

UNIVERSITI TEKNOLOGI MARA (UiTM)

**PREVALENCE AND DETERMINATION OF RISK FACTORS
OF HEART FAILURE PRESERVE EJECTION FRACTION
(HFpEF) IN TYPE II DIABETES MELLITUS POPULATION IN
HOSPITAL AL-SULTAN ABDULLAH.**

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AUTHOR'S DECLARATION

I declare that the work in the manuscript was carried out in accordance with the regulation of University Teknologi MARA. It is original and the result of my own work unless otherwise indicated or acknowledged as referenced work. This manuscript has not been submitted to any other academic or non-academic institution for any degree or qualification

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TITLE PAGE

Title

Prevalence and determination of risk factors of Heart Failure Preserve Ejection Fraction (HFpEF) in Type 2 Diabetes Mellitus (T2DM) population in Hospital Al-Sultan Abdullah

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Background: Type 2 diabetes mellitus (T2DM) and heart failure are two entities that have reached epidemic proportions worldwide. It has been shown that the prevalence of preserved ejection fraction heart failure (HFpEF) seems to be increasing due to increasing number of metabolic diseases and T2DM. However, the data on prevalence and risk factors are currently limited, particularly within our population.

Objective: The aim of this study was to determine the prevalence and associated factors of HFpEF amongst T2DM patients attending the Endocrinology & Cardiology clinics in Hospital Al-Sultan Abdullah.

Method: A cross-sectional study on patients with T2DM of more than 18 years of age, from December 2021 to May 2022 was conducted. Baseline demographic data, anthropometric measurements, echocardiography and NTproBNP levels were obtained.

Results: A total of 262 T2DM patients with a mean age of 61 ± 5.4 years were recruited. The prevalence of HFpEF amongst the study population was 21.7% (n=57). Multiple logistic regression analysis revealed that female gender ($p:0.003$, OR: 3.053 (CI, 1.107:5.455), chronic kidney disease ($p:0.001$, OR:3.625(1.537,8.550), anaemia (haemoglobin $<12\text{g/dL}$) ($p:<0.008$ OR:2.952(1.537,6.530) and use of > 3 antihypertensive medications ($p:0.005$, OR:2.612(1.345,5.332) were predictors for HFpEF in the study population.

Conclusions: The prevalence of HFpEF diagnosed with abnormal echocardiography findings and elevated NTproBNP as a surrogate marker, was notable in this group of T2DM patients. Female gender, CKD, low haemoglobin, and hypertension patient on 3 or more antihypertensive are demonstrated to be significant predictors. This study underscores the need for early detection, initiation of the necessary treatment for HFpEF and optimisation of the associated factors.

INTRODUCTION

The prevalence of Type 2 Diabetes Mellitus (T2DM) and heart failure (HF) have reached epidemic proportions, globally creating major challenges to health and social care systems (1) (2). It is a global problem with an estimated prevalence of 38 million worldwide, a number that is steadily increasing with the rising surviving age of the population. It is the most common diagnosis for hospital admission and readmissions amongst patients aged 65 years or older in high-income nations (2). Similarly, HF is an important cause of hospitalisation in Malaysia accounting for about 6%-10% of all acute medical admissions and an important cause of hospital readmissions (3).

Prevention and management of chronic complications in individuals with T2DM have been focused on nephropathy, retinopathy, neuropathy, and atherosclerotic cardiovascular disease (ASCVD) (including ischemic heart disease, stroke, and peripheral vascular disease) (4). However, HF is under-recognised and yet a common complication of diabetes, with a prevalence of up to 22% with an increasing incidence rate (5-7). Definition of heart failure has now evolved, with new classifications, based on the ejection fraction (heart failure with preserved ejection fraction (HFpEF) and heart failure with reduced ejection fraction (HFrEF))(3)

It has been reported that the prevalence of HFpEF is higher compared to HFrEF amongst T2DM patients and has steadily increased over time (8, 9). People with T2DM have a higher risk of developing HF than those without diabetes (10-12) and this is an independent risk factor for development of HF (13). FHF was found to be the most common initial manifestation of cardiovascular disease in individuals with T2DM (5). Studies to determine the prevalence of HFpEF amongst T2DM are scarce. Furthermore, most studies are conducted in European countries amongst Caucasian individuals, which reported varying prevalence of between 13% to 22.9% (8, 14, 15). The discrepancies were probably due to different criteria used to diagnose HFpEF as most studies only looked into echocardiography findings and did not include pro-BNP as a surrogate biomarker.

Among patients with HF, those with diabetes have worse functional NYHA (16-18), worse quality of life (16, 19), more causes of rehospitalisation (20, 21) and worse outcomes (22-24) than patients without diabetes. Therefore, identifying patients who are at high risk by early screening program is important to prevent the progression of the disease and subsequently improve the morbidity and mortality amongst T2DM population. In this high-risk group, early