial (DCCT) represent HbA1c as the good marker for glycemic control (8). Maintaining HbA1c <7.0% reduces the risk of developing microvascular and macrovascular complications. Hence, diabetic patients were divided into two groups based on their HbA1c levels.

Babic et al showed that TG/HDL-C ratio was found to be a useful marker in the prediction of glycemic control in T2DM (3). The TG/HDL-C ratio and BMI were independently associated with HbA1c.

TyG index was found to be significantly correlated with HbA1c. TyG index was found to be a good predictor of glycemic control. Hameed et al illustrated that TyG index has correlation with HbA1c and HOMA-IR (8). Also, TyG index is useful in assessing the magnitude of insulin resistance in T2DM (3).

Measurement of HbA1c and insulin is expensive, requires automated procedures, and may not be feasible in primary health care settings. TyG index derived from fasting blood glucose and triglyceride levels is routinely measured in small laboratories and readily available.

Conclusion

The TyG index can be used as a simple surrogate marker of glycemic control and insulin resistance in patients with T2DM. Owing to its cost effectiveness and easy quantifiability, it can be measured in small laboratories.

References

1. Gedikli MA, Sarı Kalın B, Aktaş A. Relationship Between HbA1c Level and Triglyceride/HDL Cholesterol Ratio and Triglyceride Glucose Index in Diabetes Patients. Bagcilar Med Bull 2022;7(1):27-31
2. MAEDICA – a Journal of Clinical Medicine https://doi.org/10.26574/maedica.2021.16.3.375
3. Babic N, Valjevac A, Zaciragic A, et al. The Triglyceride/HDL Ratio and Triglyceride Glucose Index as Predictors of Glycemic Control in Patients with Diabetes Mellitus Type 2. Med Arch 2019;73:163-168.
4. Association AD. Diagnosis and Classification of Diabetes Mellitus. Diabetes Care 2010;33:S62-S69.
5. Miller M, Stone NJ, Ballantyne C, et al. Triglycerides and cardiovascular disease: a scientific statement from the American Heart Association. Circulation 2011;123:2292-2333.
6. Zhao S, Yu S, Chi C, Fan X, Tang J, Ji H, et al. Association between macro-and microvascular damage and the triglyceride glucose index in community-dwelling elderly individuals: the Northern Shanghai Study. Cardiovasc Diabetol 2019;18(1):95.
7. Rohlfing CL, Wiedmeyer H-M, Little RR, et al. Defining the relationship between plasma glucose and HbA(1c): analysis of glucose profiles and HbA(1c) in the Diabetes Control and Complications Trial. Diabetes Care 2002;25:275-278.
8. Hameed EK. TyG index a promising biomarker for glycemic control in type 2 Diabetes Mellitus. Diabetes Metab Syndr 2019;13:560-563.