

INTISARI

Latar Belakang

Obesitas merupakan masalah kesehatan global yang terus meningkat dan berperan penting dalam perkembangan berbagai penyakit metabolik, termasuk *metabolic dysfunction-associated fatty liver disease* (MAFLD). MAFLD berkaitan erat dengan resistensi insulin yang sering ditemukan pada individu obesitas. Biopsi hati merupakan standar emas dalam diagnosis MAFLD, namun prosedur ini bersifat invasif, mahal, dan tidak selalu tersedia dalam praktik klinis sehari-hari. Oleh karena itu, diperlukan biomarker yang sederhana dan mudah diakses untuk skrining MAFLD. Indeks triglisericida-glukosa (*triglyceride-glucose index*, TyG) merupakan biomarker resistensi insulin yang dihitung dari kadar triglisericida dan glukosa darah puasa dan dilaporkan memiliki hubungan dengan kejadian MAFLD.

Tujuan

Penelitian ini bertujuan untuk menganalisis hubungan antara indeks TyG dan modifikasinya (TyG-BMI, TyG-WC, dan TyG-WHtR) terhadap kejadian MAFLD pada individu obesitas tanpa diabetes serta menentukan nilai *cut-off* indeks TyG sebagai alat skrining MAFLD.

Metode

Penelitian ini merupakan penelitian observasional analitik dengan rancangan potong lintang. Subjek penelitian adalah pasien obesitas tanpa diabetes yang menjalani rawat jalan di Klinik Endokrin Metabolik Diabetes dan Klinik Gastroentero-Hepatologi RSUP Dr. Sardjito Yogyakarta. Sampel dikumpulkan secara *consecutive sampling*. Variabel bebas meliputi indeks TyG dan modifikasinya, sedangkan variabel tergantung adalah kejadian MAFLD yang dinilai menggunakan pemeriksaan VCTE. Analisis data meliputi analisis univariat, analisis bivariat menggunakan uji Chi-square, serta analisis multivariat menggunakan regresi logistik dengan tingkat kemaknaan $p < 0,05$.

Hasil

Sebanyak 66 individu obesitas tanpa diabetes ikut serta dalam penelitian ini, dengan 35 subjek (53%) terdiagnosis MAFLD. Karakteristik dasar menunjukkan tidak terdapat perbedaan bermakna antara kelompok MAFLD dan non-MAFLD berdasarkan usia ($p=0,166$), jenis kelamin ($p=0,055$), aktivitas fisik ($p=0,654$), maupun riwayat pengobatan ($p=0,418$). Parameter antropometri menunjukkan lingkaran pinggang lebih tinggi secara bermakna pada kelompok MAFLD ($p=0,030$). Parameter laboratorium menunjukkan kadar SGPT ≥ 35 U/L lebih sering ditemukan pada kelompok MAFLD dan berhubungan signifikan dengan kejadian MAFLD ($p=0,007$). Analisis ROC menunjukkan bahwa indeks TyG memiliki nilai AUC sebesar 0,657 dengan *cut-off* 7,93, sensitivitas 94,59%, dan spesifisitas 13,64%. Indeks TyG-BMI mempunyai AUC 0,661 dengan *cut-off* 253,50, sensitivitas 96,67%, dan spesifisitas 17,86%. Modifikasi indeks TyG berbasis lingkaran pinggang (TyG-WC) menunjukkan performa diskriminatif terbaik dengan AUC 0,764, *cut-off* 806,80, sensitivitas 100%, dan spesifisitas 21,43%. Sementara itu, TyG-WHtR menunjukkan kemampuan diskriminatif yang lebih rendah dengan sensitivitas tinggi namun spesifisitas yang relatif rendah dibandingkan parameter lainnya.

Simpulan

Indeks TyG dan modifikasinya memiliki potensi sebagai alat skrining untuk mendeteksi MAFLD pada individu obesitas tanpa diabetes. Indeks TyG-WC menunjukkan performa diskriminatif terbaik berdasarkan analisis ROC sehingga berpotensi digunakan sebagai alat skrining awal MAFLD.

Kata kunci: MAFLD, obesitas, resistensi insulin, indeks TyG, skrining

ABSTRACT

Background

Obesity is an increasing global health problem and plays an important role in the development of various metabolic diseases, including metabolic dysfunction-associated fatty liver disease (MAFLD). MAFLD is closely related to insulin resistance, which is commonly found in individuals with obesity. Liver biopsy remains the gold standard for diagnosing MAFLD; however, this procedure is invasive, costly, and not always available in routine clinical practice. Therefore, a simple and easily accessible biomarker is needed for MAFLD screening. The triglyceride-glucose index (TyG index) is a biomarker of insulin resistance calculated from fasting triglyceride and glucose levels and has been reported to be associated with the incidence of MAFLD.

Objective

This study aimed to analyze the association between the TyG index and its modifications (TyG-BMI, TyG-WC, and TyG-WHtR) with the incidence of MAFLD in obese individuals without diabetes and to determine the optimal cut-off value of the TyG index as a screening tool for MAFLD.

Methods

This study was an analytic observational study with a cross-sectional design. The study subjects were obese individuals without diabetes who attended the Endocrine Metabolic Diabetes Clinic and the Gastroentero-Hepatology Clinic at Dr. Sardjito Hospital, Yogyakarta. Samples were collected using consecutive sampling. The independent variables included the TyG index and its modifications, while the dependent variable was the presence of MAFLD assessed using vibration-controlled transient elastography (VCTE). Data analysis included univariate analysis, bivariate analysis using the Chi-square test, and multivariate analysis using logistic regression with a significance level of $p < 0.05$.

Results

A total of 66 obese individuals without diabetes were included in this study, of whom 35 subjects (53%) were diagnosed with MAFLD. Baseline characteristics showed no significant differences between the MAFLD and non-MAFLD groups in terms of age ($p = 0.166$), sex ($p = 0.055$), physical activity ($p = 0.654$), or medication history ($p = 0.418$). Anthropometric parameters showed that waist circumference was significantly higher in the MAFLD group ($p = 0.030$). Laboratory parameters showed that SGPT ≥ 35 U/L was more frequently found in the MAFLD group and was significantly associated with MAFLD ($p = 0.007$). ROC analysis demonstrated that the TyG index had an AUC of 0.657 with a cut-off value of 7.93, sensitivity of 94.59%, and specificity of 13.64%. The TyG-BMI index had an AUC of 0.661 with a cut-off value of 253.50, sensitivity of 96.67%, and specificity of 17.86%. The waist circumference-based TyG modification (TyG-WC) showed the best discriminative performance with an AUC of 0.764, a cut-off value of 806.80, sensitivity of 100%, and specificity of 21.43%. Meanwhile, TyG-WHtR demonstrated a lower discriminative ability with high sensitivity but relatively low specificity compared to the other parameters.

Conclusion

The TyG index and its modifications have potential as screening tools for detecting MAFLD in obese individuals without diabetes. Among these parameters, the TyG-WC index showed the best discriminative performance based on ROC analysis and may serve as a practical initial screening tool for MAFLD.

Keywords: MAFLD, obesity, insulin resistance, TyG index, screening