



The Relationship Between Triglyceride Levels And Fasting Blood Glucose Levels In Patients With Type 2 Diabetes Mellitus At A Private Hospital

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Abstract

Type 2 diabetes mellitus is a metabolic disease that can cause increased blood glucose levels and disorders of lipid metabolism, including elevated triglyceride levels. This study aimed to determine the relationship between triglyceride levels and fasting blood glucose levels in patients with type 2 diabetes mellitus at Hermina Arcamanik Hospital. This study used an observational analytic design with a cross-sectional approach involving 24 patients. Data were obtained through triglyceride and fasting blood glucose examinations and were analyzed using the Spearman Rank correlation test. The results showed a mean triglyceride level of 176.13 mg/dL and a mean fasting blood glucose level of 115.83 mg/dL. The Spearman test yielded $r_s = 0.331$ and $p = 0.114$ ($p > 0.05$), indicating a weak positive relationship that was not statistically significant. The findings demonstrate that higher triglyceride levels tended to be accompanied by higher fasting blood glucose levels, although the strength of the association was weak and did not reach statistical significance in the study population. It was concluded that there was no significant relationship between triglyceride levels and fasting blood glucose levels among patients with type 2 diabetes mellitus in this study.

Keywords: Type 2 Diabetes Mellitus, Fasting Blood Glucose, Triglyceride Levels

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1. Introduction

Type 2 diabetes mellitus remains a common health problem in the community. In this condition, elevated blood glucose levels are often accompanied by disorders of lipid metabolism, including increased triglyceride levels. Persistent hyperglycemia can disrupt fat metabolism in the body and may therefore lead to increased blood triglyceride levels. High triglyceride levels are also frequently found in patients with type 2 diabetes mellitus whose blood glucose control is not yet optimal. Nevertheless, the relationship between triglyceride levels and fasting blood glucose levels does not always show the same pattern in every patient. This may be influenced by various factors, including dietary intake, level of physical activity, duration of diabetes mellitus, adherence to therapy, and the metabolic condition of each individual. Based on these conditions, examination of triglyceride levels and fasting blood glucose levels is an important component of monitoring the metabolic status of patients with type 2 diabetes mellitus. Therefore, research on the relationship between triglyceride levels and fasting blood glucose levels in patients with type 2 diabetes mellitus at a private hospital is necessary to determine the association between these two parameters and to provide information regarding patients' metabolic conditions.

Type 2 diabetes mellitus (T2DM) is a group of metabolic disorders characterized by hyperglycemia. T2DM is caused by impaired insulin secretion and/or insulin action, resulting in disturbances of carbohydrate, fat, and protein metabolism (Al Faridzi et al., 2020). Poorly controlled diabetes mellitus can result in various complications, including dyslipidemia (Hulfah et al., 2021). Diabetes mellitus is closely associated with hyperlipidemia. Hyperlipidemia is a condition in which blood lipid levels increase, one of which is triglycerides. Increased triglyceride levels are associated with insulin resistance, which can interfere with glucose metabolism. The relationship between triglyceride and glucose levels can be used as an indicator of insulin resistance, as reflected by an increased triglyceride-glucose (TyG) index. Excessive fat accumulation can cause lipotoxicity and glucotoxicity, thereby triggering insulin resistance (Yanti, 2022). This condition is characterized by insulin resistance accompanied by relative insulin deficiency. Type 2 diabetes mellitus occurs more frequently in people over 40 years of age, although it may also occur in young adults and children. Type 2 diabetes mellitus is non-insulin-dependent diabetes resulting from reduced insulin sensitivity, known as insulin resistance, or from decreased insulin production (Retno, 2022). Diabetes mellitus is a chronic metabolic disease characterized by increased blood glucose levels (hyperglycemia) due to impaired insulin production, impaired insulin action, or a combination of both. This condition prevents the body from optimally using glucose as an energy source (American Diabetes Association [ADA], 2024).

According to the World Health Organization (WHO, 2023), diabetes mellitus is a noncommunicable disease that can cause complications involving the heart, kidneys, eyes, nerves, and blood vessels when blood glucose is not adequately controlled. In general, diabetes is classified into type 1 diabetes mellitus, type 2 diabetes mellitus, gestational diabetes, and other specific types. Type 2 diabetes mellitus is the most commonly found type in the population (International Diabetes Federation [IDF], 2025). Diabetes mellitus





management aims to maintain controlled blood glucose levels through a healthy diet, physical activity, education, blood glucose monitoring, and the use of antidiabetic drugs or insulin according to the patient's condition (PERKENI, 2021; ADA, 2024).

Previous studies have demonstrated an association between triglyceride levels and blood glucose levels in patients with type 2 diabetes mellitus; however, study findings remain variable. Differences in results may be influenced by respondent characteristics, sample size, patients' clinical conditions, duration of diabetes, treatment patterns, and other metabolic factors. Therefore, research on the relationship between triglyceride levels and fasting blood glucose levels in specific populations remains necessary to provide an overview of patients' metabolic conditions in particular healthcare facilities.

2. Research Methods

This study used a non-experimental quantitative design and was conducted from April 1 to June 30, 2026, at Hermina Arcamanik Hospital. The study population consisted of 24 respondents selected using purposive sampling. Data analysis was performed using univariate and bivariate analyses with the Spearman test to determine the relationship between type 2 diabetes mellitus and triglyceride levels.

3. Results and Discussion

a. Research Results

Table 1. Distribution of Respondents by Sex

Sex	n	%
Male	8	33.33%
Female	16	66.67%
Total	24	100%

Most respondents were female, comprising 16 individuals (66.67%), whereas 8 respondents (33.33%) were male. The minimum and maximum values for triglyceride and fasting blood glucose levels among the 24 respondents are presented in Table 2.

Table 2. Descriptive Statistics

Variable	N	Min	Max	Mean
Triglycerides	24	41	460	176.13 mg/dL
Fasting Blood Glucose	24	78	302	115.83 mg/dL

The mean triglyceride level was 176.13 mg/dL, with a minimum value of 41 mg/dL and a maximum value of 460 mg/dL. A total of 14 respondents (58.33%) had normal levels and 10 respondents (41.67%) had high levels. The mean fasting blood glucose level was 115.83 mg/dL, with a range of 78–302 mg/dL; 17 respondents (70.83%) were in the normal category and 7 respondents (29.17%) were in the high category. The normality-test values for triglyceride and fasting blood glucose levels are presented in Table 3.



**Table 3.** Shapiro-Wilk Normality Test

Variable	Sig.	Interpretation
Triglycerides	0.003	Not normally distributed
Fasting Blood Glucose	0.000	Not normally distributed

The Shapiro-Wilk significance value was 0.003 for triglycerides and 0.000 for fasting blood glucose. Because both values were < 0.05 , the data were not normally distributed; therefore, the relationship analysis was continued using Spearman Rank correlation. The relationship between triglycerides and fasting blood glucose is presented in Table 4.

Table 4. Spearman Correlation Test

Variable	r	p	Interpretation
Triglycerides-FBG	0.331	0.114	Positive, weak; not significant

The Spearman test yielded $r = 0.331$ and $p = 0.114$. The positive coefficient indicates a tendency for increased triglyceride levels to be accompanied by increased fasting blood glucose levels, although the strength of the relationship was weak. Because $p > 0.05$, the relationship was not statistically significant. The absence of a significant relationship may have been influenced by the relatively small sample size of 24 respondents. In addition, triglyceride and blood glucose levels in patients with type 2 diabetes mellitus are influenced by the duration of diabetes, antidiabetic medications, lipid-lowering medications, dietary patterns, physical activity, body mass index, and patients' metabolic conditions.

The results indicate that triglyceride and fasting blood glucose examinations remain important components of metabolic monitoring. Interpretation of the results should take into account the clinical condition and other factors that may influence both parameters.

b. Discussion

With reference to Table 1, this study was conducted to determine the relationship between triglyceride levels and fasting blood glucose levels in patients with type 2 diabetes mellitus at Hermina Arcamanik Hospital. Among the 24 respondents, most were female, comprising 16 individuals (66.7%), while 8 respondents (33.3%) were male. The higher proportion of women in this study may be related to the characteristics of the population of patients with type 2 diabetes mellitus who underwent laboratory examinations during the study period. Differences in the occurrence of diabetes according to sex may be influenced by various factors, such as changes in body composition, physical activity, dietary patterns, hormonal factors, and differences in body-fat distribution. However, sex was not analyzed in relation to triglyceride or blood glucose levels in this study.

With reference to Table 2, triglyceride examination results showed that the mean triglyceride level among respondents was 176.13 mg/dL, with a minimum value of 41 mg/dL and a maximum value of 460 mg/dL. Based on laboratory reference categories, 14 respondents (58.33%) had triglyceride levels in the normal category and 10 respondents (41.67%) had high triglyceride levels. These results indicate that most patients had





triglyceride levels within the reference range, although a proportion of patients still had elevated triglyceride levels. Fasting blood glucose levels in this study had a mean value of 115.83 mg/dL, with a minimum value of 78 mg/dL and a maximum value of 302 mg/dL. Based on the classification results, 17 respondents (70.83%) were in the normal category according to laboratory reference values, whereas 7 respondents (29.17%) were in the high category. This condition indicates that most respondents had fasting blood glucose levels that remained within the laboratory reference range. However, interpretation of blood glucose levels in patients with diabetes mellitus should still consider clinical glycemic-control targets because a single examination value may be influenced by therapy, dietary patterns, physical activity, and the patient's condition at the time of examination.

With reference to Table 3, the normality-test results showed that triglyceride and fasting blood glucose data were not normally distributed. The Shapiro-Wilk significance value was 0.003 for triglycerides and 0.000 for fasting blood glucose; therefore, the relationship analysis was continued using the Spearman Rank correlation test. The selection of the Spearman test was appropriate in this study because this method is used to analyze the relationship between two numerical variables when the data distribution is not normal. With reference to Table 4, the Spearman correlation test yielded a correlation coefficient of 0.331 with a significance value of 0.114. The correlation coefficient indicates a weak positive relationship between triglyceride levels and fasting blood glucose levels. A positive relationship means that an increase in triglyceride levels tended to be accompanied by an increase in fasting blood glucose levels; however, the relationship was not statistically significant because the p-value was greater than 0.05.

The absence of a significant relationship in this study may have been influenced by several factors. One possible factor was the relatively small study sample, consisting of only 24 respondents. A limited sample size may reduce the statistical ability to detect an association. In addition, triglyceride and blood glucose levels in patients with type 2 diabetes mellitus may be influenced by various other factors, including duration of diabetes, use of antidiabetic medications, use of lipid-lowering medications, dietary intake, physical activity, body mass index, and the metabolic condition of each patient. The findings of this study indicate that the relationship between triglyceride levels and fasting blood glucose is influenced not only by the physiological relationship between carbohydrate and lipid metabolism but also by various complex clinical factors. Although increased triglyceride levels are biologically often associated with insulin resistance and impaired glucose metabolism, the findings of this study show that, in the population of patients with type 2 diabetes mellitus at Hermina Arcamanik Hospital, this relationship did not demonstrate statistical significance.

4. Conclusion

Based on the study results, it can be concluded that most respondents were female and that most had triglyceride and fasting blood glucose levels in the normal category. The Spearman test showed a weak positive relationship between triglyceride levels and fasting blood glucose levels, but the relationship was not statistically significant ($p = 0.114$). Thus, this study did not identify a significant relationship between triglyceride levels and fasting





blood glucose levels. Future studies are expected to involve a larger number of respondents and to consider other factors that may affect triglyceride and fasting blood glucose levels in patients with type 2 diabetes mellitus. In addition, studies may be conducted with a broader scope to obtain more diverse results and provide information for understanding metabolic conditions in patients with type 2 diabetes mellitus.

5. Compliance with Ethical Standards

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Disclosure of Conflict of Interest

The original manuscript did not provide a conflict-of-interest statement.

Statement of Informed Consent

The original manuscript did not provide an informed-consent statement.

References

- Al Faridzi, F. Z., Amalia, Y. and Triliana, R. (2020) 'Peran kendali glukosa terhadap kadar trigliserida dan high-density lipoprotein serum pada pasien diabetes melitus tipe 2 di Malang Raya', *Jurnal Bio Komplementer Medicine*, 7(2), pp. 1–10. Penelitian ini sangat relevan karena menemukan hubungan antara trigliserida dengan glukosa darah puasa pada pasien DMT2.
- American Diabetes Association Professional Practice Committee (2026) 'Standards of care in diabetes—2026', *Diabetes Care*, 49(Suppl. 1), pp. S1–S350.
- Amanda, E., Juniarto, A. Z., Afifah, D. N., Muniroh, M., Al-Baarri, A. N. and Fitranti, D. Y. (2021) 'Perbaikan kadar trigliserida dan hs-CRP pada tikus Wistar diabetes melitus tipe 2 dengan biskuit biji bunga matahari', *AcTion: Aceh Nutrition Journal*, 6(2), pp. 189–198. doi:10.30867/action.v6i2.560.
- Beshara, A., Cohen, E., Goldberg, E., Lilos, P., Garty, M. and Krause, I. (2016) 'Triglyceride levels and risk of type 2 diabetes mellitus: A longitudinal large study', *Journal of Investigative Medicine*, 64(2), pp. 383–387. doi:10.1136/jim-2015-000025. Penelitian longitudinal ini menunjukkan bahwa peningkatan trigliserida berhubungan dengan peningkatan risiko diabetes dan gangguan glukosa puasa.
- Burtis, C. A. and Bruns, D. E. (eds.) (2023) *Tietz fundamentals of clinical chemistry and molecular diagnostics*. 9th edn. Elsevier.
- Chamroonkiadtikun, P., Ananchaisarp, T. and Wanichanon, W. (2020) 'The triglyceride-glucose index, a predictor of type 2 diabetes development: A retrospective cohort study', *Primary Care Diabetes*, 14(2), pp. 161–167. doi:10.1016/j.pcd.2019.08.004. Artikel ini sangat relevan karena TyG dihitung langsung dari trigliserida dan fasting plasma glucose.
- da Silva, A., Caldas, A. P. S., Rocha, D. M. U. P. and Bressan, J. (2020) 'Triglyceride-glucose index predicts independently type 2 diabetes mellitus risk: A systematic review and meta-analysis of cohort studies', *Primary Care Diabetes*, 14(6), pp. 584–593. doi:10.1016/j.pcd.2020.09.001. Meta-analisis ini memperkuat dasar hubungan fisiologis dan klinis antara trigliserida, glukosa puasa, resistensi insulin, dan DMT2.
- International Diabetes Federation (2025) *IDF diabetes atlas*. 11th edn. Brussels: International Diabetes Federation.
- Kementerian Kesehatan Republik Indonesia (2021) *Pedoman nasional pelayanan kedokteran tata laksana diabetes melitus tipe 2 dewasa*. Jakarta: Kementerian Kesehatan Republik Indonesia.
- Kusdiantini, A. and Istiqomah, A. A. (2024) 'Gambaran kadar HbA1c dan glukosa darah puasa pada penderita diabetes melitus di RSUD Daerah Bandung', *PREPOTIF: Jurnal Kesehatan Masyarakat*, 8(3), pp. 4652–4655. doi:10.31004/prepotif.v8i3.33317. Penulis berafiliasi dengan Program Studi Analisis Kesehatan, Politeknik Piksi Ganesha; artikel ini sangat relevan untuk variabel fasting blood glucose pada penderita diabetes mellitus.
- Kusdiantini, A., Nuraeni, Y. A., Susanti, A. S., Elvira, S., Hina, S. A. D. and Aulia, D. (2025) 'Edukasi dan interpretasi hasil pemeriksaan kolesterol dan trigliserida bagi kader Posyandu di Kecamatan Batununggal, Kota Bandung', *PADMA: Jurnal Pengabdian Kepada Masyarakat*, 5(1), pp. 501–514. doi:10.56689/padma.v5i1.2646. Publikasi Politeknik Piksi Ganesha ini mendukung aspek pemeriksaan laboratorium dan interpretasi kadar trigliserida.
- Rifai, N., Horvath, A. R. and Wittwer, C. T. (eds.) (2023) *Tietz textbook of laboratory medicine*. 7th edn. Elsevier.





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- Sacks, D. B., Arnold, M., Bakris, G. L., Bruns, D. E., Horvath, A. R. and Kirkman, M. S. (2023) 'Guidelines and recommendations for laboratory analysis in the diagnosis and management of diabetes mellitus', *Clinical Chemistry*, 69(5), pp. e1–e45.
- World Health Organization (2019) *Classification of diabetes mellitus*. Geneva: World Health Organization.
- Yanti, M. M. (2022) 'Gambaran indeks trigliserida dan glukosa pada penyandang obes', *Majalah Kedokteran Andalas*, 45(3), pp. 393–399. doi:10.25077/mka.v45.i3.p393-399.2022. Penelitian ini menggunakan pemeriksaan trigliserida dan glukosa darah puasa untuk menentukan Triglyceride-Glucose (TyG) Index sebagai indikator resistensi insulin.

