

ABSTRACT

Background: Heart failure remains a major global health burden, causing 17,9 million deaths in 2019. It is classified with left ventricular ejection fraction (LVEF) into HFpEF, HFmrEF, and HFpEF. Type 2 diabetes mellitus (T2DM) is a strong risk factor for heart failure for it increase heart failure risk up to fivefold. Recently, glycemic variability emerged as an important predictor of cardiovascular outcomes. However, its association with specific heart failure phenotype in T2DM remains unclear. This study investigates the association between standard deviation of glycemic variability and heart failure phenotypes in T2DM patients.

Objective: This study aims to know the association of standard deviation of glycemic variability with heart failure phenotype in patients with diabetes mellitus type 2.

Methods: This cross-sectional study used medical record data from dr. Sardjito General Hospital. The population included in patients with type 2 diabetes mellitus and heart failure from January 2021–2024, with point-of-care glucose data (± 7 days) of at least 3 values over 3 consecutive days from echocardiography. Exclusion criteria were kidney replacement therapy, malignancy, chronic liver disease, and anemia. Glycemic variability (standard deviation) was categorized as high or low based on ROC curve cutoff. Analyses included contingency tables, T-test, and Mann–Whitney U as appropriate, followed by multivariate logistic regression using backward likelihood ratio with variables significant in bivariate analysis. Sample size was determined using a two-proportion hypothesis.

Results: A total of 231 samples were included with the mean age of $60.74 \pm 9,285$ years with male predominant (70,6%). Multivariate analysis using logistic regression showed standard deviation of glycemic variability (SDGV) (OR = 3.659; 95% CI: 1.518-8.820; $p = 0.004$), hypertension comorbid (OR = 0.071; 95% CI: 0.011-0.448; $p = 0.005$), CKD (OR = 3,268; 95% CI: 1.362–7.844; $p = 0.008$), ARB

use (OR = 0.256; 95% CI: 0.102-0.646; $p = 0.004$), and Statin (OR = 14.815; 95% CI: 5.928-37.028; $p < 0.001$) were significantly associated with non-HFpEF. CCB use, MRA use, and other confoundings proved to be insignificant in association with non-HFpEF.

Conclusions: Standard deviation of glycemic variability (SDGV) is associated and predict heart failure phenotype in patients with type 2 diabetes mellitus. Patient with high SDGV were significantly more likely to develop non-HFpEF phenotypes (HFmrEF, HFfrEF) compared to otherwise.

Keywords: Glycemic variability, diabetes mellitus, heart failure phenotype, standard deviation