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Original Article

Effect of Dapagliflozin in Type II Diabetic Patients Presenting with Acute yocardial Infarction and Stage B Heart Failure

Ahmed Gamal Darwish*; Ahmed AL-HABBAA; Ahmad Mohammad Hassaan;

[1] Department of Cardiology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt.

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*Corresponding author

Email: a.gamal2001@gmail.com

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Abstract

Background: Patients with type II diabetes mellitus (T2DM) and acute myocardial infarction (AMI) undergoing percutaneous coronary intervention (PCI) are at increased risk of major adverse cardiovascular events (MACE). Sodium-glucose co-transporter 2 (SGLT2) inhibitors like dapagliflozin have demonstrated cardiovascular benefits, yet their early impact post-PCI remains underexplored.

Aim: To evaluate the effect of dapagliflozin on 30-day mortality and MACE in T2DM patients with AMI undergoing PCI and classified as stage B heart failure.

Patients and Methods: This prospective comparative study enrolled 110 T2DM patients with AMI who underwent successful PCI and were classified as stage B heart failure. Patients were divided into two groups: dapagliflozin group (n=55) and control group (n=55). Baseline demographics, comorbidities, echocardiographic parameters, angiographic findings, and 30-day post-discharge outcomes were assessed and compared.

Results: The two groups were matched in age, gender, and comorbidities ($p > 0.05$), except for a higher prevalence of smoking in the control group. Anterior STEMI was the most common presentation. PCI data showed similar use of single drug-eluting stents ($p = 0.6$) and LAD as the most affected vessel. Echocardiographic assessments revealed comparable ejection fraction and diastolic dysfunction between groups. At 30-day follow-up, no significant difference was noted in mortality (3.6% vs. 5.5%), recurrent MI (1.8% vs. 1.8%), stroke (1.8% vs. 1.8%), heart failure symptoms (7.3% vs. 14.5%), or admissions due to heart failure (3.6% vs. 7.3%). No dapagliflozin-related adverse events were observed.

Conclusion: Although this study did not find a statistically significant reduction in early post-discharge cardiovascular events with dapagliflozin in stage B heart failure patients with type 2 diabetes and acute myocardial infarction, previous research indicates a potentially beneficial trend that may become clearer with larger cohorts and extended follow-up. The growing evidence supporting the cardio-renal benefits of SGLT2 inhibitors warrants further investigation into their early use post-AMI.

Keywords: Dapagliflozin; Acute Myocardial Infarction; Percutaneous Coronary Intervention, Type 2 Diabetes Mellitus; Heart Failure; Major Adverse Cardiovascular Events;

INTRODUCTION

Cardiovascular diseases (CVDs) remain the foremost cause of global mortality, accounting for approximately 17.2 million deaths annually. In the Middle East and North Africa (MENA) region alone, over 1.08 million CVD-related deaths were reported in 2015, with ischemic heart disease (IHD) contributing to nearly 600,000 of these fatalities. This substantial burden reflects the urgent need for improved cardiovascular risk management, particularly in vulnerable populations such as patients with type II diabetes mellitus who are at heightened risk for cardiovascular complications, including acute myocardial infarction and heart failure (HF) (1).

Acute coronary syndromes (ACS), including ST-segment elevation and non-ST-segment elevation myocardial infarction, represent a critical subset of cardiovascular emergencies. Prompt recognition and intervention, especially through reperfusion strategies such as percutaneous coronary intervention (PCI), are essential to reduce both mortality and major adverse cardiovascular events (MACE). Despite optimal treatment, the risk of long-term complications, including recurrent ischemic events and HF, remains considerable, necessitating adjunctive therapeutic strategies to enhance cardiovascular outcomes (2).

According to the Fourth Universal Definition of Myocardial Infarction, AMI is diagnosed when there is evidence of acute myocardial injury, typically indicated by a rise and/or fall in cardiac troponin levels, with at least one value above the 99th percentile upper reference limit, alongside clinical signs of ischemia. These may include ischemic symptoms, new ECG changes, imaging confirmation of myocardial damage, or identification of a coronary thrombus. Patients with T2DM often experience atypical presentations of AMI and worse prognoses, which emphasizes the need for tailored interventions in this population (3).

Heart failure is a frequent and serious complication following AMI, significantly impairing prognosis and quality of life. Clinically, HF is characterized by symptoms such as dyspnea, fatigue, and peripheral edema, resulting from structural or functional cardiac abnormalities. These changes lead to impaired cardiac output and/or elevated intracardiac pressures, both at rest and during exertion. Importantly, diabetic patients are particularly susceptible to HF due to a combination of metabolic, hemodynamic, and ischemic insults that contribute to myocardial dysfunction (4).

The American College of Cardiology/American Heart Association (ACC/AHA) classifies heart failure into four progressive stages. Stage B, the focus of this study, comprises individuals with structural heart disease (e.g., reduced ejection fraction, chamber enlargement, wall motion abnormalities) but without signs or symptoms of HF. It also includes patients with elevated biomarkers such as brain natriuretic peptide (BNP) or persistently elevated troponins in the absence of other causes. Identifying and managing patients at this stage is crucial, as it offers a window for early therapeutic intervention to prevent clinical HF (5).

Sodium-glucose co-transporter 2 is an integral protein expressed in the proximal renal tubules, facilitating the reabsorption of filtered glucose. Dapagliflozin, a selective SGLT2 inhibitor, promotes glycosuria and thus improves glycemic control in patients with T2DM. Beyond its glucose-lowering effects, dapagliflozin has shown significant cardioprotective properties, prompting investigation into its use for indications beyond diabetes (6).

Recent randomized clinical trials have demonstrated that SGLT2 inhibitors substantially reduce cardiovascular death and hospitalization for HF, even in patients without diabetes. These benefits appear to extend across a wide spectrum of cardiovascular disease, suggesting mechanisms of action that go beyond glucose control. While the exact pathways are still being explored, their rapid and consistent cardiovascular effects underscore their potential as a cornerstone therapy in cardiometabolic disease (7).

Multiple hypotheses have been proposed to explain the cardioprotective effects of SGLT2 inhibition. These include osmotic diuresis and natriuresis, reduction in preload and afterload, improved ventricular loading conditions, anti-inflammatory effects, enhanced myocardial energy utilization, attenuation of cardiac fibrosis, and reduced sympathetic nervous system activity. Other mechanisms such as improved endothelial function, modulation of adiposity, and inhibition of cardiac remodeling further support their role in cardiovascular health (8).

This study was designed to evaluate the impact of initiating dapagliflozin prior to hospital discharge on 30-day all-cause mortality and major adverse cardiovascular events in type II diabetic patients presenting with acute myocardial infarction, who have undergone percutaneous coronary intervention and are classified as having stage B heart failure according to ACC/AHA guidelines.

PATIENTS AND METHODS

This prospective, single-center, open-label randomized controlled trial was conducted at Sednawy Health Insurance Hospital. A total of 110 patients who presented with acute myocardial infarction and were admitted to the Cardiac Care Unit (CCU) following primary PCI were enrolled. All patients were subsequently classified as having stage B heart failure in accordance ACC/AHA heart failure staging criteria. Our study was guided by the Helsinki declaration principals, and ethical approval was obtained from the Ethics Committee of the Institutional Review Board of the Faculty of Medicine, Al-Azhar University. Written informed consent was obtained from all participants.

The Inclusion Criteria

Eligible participants were; 1) Adults aged 18 years or older with a confirmed diagnosis of type II diabetes mellitus who had not previously been treated with SGLT2 inhibitors. 2) Had presented with ST-elevation or non–ST-elevation myocardial infarction and had undergone successful PCI. 3) Meet the definition of stage B heart failure, characterized by the absence of heart failure symptoms but with; a) structural heart abnormalities (e.g., reduced ejection fraction, ventricular hypertrophy, chamber enlargement, valvular disease), b) evidence of elevated filling pressures which could be confirmed through invasive hemodynamic studies or noninvasive imaging such as Doppler echocardiography. c) with persistently elevated levels of BNP or cardiac troponin in the absence of other causes (e.g., chronic kidney disease) were also included under this category (5).

The Exclusion Criteria

Patients were excluded if they had impaired renal function (estimated glomerular filtration rate <90 mL/min/1.73 m²), a history of recurrent urinary tract infections, cardiogenic shock, or if they had experienced cardiac arrest prior to or during hospitalization. Although some patients had HFmrEF, the initiation of SGLT2i in this subgroup during the acute STEMI phase was not yet universally practiced at the time of study conduct. Moreover, our institutional protocol did not mandate SGLT2i for HFmrEF during hospitalization, and all patients were subsequently discharged with recommendations for guideline-directed outpatient follow-up, ensuring that long-term evidence-based therapies were not withheld. Other exclusion criteria included known hypersensitivity to SGLT2 inhibitors, diagnosis of type I diabetes mellitus, and the presence of metabolic acidosis.

Randomization and Study Groups

Participants were randomly assigned into two groups using the Research Randomizer software. The intervention group (n=55) received dapagliflozin 10 mg once daily, initiated 12 hours post-PCI and continued for 24 hours before hospital discharge, in addition to guideline-directed anti-ischemic therapy (dual antiplatelet therapy, high-dose statin, ACE inhibitors, and beta-blockers). The control group

(n=55) received only the standard anti-ischemic therapy without dapagliflozin.

Outcomes

The primary endpoint of the trial was the incidence of MACE or cardiovascular death within 30 days following AMI. MACE was defined as a composite of all-cause mortality, recurrent myocardial infarction, and cerebrovascular stroke. Secondary endpoints included the assessment of heart failure progression using the New York Heart Association (NYHA) functional classification, frequency of hospitalizations due to heart failure, and the occurrence and severity of post-infarction angina classified according to the Canadian Cardiovascular Society (CCS) system. Additionally, renal function was monitored by measuring changes in glomerular filtration rate to evaluate the renal safety profile of dapagliflozin. Any adverse effects or complications related to dapagliflozin use, such as metabolic acidosis or urinary tract infections, were also systematically recorded.

Data Collection

A structured checklist was used to collect detailed clinical data for all patients, including medical history, examination findings, diagnostic workup (electrocardiography, echocardiography, coronary angiography, and laboratory tests), eligibility criteria, and follow-up data. Outcomes such as major adverse cardiovascular events (MACE), heart failure progression, post-infarction angina, renal function, and potential dapagliflozin-related complications were recorded. Data were securely entered into a computerized database ensuring confidentiality.

Clinical Evaluation

All patients provided written informed consent prior to enrollment. A comprehensive history was taken at first medical contact, documenting demographic data and cardiovascular risk factors including smoking, hypertension (defined as BP >140/90 mmHg per European guidelines) (9), dyslipidemia, prior coronary disease or intervention, and family history of premature ischemic heart disease (10,11). Dyslipidemia was defined by total cholesterol >200 mg/dL or LDL-C >100 mg/dL (11), with LDL-C targets guided by cardiovascular risk stratification per 2019 ESC/EAS guidelines (12). Baseline physical examination including vital signs and local examination was performed for all patients. A 12-lead ECG was obtained within 10 minutes of initial contact and repeated 90 minutes post-intervention to confirm revascularization. Laboratory investigations included random blood glucose, CBC, ABG, renal function tests (eGFR), cardiac biomarkers, and HbA1c.

Coronary Angiography and PCI

All patients underwent primary PCI performed by a high-volume interventional cardiologist. Standard coronary angiograms were obtained in at least two views for each artery prior to intervention. Following PCI, patients were monitored in the cardiac care unit for ST-segment resolution, arrhythmias, and in-hospital mortality.

Echocardiography

Pre-discharge echocardiography was performed using a Vivid e95 ultrasound system (GE Healthcare, 3–8 MHz). Parameters recorded included left ventricular (LV) volumes and ejection fraction (LVEF), regional wall motion abnormalities (RWMA), diastolic function, valvular status, right ventricular function, and LV hypertrophy. Diastolic dysfunction was assessed using an established algorithm combining 2D data and clinical context (13). RWMA was defined as segmental hypokinesis, akinesis, or dyskinesis contrasting with adjacent segments (14).

Medical Therapy and Intervention

All patients received standard guideline-directed medical therapy including dual antiplatelet therapy, high-dose statins, ACE inhibitors, and beta-blockers (15). In the intervention group, dapagliflozin 10 mg daily was initiated 12 hours post-PCI and at least 24 hours before discharge, continuing after hospital stay. Cross-over to dapagliflozin from the control group was permitted if clinically indicated.

Follow-Up and Outcome Assessment

Treatment with dapagliflozin was continued after discharge, and patients were instructed to maintain the same dose throughout the follow-up period, unless contraindications developed. Adherence and persistence were assessed at each follow-up visit through direct patient reporting and medication reconciliation. All patients were followed up for one-month post-discharge. Primary outcomes included the occurrence of MACE (myocardial infarction, stroke, hospitalization for heart failure, or death). Secondary assessments included NYHA heart failure classification, post-infarction angina (graded by the Canadian Cardiovascular Society classification), renal function (eGFR), and adverse events such as urinary tract infection or metabolic acidosis

Statistical analysis

Statistical analysis was performed with SPSS statistical software, version 26 (IBM, Chicago, Illinois, USA). The normality of the data was tested by the Kolmogrov-Smirnov test. Qualitative data were presented as numbers and percentages and were compared by the Chi square test, or Fisher exact test. Quantitative data were presented as mean and standard deviations and were compared by the independent t test or Mann Whitney U test. As a result, the p-value will be considered significant at the level of <0.05

RESULTS

A total number of 110 patients were included in this study. The mean age was 57.15 ± 9.74 years in Dapagliflozin group and 57.44 ± 8.70 years in Control group. Males represented 78.2% and 83.6% in the dapagliflozin group and the control group respectively. The two groups were matched for their age and gender (P> 0.05 for all). The associated comorbidities in the dapagliflozin group included hypertension in 29 cases (52.7%), IHDs in 11 cases (20%), dyslipidaemia in 3 cases (5.5%) and hypothyroidism in 1 case (1.8%). While the associated comorbidities in the control group included hypertension in 31 cases (56.4%), IHDs in 8 cases (14.5%), dyslipidaemia in 4 cases (7.3%), hypothyroidism in 5 cases (9.1%) and ischemic stroke in 1 case (1.8%). There was no statistically significant difference between the two groups in terms of the associated comorbidities (P> 0.05 for all). However, the prevalence of current smoking was significantly higher in the control group (Table 1).

As regards the patterns of ACS, anterior STEMI was the most common clinical diagnosis in the two study groups representing 65.5% and 81.8% in the dapagliflozin group and the control group respectively followed by inferior STEMI in 18.2% and 9.1% in the dapagliflozin group and the control group respectively (P= 0.1) (Table 2).

According to the PCI data, single DES was used in 74.5% and 78.2% in the dapagliflozin group and the control group respectively (P=0.6). The most affected vessel was LAD that was affected in 78.2% and 83.6% in the dapagliflozin group and the control group respectively (P=0.2) (Table 3).

Regarding the echocardiography data, the ejection fraction was 57.15 ± 9.74 % and 57.44 ± 8.70 % in the dapagliflozin group and the control group respectively (p= 0.869). The LV was dilated in 27.3% and 16.4% in the dapagliflozin group and the control group respectively (p= 0.166). In the dapagliflozin group, DD I and DD II were reported in 56.4% and 43.6% respectively while in the control group, DD I and DD II were reported in 47.3% and 52.7% respectively. RWMA was detected in 89.1% and 92.7% in the dapagliflozin group and the control group respectively (p= 0.507). Regarding the associated valvular lesions, mild MR was the most common detected abnormality in the two study groups representing 27.3% and 30.9% in the dapagliflozin group and the control group respectively. RV dimension was normal in both groups while RV function showed Borderline function in one case only in the control group as shown in (Table 4).

There was no statistically significant difference between the dapagliflozin group and the control group regarding the 30 days post discharge outcomes. Mortality was reported in 2 cases (3.6%) and 3 cases (5.5%) in the dapagliflozin group and the control group respectively, MI in 1 case (1.8%) in each group, stroke in 1 case (1.8%) in each group, HF symptoms in 4 cases (7.3%) and 8 cases (14.5%) in the dapagliflozin group and the control group respectively, admission due to HF in 2 cases (3.6%) and 4 cases (7.3%) in the dapagliflozin group and the control group respectively, mild pyuria in 2 cases (3.6%) and 1 case (1.8%) in the dapagliflozin group and the control group respectively. In both groups, class II and class III angina were reported in 3 cases (5.5%) and 1 case (1.8%) respectively. In both groups there was no change regarding Kidney Function state using eGFR at 30 days follow up. There were no complications requiring stopping dapagliflozin treatment (no reported allergies, no metabolic acidosis by ABG follow up at 30d days, no severe urinary tract infection requiring treatment by urine analysis at 30 days follow up (Table 5).

Table 1: Demographic and Baseline data of the studied patients.

Variable		Dapagliflozin group (N= 55)	Control group (N= 55)	Test of sig.
Demographics	Age (years) Males Females	57.15 ± 9.74 43 (78.2%) 12 (21.8%)	57.44 ± 8.70 46 (83.6%) 9 (16.4%)	t = - 0.165 P = 0.81 $\chi 2$= 0.530 P = 0.467
Comorbidities	Hypertension IHDs Dyslipidaemia Hypothyroidism Ischemic stroke	29 (52.7%) 11 (20%) 3 (5.5%) 1 (1.8%) 0 (0%)	31 (56.4%) 8 (14.5%) 4 (7.3%) 5 (9.1%) 1 (1.8%)	$\chi 2$= 0.147 P = 0.702 $\chi 2$= 0.573 P = 0.449 FET= 0.153 P = 0.696 FET= 2.821 P = 0.093 FET= 1.009 P = 0.315
Smoking	No smoking Smoking Ex-smokers	25 (45.5%) 26 (47.3%) 4 (7.3%)	18 (32.7%) 37 (67.3%) 0 (0%)	MC = 7.060 P = 0.029*

Table 2: Analysis of the patterns of ACS in the two study groups

Variable	Dapagliflozin group (N= 55)	Control group (N= 55)	Test of sig.
Anterior STEMI	36 (65.5%)	45 (81.8%)	MC = 10.667 P = 0.154
Inferior STEMI	10 (18.2%)	5 (9.1%)	
Lateral STEMI	1 (1.8%)	1 (1.8%)	
Antero-inferior STEMI	2 (3.6%)	0 (0%)	
Antero-Lateral STEMI	3 (5.0%)	0 (0%)	
Wallen Syndrome	2 (3.6%)	2 (3.6%)	
NSTEMI	0 (0%)	2 (3.6%)	
Evolved anterior	1 (1.8%)	0 (0%)	

Table 3: Analysis of PCI intervention related data in the two study groups

Variable	Dapagliflozin group (N= 55)		Control group (N= 55)	Test of sig.
Number of DES	1 2	41 (74.5%) 14 (25.5%)	43 (78.2%) 12 (21.8%)	χ^2= 0.201 P = 0.654
Vessels	LAD LAD and LCX LAD and RCA LCX OM RCA PTCA LAD	39 (78.2%) 6 (21.8%) 1 (1.8%) 1 (1.8%) 1 (1.8%) 6 (21.8%) 1 (1.8%)	46 (83.6%) 0 (0 %) 1 (1.8%) 1 (1.8%) 0 (0 %) 5 (9.1%) 2 (3.6%)	MC = 8.001 P = 0.238

χ^2: Chi-square test / MC: Monte-Carlo test

Table 4: Analysis of the echocardiographic data in the two study groups

Variable	Dapagliflozin group (N= 55)		Control group (N= 55)	Test of sig.
Ejection fraction (%)	57.15 ± 9.74		57.44 ± 8.70	t = - 0.165 P = 0.869
LVEDD (ml)	50.22 ± 7.16		49.31 ± 6.37	t = 0.704 P = 0.483
LVESD (ml)	36.75 ± 7.85		35.96 ± 6.67	t = 0.563 P = 0.575
LVEDV (ml/m^2)	92.80 ± 30.16		89.09 ± 25.94	t = 0.691 P = 0.491
LVESV (ml/m^2)	48.95 ± 19.16		47.76 ± 16.51	t = 0.347 P = 0.730
RV Function (TAPSE)	21.62 ± 3.11		21.18 ± 3.16	t = 0.730 P = 0.467
LV dimension	Normal Dilated	40 (72.7%) 15 (27.3%)	46 (83.6%) 9 (16.4%)	χ^2= 1.919 P = 0.166
Diastolic dysfunction	DD I DD II	31 (56.4%) 24 (43.6%)	26 (47.3%) 29 (52.7%)	χ^2= 0.910 P = 0.340
RWMA	No Yes	6 (10.9%) 49 (89.1%)	4 (7.3%) 51 (92.7%)	FET = 0.440 P = 0.507
Valvular heart diseases	Mild AR Mild MR Moderate AR Moderate MR Moderate TR	6 (10.9%) 15 (27.3%) 1 (1.8%) 8 (14.5%) 1 (1.8%)	1 (1.8%) 17 (30.9%) 1 (1.8%) 10 (18.2%) 1 (1.8%)	MC = 1.511 P = 0.912
RV dimensions	Normal Dilated	55 (100%) 0 (0%)	55 (100%) 0 (0%)	FET = 0 P = 1
RV Functions	Normal Borderline	55 (100%) 0 (0%)	54 (98.2%) 1 (1.8%)	FET = 1.009 P = 0.315

t: Independent samples t-test/. χ2: Chi-square test. FET: Fischer's exact test. MC: Montecarlo test.

Table 5: Analysis of the outcomes in the two study groups

Variable		Dapagliflozin group (N= 55)	Control group (N= 55)	Test of sig.
Death		2 (3.6%)	3 (5.5%)	FET= 0.210 P = 0.647
MI		1 (1.8%)	1 (1.8%)	FET = 0 P = 1
Stroke		1 (1.8%)	1 (1.8%)	FET = 0 P = 1
HF symptoms		4 (7.3%)	8 (14.5%)	FET= 1.497 P = 0.221
HF admission		2 (3.6%)	4 (7.3%)	FET= 0.705 P = 0.401
Angina	Class II Class III	3 (5.5%) 1 (1.8%)	3 (5.5%) 1 (1.8%)	FET = 0 P = 1
Mild pyuria		2 (3.6%)	1 (1.8%)	FET= 0.343 P = 0.558

DISCUSSION

Ischemic heart disease, particularly myocardial infarction, remains the leading cause of mortality worldwide. Acute MI is typically precipitated by thrombotic occlusion of a coronary artery (16). The standard therapeutic strategy involves early reperfusion through primary percutaneous coronary intervention, aiming to limit myocardial necrosis and improve outcomes. Despite advancements in interventional cardiology, major adverse cardiovascular events continue to occur frequently following acute myocardial infarction. Prognosis is further compromised by comorbidities such as type II diabetes mellitus, chronic kidney disease (CKD), atrial fibrillation, extensive coronary artery disease, low ejection fraction, and older age (17).

Sodium-glucose cotransporter 2 inhibitors (SGLT2i) are oral antidiabetics with proven cardiovascular benefits beyond glycemic control in patients with TIIDM (18). While SGLT2i have demonstrated efficacy in reducing heart failure (HF) progression, their utility in patients with AMI—particularly those in stage B HF according to the ACC/AHA classification—remains underexplored (19). Most prior trials have targeted later stages of HF (C and D), with minimal data on asymptomatic ventricular dysfunction post-AMI, classified as stage B HF (5).

This study evaluated the short-term (30-day) impact of dapagliflozin initiation prior to discharge in diabetic patients with AMI undergoing PCI and classified as stage B HF. A total of 110 TIIDM patients with AMI were enrolled and randomized into two groups: one receiving dapagliflozin (10 mg daily) in addition to standard anti-ischemic and antidiabetic therapy, and the other receiving standard therapy without dapagliflozin.

Baseline demographics showed no significant differences between groups, affirming the effectiveness of randomization. The mean ages were comparable (~57 years), aligning with local data by Elrayes et al., (20) and Ibrahim et al., (21), who reported similar mean ages of CAD onset in Egyptian populations.

Male predominance in our cohort (78.2% and 83.6% in dapagliflozin and control groups, respectively) is consistent with previous studies indicating higher AMI incidence in males (22), likely due to hormonal and anatomical cardiovascular differences. Conversely, Donal et al. reported a female predominance, possibly due to gender-related variations in left ventricular remodeling and estrogen-mediated cardioprotection (23).

Smoking prevalence was substantial in both groups (47.3% vs. 67.3%), reinforcing its strong association with coronary artery disease and adverse cardiovascular events. Trivedi and others have emphasized the dose-dependent relationship between smoking duration and CAD risk, estimating a 2–5-fold increased risk among smokers (24). Similarly, passive smoking also contributes significantly to cardiovascular morbidity (25).

Hypertension affected over half the patients in both groups (52.7% vs. 56.4%), aligning with prior Egyptian studies reporting hypertension prevalence between 56% and 57% among CAD patients (21). International data also show higher hypertension rates in non-STEMI patients, suggesting its role in plaque vulnerability and thrombosis (26).

A prior history of ischemic heart disease (IHD) was reported in 20% of the dapagliflozin group and 14.5% of controls. This aligns with studies by Wahrenberg and others documenting family history in 8–46% of CAD patients, supporting its role as a non-modifiable risk factor (27, 28).

Regarding infarct location, anterior STEMI predominated in both groups (65.5% vs. 81.8%), followed by inferior STEMI. This pattern is consistent with findings by Wasfy et al., (29), who observed similar STEMI distributions in patients receiving dapagliflozin during hospitalization. Despite anterior MI being strongly associated with greater impairment of LV function, the preserved EF values (49–57%) in our cohort may reflect early reperfusion, exclusion of patients with severe LV dysfunction at baseline, and the beneficial effect of optimal medical therapy administered during hospitalization. Moreover, LAD was the most frequently affected vessel in our study (78.2% vs. 83.6%), which is in agreement with Jo et al. and others who identified LAD involvement as a predictor of poor prognosis due to the extent of myocardium at risk (30, 31). However, Aldosari et al. (32), reported regional variation, with LCX being the most affected artery in their Saudi cohort.

Despite the established cardiovascular benefits of SGLT2i in HF and CKD, our study found no statistically significant differences between the dapagliflozin and control groups in 30-day outcomes (mortality, recurrent MI, stroke, HF symptoms, or hospitalization). This finding diverges from previous trials. Elkot et al. demonstrated improved ST resolution and LVEF in patients receiving SGLT2i post-PCI, along with reduced mitral regurgitation (17).

Similarly, Paolisso et al. (18), reported enhanced ST-segment resolution, greater improvements in LVEF, and lower incidence of wall motion abnormalities and mitral regurgitation in the SGLT2i group. Moreover, in a large retrospective cohort of 786 AMI patients, Zhu et al. observed a significantly lower incidence of MACE—including mortality, HF, nonfatal MI, and repeat revascularization—among dapagliflozin users (19). The discrepancy with our findings may relate to the short duration of follow-up (30 days), sample size limitations, or lower event rates.

In terms of safety, SGLT2i may reduce glomerular filtration acutely due to afferent arteriolar vasoconstriction; however, they stabilize renal function in the long term. This renal safety profile has been demonstrated in TIIDM, CKD, and HF with reduced ejection fraction, suggesting dapagliflozin can be safely administered in the peri-AMI period despite contrast exposure during PCI (33).

In-hospital studies by Paolisso and colleagues further underscore the cardioprotective effects of SGLT2i. Chronic users had reduced adverse remodeling, lower in-hospital mortality, arrhythmic burden, and incidence of contrast-induced nephropathy. Adjusted analyses confirmed SGLT2i as independent predictors of reduced MACE and HF admissions (18).

At the mechanistic level, dapagliflozin enhances both microvascular and macrovascular endothelial function compared to other OADs like glibenclamide, even without altering glycemia (34). It also modulates TGF-β/Smad signaling to attenuate myocardial fibrosis, promotes vasodilation via KV7 channel activation, and reduces podocyte inflammation through AMPK-mTOR mediated autophagy (35–37). Additional benefits include improved coronary perfusion, reduced neurohormonal activation, and mitigation of reperfusion injury, ultimately leading to favorable cardiac

remodeling and reversal of myocardial fibrosis (38, 39). These pleiotropic effects extend to renal benefits, including decreased glomerular pressure and increased erythropoietin synthesis, reinforcing SGLT2i's role in optimizing cardiorenal outcomes (40).

Preclinical models support these findings, showing reduced infarct size, arrhythmias, and myocardial fibrosis, with preserved left ventricular function independent of glycemic status (41, 42). These experimental results provide a strong rationale for continued evaluation of dapagliflozin in post-AMI settings.

Conclusions: Although our findings did not demonstrate a statistically significant reduction in early post-discharge adverse cardiovascular outcomes with dapagliflozin initiation in stage B HF patients with TIIDM and AMI, prior studies suggest a favorable trend that may become more evident with larger sample sizes and longer follow-up. The accumulating evidence on the cardio-renal protective mechanisms of SGLT2i justifies further exploration of their early initiation in the context of AMI.

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