

International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
+15878858911
editorial-office@sciformat.ca

ARTICLE TITLE	EFFICACY AND SAFETY OF SGLT2 INHIBITORS IN POST-ACUTE MYOCARDIAL INFARCTION PATIENTS: A SYSTEMATIC REVIEW
DOI	https://doi.org/10.31435/ijitss.4(52).2026.6864
RECEIVED	05 September 2026
ACCEPTED	07 November 2026
PUBLISHED	13 November 2026
LICENSE	The article is licensed under a **Creative Commons Attribution 4.0 International License.**

© The author(s) 2026.
This article is published as open access under the Creative Commons Attribution 4.0 International License (CC BY 4.0), allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

EFFICACY AND SAFETY OF SGLT2 INHIBITORS IN POST-ACUTE MYOCARDIAL INFARCTION PATIENTS: A SYSTEMATIC REVIEW

Jakub Sokołowski
Medical University of Silesia, 40-055 Katowice, Poland
ORCID ID: 0009-0008-7031-5311

Kalina Światlak
Medical University of Silesia, 40-055 Katowice, Poland
ORCID ID: 0009-0007-9406-6519

Justyna Trzaskalik
Medical University of Silesia, 40-055 Katowice, Poland
ORCID ID: 0009-0006-8466-0402

Wiktoria Żelazna *(Corresponding Author, Email: wikzel@gmail.com)*
Medical University of Silesia, 40-055 Katowice, Poland
ORCID ID: 0009-0001-8185-4846

Monika Leśniak
Medical University of Silesia, 40-055 Katowice, Poland
ORCID ID: 0009-0004-1400-1263

ABSTRACT

Background: Preventing adverse left ventricular remodeling and heart failure (HF) remains a key challenge after acute myocardial infarction (AMI). This systematic review evaluated the efficacy and safety of early SGLT2 inhibitor initiation in patients with AMI.
Aim: To systematically evaluate the clinical efficacy and safety of SGLT2 inhibitors initiated early after AMI, focusing on heart failure outcomes, mortality, echocardiographic markers of ventricular remodeling, and treatment-related adverse events
Materials and methods: A systematic PubMed search identified 30 eligible studies (including 24 randomized controlled trials and post-hoc analyses) that evaluated SGLT2 inhibitors versus placebo or standard care in adults post-AMI patients. Key outcomes included mortality, HF hospitalizations, echocardiographic parameters, and adverse events
Results: SGLT2 inhibitors (predominantly empagliflozin 10 mg or dapagliflozin 10 mg daily) were typically initiated within 72 h to 14 days post-MI. While all-cause mortality was comparable to that of placebo across the included studies, SGLT2 inhibitors significantly reduced HF-related endpoints. Landmark evidence (EMPACT-MI) demonstrated a 22% reduction in first HF hospitalization or HF death (HR 0.78; 95% CI 0.62–0.98; P=0.031) and a 31% reduction in total cumulative HF events (RR 0.69; 95% CI 0.51–0.93; P=0.015), irrespective of baseline diabetes or chronic kidney disease status. Most trials also showed favorable impacts on left ventricular remodeling parameters (LVEF and GLS). The therapy exhibited high tolerability, with severe adverse events (ketoacidosis, hypoglycemia, and renal impairment) occurring in <0.1% of patients, similar to the placebo.
Conclusion: Early post-AMI initiation of SGLT2 inhibitors is safe and significantly mitigates the risk of HF hospitalization and cumulative adverse cardiac events, supporting their integration into post-infarction therapeutic regimens.

KEYWORDS

Acute Myocardial Infarction, SGLT2 Inhibitors, Left Ventricular Remodeling, Heart Failure Hospitalization

CITATION

Sokołowski, J., Światlak, K., Trzaskalik, J., Żelazna, W., & Leśniak, M. (2026). Efficacy and safety of SGLT2 inhibitors in post-acute myocardial infarction patients: A systematic review. *International Journal of Innovative Technologies in Social Science*, 4(52). https://doi.org/10.31435/ijitss.4(52).2026.6864

COPYRIGHT
© The author(s) 2026. This article is published as open access under the Creative Commons Attribution 4.0 International License (CC BY 4.0), allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

1. Introduction

Despite remarkable advances in early reperfusion strategies and evidence-based pharmacotherapy, acute myocardial infarction (AMI) continues to be one of the leading causes of cardiovascular mortality and disability worldwide. Improvements in primary percutaneous coronary intervention (PCI), dual antiplatelet therapy, high-intensity lipid-lowering treatment, and neurohormonal blockade have substantially reduced early mortality; however, long-termprognosis remains limited by the development of adverse left ventricular remodeling and subsequent heart failure (HF). HF remains one of the most frequent complications following myocardial infarction (MI) and is associated with recurrent hospitalizations, reduced quality of life, and increased cardiovascular mortality. Consequently, preventing ventricular remodeling has become one of the principal therapeutic objectives in contemporary postinfarction management [1,2]

The biological response to MI extends far beyond the death of ischemic cardiomyocytes. Coronary occlusion initiates a highly coordinated cascade of inflammatory activation, oxidative stress, endothelial dysfunction, mitochondrial injury, and neurohormonal stimulation, involving both the sympathetic nervous system and the renin–angiotensin–aldosterone system (RAAS). Although these mechanisms are essential for infarct healing, their prolonged activation promotes maladaptive myocardial remodeling, characterized by interstitial fibrosis, ventricular dilatation, increased wall stress, progressive systolic dysfunction, and ultimately the development of chronic HF. Importantly, despite optimal guideline-directed therapy, residual cardiovascular risk remains considerable, suggesting that currently available treatments are insufficient to fully prevent post-infarction structural remodeling [1,3].

Originally developed as glucose-lowering agents for patients with type 2 diabetes mellitus (T2DM), sodium glucose cotransporter-2 (SGLT2) inhibitors have rapidly emerged as one of the most important therapeutic advances in cardiovascular medicine. Large cardiovascular outcome trials have consistently demonstrated that these agents substantially reduce hospitalization for heart failure, slow the progression of chronic kidney disease (CKD), and improve cardiovascular outcomes, irrespective of diabetic status. These findings fundamentally changed international treatment recommendations, positioning SGLT2 inhibitors among the four foundational therapies for heart failure with reduced ejection fraction and expanding their indications far beyond glucose control [4,5].

The remarkable cardiovascular benefits of SGLT2 inhibitors cannot be explained solely by their antihyperglycemic properties. Increasing evidence indicates that these drugs exert a broad spectrum of pleiotropic effects, involving multiple molecular and cellular pathways. In addition to inducing osmotic diuresis and natriuresis, SGLT2 inhibitors improve myocardial energetic efficiency through enhanced ketone body utilization, reduce intracellular sodium and calcium overload by inhibiting the cardiac sodium hydrogen exchanger (NHE-1), attenuate oxidative stress, suppress inflammatory signaling, improve endothelial function, and limit myocardial fibrosis. Experimental studies have demonstrated favorable effects on mitochondrial integrity, vascular stiffness, myocardial metabolism, and cardiomyocyte survival following ischemia-reperfusion injury, suggesting that SGLT2 inhibitors directly modify the mechanisms responsible for adverse cardiac remodeling [4,6].

These observations have generated considerable interest in the potential role of SGLT2 inhibitors in the early post-AMI period. Unlike patients with established chronic heart failure, individuals recovering from AMI represent a unique population in which pharmacological modulation of inflammatory and remodeling pathways may alter the natural history of the disease before irreversible ventricular dysfunction develops. This concept is particularly attractive because the first weeks after MI constitute a critical therapeutic window during which biological processes responsible for long term ventricular remodeling remain highly dynamic and potentially modifiable [7]

Beyond their established effects in chronic heart failure, several experimental and translational studies suggest that SGLT2 inhibitors may attenuate infarct expansion, improve ventricular compliance, reduce myocardial fibrosis, preserve renal function, and favorably influence neurohormonal activation during the recovery phase after myocardial infarction (AMI. Furthermore, their anti-inflammatory and metabolic properties may contribute to improved myocardial healing while simultaneously reducing the risk of subsequent HF. Nevertheless, although the biological rationale supporting the early initiation of SGLT2 inhibitors after MI is compelling, their impact on major clinical outcomes, including cardiovascular mortality, recurrent myocardial infarction, and HF hospitalization, remains unclear. Likewise, concerns regarding hemodynamic stability, renal function, and metabolic complications immediately following AMI continue to warrant careful evaluation [4,5]

In recent years, several randomized clinical trials (RCTs) have investigated the efficacy and safety of early SGLT2 inhibitor administration following AMI, providing important insights into their potential role in contemporary post-infarction management. Although these studies have generally demonstrated favorable effects on surrogate markers of ventricular remodeling and cardiometabolic status, their findings regarding hard clinical endpoints remain inconsistent. Consequently, integrating the currently available evidence is essential to better define the therapeutic value of this drug class in patients recovering from AMI.

Therefore, this review aimed to critically summarize the current evidence regarding the efficacy and safety of SGLT2 inhibitors initiated after AMI, with particular emphasis on their effects on ventricular remodeling, prevention of HF, cardiovascular outcomes, and treatment-related adverse events. In addition, we discuss the biological mechanisms that may explain their cardioprotective properties and identify the current gaps in knowledge that should be addressed in future clinical research.

2. Materials and Methods

To evaluate the impact of SGLT2 inhibitors in post-AMI patients, a systematic literature search was conducted on July 23, 2026, using the PubMed electronic database.

The following search query was applied.

("acute myocardial infarction"[TiAb] OR "AMI"[TiAb] OR "STEMI"[TiAb] OR "NSTEMI"[TiAb] OR "acute coronary syndrome"[TiAb] OR "post-myocardial infarction"[TiAb] OR "recent myocardial infarction"[TiAb]) AND ("Sodium-Glucose Transporter 2 Inhibitors"[Mesh] OR "SGLT2"[TiAb] OR "SGLT2"[TiAb] OR "empagliflozin"[TiAb] OR "dapagliflozin"[TiAb] OR "sotagliflozin"[TiAb] OR "canagliflozin"[TiAb]) AND ("randomized controlled trial"[Publication Type] OR "randomized"[TiAb] OR "placebo"[TiAb]) NOT ("Animals"[Mesh] NOT "Humans"[Mesh]).

As a result of applying this strategy, 121 records were identified. The results were exported to the Rayyan platform, which is dedicated to literature review management and analyses. Using this platform, five duplicates were identified and removed after manual verification by our team. This process identified 116 unique articles that qualified for the next selection stage.

2.1. Inclusion Criteria

The research inclusion criteria were structured based on the PICOS framework (Population, Intervention, Comparison, Outcome, Study design), in accordance with the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The selected articles aimed to answer the following research question: "What are the efficacy and safety of SGLT2 inhibitors compared to placebo or standard care in terms of improving left ventricular function and reducing all-cause mortality, cardiovascular mortality, and hospitalization rates in adult patients following an acute myocardial infarction?"

The main inclusion criteria were as follows: (1) clinical, cohort, or case-control studies; (2) a population of adult patients over the age of 18 years with a confirmed history of acute myocardial infarction (including STEMI and NSTEMI), regardless of their type 2 diabetes (DM) status; (3) documented SGLT2 inhibitor treatment; (4) inclusion of a control group consisting of adult patients receiving placebo and/or standard care; (5) measurement of left ventricular ejection fraction (LVEF) and/or other structural/functional echocardiographic parameter changes during treatment; and (6) reporting of adverse event rates as well as the incidence of all-cause mortality, cardiovascular mortality, and hospitalization rates.

The exclusion criteria were as follows: (1) literature reviews, meta-analyses, and case reports; (2) research conducted *in vitro* or on animal models (*in vivo*), as well as studies covering pediatric populations; and (3) cases involving acute coronary syndrome (ACS) or unstable angina where no actual myocardial infarction occurred.

2.2. Data collection and analysis

The literature selection process was performed in multiple stages, strictly following the PRISMA guidelines. Initially, a five-member team of independent reviewers assessed the titles and abstracts of 116 articles, examining their compliance with the main objective of the study. To ensure maximum objectivity and minimize systematic errors, this stage was conducted independently on the Rayyan platform. Studies that did not meet the basic assumptions of the PICOS protocol were excluded. The next step involved an independent full-text assessment of the remaining publications by all five authors based on detailed inclusion and exclusion criteria. Potential disagreements and conflicting assessments were subjected to joint analysis and discussion until a final consensus was reached. Thirty studies were included in this systematic review. Twenty-four articles were RCTs and post-hoc analyses of the conducted trials. All of these were published after 2020.

2.3. Data Extraction

The following data were extracted from the qualified publications: DOI number, first author's name, year of publication, study type, and clinical trial name; follow-up period; number of participants in the study and control groups; mean age;baseline clinical characteristics of participants (including the presence of T2DM, HF, CKD, and type of AMI); SGLT2 inhibitor type, dosage, and administration protocol (including the time from AMI to drug initiation); type of control used within the control cohort (placebo and/or standard therapy); baseline clinical parameters (including LVEF and other echocardiographic measurements, NYHA class), and mean changes in these parameters over the study period; hospitalization rates and all-cause mortality or cardiovascular mortality; and adverse events.

3. Research results

Nineteen studies investigated empagliflozin, nine focused on dapagliflozin, and the remaining studies (retrospective cohort studies) were not limited to a single active substance. In all articles detailing the dosage regimen, SGLT2 inhibitors were administered at a dose of 10 mg once daily. The time elapsed from AMI onset or clinical stabilization to drug initiation was typically between 72 h and 14 days. Several studies deviated from this protocol, initiating therapy at 24 h[37], 48 h [35], or even prior to PCI [22].

3.1. Impact of SGLT2 inhibitors on mortality risk

All-cause mortality was systematically evaluated in the 11 included studies. The baseline analysis revealed that patients with T2DM exhibited a significantly elevated risk of death compared with non-diabetic individuals (HR 1.70; 95% CI 1.13–2.56). However, empagliflozin therapy did not yield a statistically significant reduction in all-cause mortality,regardless of diabetic status, and no significant interaction was identified between the overall treatment effect and the presence of T2DM [10]. Across the vast majority of the evaluated studies, mortality outcomes between the active treatment and placebo arms remained comparable, showing no statistically significant divergence [1, 2, 26–28]. A notable exception occurred in the post-hoc EMPACT-MI analysis, where both composite endpoints demonstrated statistical significance in favor of the investigational therapy. Specifically, the study established a significant 22% reduction in the risk of first heart failure (HF) hospitalization or HF-related death (HR 0.78; 95% CI 0.62–0.98; P=0.031), alongside an even more pronounced 31% decrease in total cumulative HF hospitalizations or deaths attributable to HF (RR 0.69; 95% CI 0.51–0.93; P=0.015) [11].

3.2. Impact of SGLT2 inhibitors on hospitalization rates

A reduction in hospitalization rates, HF events, or major adverse cardiovascular events (MACE) associated with SGLT2 inhibitor therapy was demonstrated in two RCTs [9, 29] and a retrospective cohort study [32]. In the EMPACT-MI trial, the authors highlighted a prolonged time to first hospitalization in patients treated with empagliflozin compared with placebo [8], while Hernandez et al. [11], in their post-hoc analysis, additionally reported a reduced rate ratio (RR) for total HF hospitalization. This protective effect persisted irrespective of the baseline LVEF, presence of congestion, or both [13].

One potential mechanism underlying these clinical benefits was provided by Deng et al. [31] in a prospective observational study utilizing propensity score matching in elderly patients post AMI. The authors observed a decreased risk of malignant ventricular arrhythmias during hospitalization in the dapagliflozin arm than in the standard therapy arm.

A critical consideration in interpreting the findings of SGLT2 inhibitor trials is the confounding impact of T2DM and CKD on the frequency of hospitalizations. Subsequent post-hoc analyses of the EMPACT-MI trial [14, 17, 19] demonstrated that the favorable impact of these agents on hospitalization rates occurred independently of the baseline T2DM or CKD status.

Conversely, some RCTs reported no significant differences between cohorts in terms of hospitalization rates or MACE risk [10, 16, 34, 35]. Similar findings were described by Daoulah et al. [30] and Chen et al. [33] in their retrospective cohort studies. Notably, the latter study highlighted a significant reduction in HF-related rehospitalizations, despite the absence of differences in hospitalizations for other causes.

3.3. Changes in echocardiographic parameters

A positive effect of SGLT2 inhibitor therapy on echocardiographic parameters compared with placebo or standard care was demonstrated in several RCTs and their post-hoc analyses [10, 22, 25, 27, 29, 35, 36] as well as in retrospective studies [32]. Post-hoc analysis of the EMMY trial [24] further revealed that the therapeutic efficacy of empagliflozin was independent of sex.

In contrast, two RCTs failed to show significant improvements in left ventricular systolic or diastolic function [15, 34]. The DACAM trial [23] demonstrated a reduction in left ventricular mass index (LVMI) without a concomitant benefit in LVEF recovery. Similarly, the results of the DAPA-STEMI trial [16, 28] indicated no significant differences in biomarkers of myocardial fibrosis.

3.4. Differences based on T2DM status

Most of the evaluated studies enrolled participants regardless of their baseline T2DM status. Four studies (including three RCTs) restricted inclusion to patients with diabetes [26, 29, 33, 34], whereas four studies excluded patients with diabetes [9, 22, 23, 35]. In the former group, only one study reported clinical improvements in mortality, hospitalization rates, or echocardiographic parameters [26]. Notably, in the non-diabetic cohort, the evidence was more nuanced, leaning toward the overall beneficial therapeutic effect of SGLT2 inhibitors.

3.5. Adverse events of SGLT2 inhibitors

Detailed data regarding adverse events were reported in three studies [8,9,10]. In the vast majority of these cases, the overall incidence of adverse events in the intervention group was comparable to that observed in the placebo group, demonstrating no significant increase in the overall risk associated with SGLT2 inhibitor therapy. The specific adverse events reported were exceptionally rare, occurring at a rate of less than 0.1%, and primarily included diabetic ketoacidosis, hypoglycemic episodes, and acute kidney damage. Furthermore, a single study isolated less frequent occurrences of urinary tract infections, genital fungal infections, and hematomas [10]. Overall, these findings reinforce the favorable safety profile and high tolerability of treatment regimens utilizing SGLT2 inhibitors within the evaluated patient population.

4. Discussion

This systematic review indicates that early initiation of SGLT2 inhibitors after acute myocardial infarction is generally well tolerated and may reduce the risk of subsequent HF hospitalization. However, the available evidence does not demonstrate a consistent reduction in all-cause or cardiovascular mortality rates. The effects on ventricular remodeling were favorable in several studies but remained heterogeneous.

The largest body of evidence was provided by the EMPACT-MI study. Empagliflozin did not significantly reduce the primary composite endpoint of first HF hospitalization or death from any cause [8]. However, a subsequent analysis demonstrated a 22% reduction in first HF hospitalization or HF-related death and a 31% reduction in total recurrent HF hospitalizations or HF-related deaths [11]. This benefit was driven mainly by fewer hospitalizations and remained consistent across patients with reduced LVEF, congestion, or both, regardless of baseline T2DM and CKD status [13, 16, 18]. Thus, the principal clinical benefit appears to be the prevention of HF events rather than mortality.

In the DAPA-MI trial, dapagliflozin improved the hierarchical cardiometabolic composite outcomes in patients without diabetes or chronic heart failure (HF) [9]. Nevertheless, the results were primarily driven by cardiometabolic components rather than cardiovascular death or HF hospitalization. Differences between DAPA-MI and EMPACT-MI may partly reflect baseline risk, as EMPACT-MI enrolled patients at a higher risk of post-infarction HF [8, 9].

Several smaller randomized and observational studies have also suggested reductions in HF hospitalization, MACE, andother cardiovascular events [30, 32, 35, 36]. Dapagliflozin was also associated with fewer malignant ventricular arrhythmias in an observational cohort of elderly patients [30]. In contrast, other studies have found no significant differences in hospitalization or composite cardiovascular outcomes [21, 22, 29, 33, 34]. These discrepancies may result from differences in sample size, patient characteristics, follow-up duration, treatment timing, and endpoint definition.

The effects of SGLT2 inhibitors on ventricular remodeling are similarly inconsistent. Several studies have reported improvements in LVEF, GLS, LV volume, LV mass, and HF biomarkers [10, 24, 27, 28, 31, 34, 35]. In EMMY, empagliflozin initiated within 72 h after PCI reduced NT-proBNP levels and improved selected structural and functional parameters [10]. Subsequent analyses suggested comparable effects in women and men [19, 23] and favorable changes in the left ventricular structure and systolic function [35].

Conversely, EMPRESS-MI did not demonstrate significant improvements in left ventricular volumes or systolic function [14], and other randomized studies have found no consistent benefit in LVEF or diastolic function [21, 22]. DAPA-STEMI also showed no significant effects on myocardial fibrosis markers or ventricular function [15, 27]. Differences in baseline LVEF, infarct characteristics, imaging methods, and follow-up duration may explain these discrepancies. Moreover, changes in surrogate parameters do not necessarily translate to improved clinical outcomes.

Therapy was generally initiated after clinical stabilization, most often within 72 h to 14 days after AMI, although earlier administration was evaluated in several studies [27, 28, 34, 36]. The optimal initiation time remains uncertain because the treatment protocols differ substantially. Therefore, current evidence is most applicable to hemodynamically stable patients following revascularization. The observed benefits in patients with and without T2DM suggest that the effects of SGLT2 inhibitors extend beyond glucose lowering [8, 9, 13, 16].

Early treatment was generally well tolerated by the patients. In EMPACT-MI, serious adverse events occurred at similar rates in the empagliflozin and placebo groups, whereas diabetic ketoacidosis and severe hypoglycemia were rare [8]. DAPA-MI and EMMY also showed no clinically relevant increases in serious adverse events or treatment discontinuation [9, 10]. Nevertheless, detailed safety data are available from only a limited number of studies, and safety in hemodynamically unstable patients remains insufficiently established.

This review had several limitations. The included studies differed in terms of design, baseline risk, infarct type, comorbidities, treatment timing, follow-up duration, and outcome definitions. Several publications were secondary or post-hoc analyses of the same trials, particularly EMPACT-MI and EMMY, and therefore did not represent independent populations [11, 13, 16, 18–20, 23, 35]. Many smaller studies were designed to assess surrogate endpoints and lacked sufficient power to evaluate mortality or HF hospitalization. Observational studies are susceptible to selection bias and residual confounding. Inconsistent safety reporting and the use of a single bibliographic database further limit the conclusions.

Future randomized studies should identify patients who are most likely to benefit from this treatment and determine the optimal timing for treatment initiation. Longer follow-up is also required to establish whether reductions in HF hospitalization and favorable ventricular remodeling ultimately improve the survival rate.

Overall, early initiation of SGLT2 inhibitors after AMI appears to be feasible and safe in clinically stable patients. The most consistent benefit is a reduction in HF hospitalization, particularly among patients at increased risk of post-infarction HF, whereas the effects on mortality and ventricular remodeling remain inconclusive.

5. Conclusions

Early initiation of SGLT2 inhibitors after acute myocardial infarction appears to be a feasible and generally well-tolerated therapeutic strategy in clinically stable patients. Current evidence does not demonstrate a consistent reduction in all-cause or cardiovascular mortality rates. Nevertheless, treatment with empagliflozin or dapagliflozin may reduce first and recurrent HF hospitalizations, particularly in patients at an increased risk of post-infarction HF. Possible benefits regarding MACE and ventricular arrhythmias have also been reported, although these findings remain less consistent and require confirmation in adequately powered randomized trials.

Several studies have demonstrated favorable changes in LVEF, GLS, LV volume, LV mass, and HF-related biomarkers, suggesting a potential effect on post-infarction ventricular remodeling. However, these improvements were not observed in all trials, and their translation into long-term clinical benefits remains uncertain. Differences in study populations, baseline ventricular function, infarct characteristics, imaging protocols, and follow-up durations may partly explain the heterogeneous findings.

The effects of SGLT2 inhibitors were observed in patients with and without T2DM, indicating that their potential cardiovascular benefits extend beyond glucose lowering. Available subgroup analyses also suggest that the reduction in HF events may occur irrespective of the baseline CKD status. However, the optimal time for treatment initiation after AMI has not been established, as administration protocols have ranged from the period before PCI to 14 days after the event.

The overall safety profile was favorable, with similar rates of serious adverse events between the intervention and control groups. Diabetic ketoacidosis, severe hypoglycemia, acute kidney injury, and genitourinary infections were rare. Nevertheless, safety data have been inconsistently reported, and the evidence applies primarily to hemodynamically stable patients rather than those with cardiogenic shock or acute organ dysfunction.

Further randomized studies with standardized endpoints and longer follow-up are required to identify patients who are most likely to benefit, establish the optimal timing of treatment initiation, and determine whether reductions in HF hospitalization and favorable ventricular remodeling ultimately translate into improved survival.

Author Contributions:

Conceptualization, W.Ż, K.Ś.; methodology, K.Ś,, J.T, J.S, W.Ż and M.L; validation, K.Ś and W.Ż.; formal analysis, K.Ś, W.Ż; resources, K.Ś, J.T, J.S, W.Ż and M.L.; data curation,K.Ś, J.T, J.S, W.Ż, M.L; writing—original draft preparation, K.Ś, J.T, J.S, W.Ż. and M.L.; writing—review and editing, K.Ś; visualization, K.Ś, J.T, J.S, W.Ż and M.L.; supervision, K.Ś and W.Ż.; project administration, K.Ś and W.Ż .; funding acquisition, K.Ś, W.Ż. , J.T., J.S, M.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: No new data were created or analyzed in this study.

During the preparation of this work, the authors used Rayyan for the purpose of dedicated literature review management. After using this tool/service, the authors reviewed and edited the content as needed and takes full responsibility for the substantive content of the publication.

Conflicts of Interest: The authors declare no conflicts of the interest.

REFERENCES

1. Byrne RA, Rossello X, Coughlan JJ, Barbato E, Berry C, Chieffo A, Claeys MJ, Dan GA, Dweck MR, Galbraith M, Gilard M, Hinterbuchner L, Jankowska EA, Jüni P, Kimura T, Kunadian V, Leosdottir M, Lorusso R, Pedretti RFE, Rigopoulos AG, Rubini Gimenez M, Thiele H, Vranckx P, Wassmann S, Wenger NK, Ibanez B; ESC Scientific Document Group. 2023 ESC Guidelines for the management of acute coronary syndromes. Eur Heart J. 2023 Oct 12;44(38):3720-3826. https://doi.org/10.1093/eurheartj/ehad191. Erratum in: Eur Heart J. 2024 Apr 1;45(13):1145. https://doi.org/10.1093/eurheartj/ehad870 PMID: 37622654.
2. McDonagh TA, Metra M, Adamo M, Gardner RS, Baumbach A, Böhm M, Burri H, Butler J, Čelutkienė J, Chioncel O, Cleland JGF, Coats AJS, Crespo-Leiro MG, Farmakis D, Gilard M, Heymans S, Hoes AW, Jaarsma T, Jankowska EA, Lainscak M, Lam CSP, Lyon AR, McMurray JJV, Mebazaa A, Mindham R, Muneretto C, Francesco Piepoli M, Price S, Rosano GMC, Ruschitzka F, Kathrine Skibelund A; ESC Scientific Document Group. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. Eur Heart J. 2021 Sep 21;42(36):3599-3726. https://doi.org/10.1093/eurheartj/ehab368 Erratum in: Eur Heart J. 2021 Dec 21;42(48):4901. https://doi.org/10.1093/eurheartj/ehab670. PMID: 34447992.
3. Heusch G. Myocardial ischaemia-reperfusion injury and cardioprotection in perspective. Nat Rev Cardiol. 2020 Dec;17(12):773-789. https://doi.org/10.1038/s41569-020-0403-y Epub 2020 Jul 3. PMID: 32620851..
4. Cowie MR, Fisher M. SGLT2 inhibitors: mechanisms of cardiovascular benefit beyond glycaemic control. Nat Rev Cardiol. 2020 Dec;17(12):761-772. https://doi.org/10.1038/s41569-020-0406-8 Epub 2020 Jul 14. PMID: 32665641.
5. Scheen AJ. Sodium-glucose cotransporter type 2 inhibitors for the treatment of type 2 diabetes mellitus. Nat Rev Endocrinol. 2020 Oct;16(10):556-577. https://doi.org/10.1038/s41574-020-0392-2 Epub 2020 Aug 27. PMID: 32855502.
6. Lopaschuk GD, Verma S. Mechanisms of Cardiovascular Benefits of Sodium Glucose Co-Transporter 2 (SGLT2) Inhibitors: A State-of-the-Art Review. JACC Basic Transl Sci. 2020 Jun 22;5(6):632-644. https://doi.org/10.1016/j.jacbts.2020.02.004 PMID: 32613148; PMCID: PMC7315190.
7. Tavecchia GA, Gualini E, Sacco A, Oliva F. The role of sodium-glucose co-transporter 2 inhibitors in myocardial infarction: available evidence and future perspectives. Eur Heart J Suppl. 2024 Apr 17;26(Suppl 1):i84-i87. https://doi.org/10.1093/eurheartjsupp/suae008 PMID: 38867868; PMCID: PMC11167973.
8. Butler J, Jones WS, Udell JA, Anker SD, Petrie MC, Harrington J, Mattheus M, Zwiener I, Amir O, Bahit MC, Bauersachs J, Bayes-Genis A, Chen Y, Chopra VK, Figtree G, Ge J, Goodman SG, Gotcheva N, Goto S, Gasior T, Jamal W, Januzzi JL, Jeong MH, Lopatin Y, Lopes RD, Merkely B, Parikh PB, Parkhomenko A, Ponikowski P, Rossello X, Schou M, Simic D, Steg PG, Szachniewicz J, van der Meer P, Vinereanu D, Zieroth S, Brueckmann M, Sumin M, Bhatt DL, Hernandez AF. Empagliflozin after Acute Myocardial Infarction. N Engl J Med. 2024 Apr 25;390(16):1455-1466. https://doi.org/10.1056/NEJMoa2314051 Epub 2024 Apr 6. PMID: 38587237.
9. James S, Erlinge D, Storey RF, McGuire DK, de Belder M, Eriksson N, Andersen K, Austin D, Arefalk G, Carrick D, Hofmann R, Hoole SP, Jones DA, Lee K, Tygesen H, Johansson PA, Langkilde AM, Ridderstråle W, Parvaresh Rizi E, Deanfield J, Oldgren J. Dapagliflozin in Myocardial Infarction without Diabetes or Heart Failure. NEJM Evid. 2024 Feb;3(2):EVIDoa2300286. https://doi.org/10.1056/EVIDoa2300286 Epub 2023 Nov 11. PMID: 38320489.
10. von Lewinski D, Kolesnik E, Tripolt NJ, Pferschy PN, Benedikt M, Wallner M, Alber H, Berger R, Lichtenauer M, Saely CH, Moertl D, Auersperg P, Reiter C, Rieder T, Siller-Matula JM, Gager GM, Hasun M, Weidinger F, Pieber TR, Zechner PM, Herrmann M, Zirlik A, Holman RR, Oulhaj A, Sourij H. Empagliflozin in acute myocardial infarction: the EMMY trial. Eur Heart J. 2022 Nov 1;43(41):4421-4432. https://doi.org/10.1093/eurheartj/ehac494 PMID: 36036746; PMCID: PMC9622301.
11. Hernandez AF, Udell JA, Jones WS, Anker SD, Petrie MC, Harrington J, Mattheus M, Seide S, Zwiener I, Amir O, Bahit MC, Bauersachs J, Bayes-Genis A, Chen Y, Chopra VK, A Figtree G, Ge J, G Goodman S, Gotcheva N, Goto S, Gasior T, Jamal W, Januzzi JL, Jeong MH, Lopatin Y, Lopes RD, Merkely B, Parikh PB, Parkhomenko A, Ponikowski P, Rossello X, Schou M, Simic D, Steg PG, Szachniewicz J, van der Meer P, Vinereanu D, Zieroth S, Brueckmann M, Sumin M, Bhatt DL, Butler J. Effect of Empagliflozin on Heart Failure Outcomes After Acute Myocardial Infarction: Insights From the EMPACT-MI Trial. Circulation. 2024 May 21;149(21):1627-1638. https://doi.org/10.1161/CIRCULATIONAHA.124.069217 Epub 2024 Apr 6. PMID: 38581389; PMCID: PMC11115458.
12. Erlinge D, James S, Deanfield J, Eriksson N, de Belder M, Alchay M, Austin D, Jones DA, Ravn-Fischer A, Sederholm Lawesson S, Shah N, Strange JW, Szummer K, Ridderstråle W, Parvaresh Rizi E, Langkilde AM, Johansson PA, McGuire DK, Oldgren J, Storey RF. Cardiometabolic outcomes with dapagliflozin after myocardial infarction by baseline ejection fraction: DAPA-MI. ESC Heart Fail. 2025 Dec;12(6):4184-4193. https://doi.org/10.1002/ehf2.15420 Epub 2025 Sep 16. PMID: 40958495; PMCID: PMC12719873.

13. Fioretti F, Butler J, Udell JA, Schuyler Jones W, Petrie MC, Harrington J, Mattheus M, Bauersachs J, Bayes-Genis A, Goodman SG, Gasior T, Januzzi JL, Lopes RD, Ponikowski P, Rossello X, Schou M, van der Meer P, Vinereanu D, Zieroth S, Brueckmann M, Sumin M, Bhatt DL, Hernandez AF, Anker SD. Empagliflozin after myocardial infarction with or without diabetes and chronic kidney disease: Insights from EMPACT-MI. ESC Heart Fail. 2025 Dec;12(6):3940-3952. https://doi.org/10.1002/ehf2.15393 Epub 2025 Sep 14. PMID: 40947857; PMCID: PMC12719805.

14. Carberry J, Petrie MC, Lee MMY, Stanley B, Brooksbank KJM, Campbell RT, Good R, Jhund PS, Kellman P, Lang NN, Lindsay MM, Mangion K, Gardner RS, Mark PB, Meyer B, O'Donnell J, Orchard V, Shaukat A, Watkins S, McConnachie A, McMurray JJV, Welsh P, Sattar N, Berry C, Docherty KF. Empagliflozin to prevent worsening of left ventricular volumes and systolic function after myocardial infarction (EMPRESS-MI). Eur J Heart Fail. 2025 Mar;27(3):566-576. https://doi.org/10.1002/ejhf.3560 Epub 2024 Dec 15. PMID: 39675781; PMCID: PMC11955320.

15. Ortega-Paz L, Laudani C, Sionis A, Vidal-Cales P, Arevalos V, Andrea R, Morr CI, De Diego O, Ortega E, Jimenez-Trinidad FR, Dantas AP, Angiolillo DJ, Sabaté M, Ortiz-Pérez JT, Brugaletta S. Effect of DAPAgliflozin on Myocardial Fibrosis and Ventricular Function in Patients with ST-Segment Elevation Myocardial Infarction-DAPA-STEMI Trial. J Cardiovasc Dev Dis. 2025 Jun 11;12(6):220. https://doi.org/10.3390/jcdd12060220 PMID: 40558655; PMCID: PMC12194218.

16. Petrie MC, Udell JA, Anker SD, Harrington J, Jones WS, Mattheus M, Gasior T, van der Meer P, Amir O, Bahit MC, Bauersachs J, Bayes-Genis A, Chopra VK, Januzzi JL, Lopes RD, Ponikowski P, Rossello X, Schou M, Zieroth S, Brueckmann M, Sumin M, Bhatt DL, Hernandez AF, Butler J. Empagliflozin in acute myocardial infarction in patients with and without type 2 diabetes: A pre-specified analysis of the EMPACT-MI trial. Eur J Heart Fail. 2025 Mar;27(3):577-588. https://doi.org/10.1002/ejhf.3548 Epub 2024 Dec 26. PMID: 39725521; PMCID: PMC11955319.

17. Mozawa K, Kubota Y, Hoshika Y, Tara S, Tokita Y, Yodogawa K, Iwasaki YK, Yamamoto T, Takano H, Tsukada Y, Asai K, Miyamoto M, Miyauchi Y, Kodani E, Maruyama M, Tanabe J, Shimizu W. Empagliflozin confers reno-protection in acute myocardial infarction and type 2 diabetes mellitus. ESC Heart Fail. 2021 Oct;8(5):4161-4173. https://doi.org/10.1002/ehf2.13509 Epub 2021 Jul 7. PMID: 34235875; PMCID: PMC8497324.

18. Aggarwal R, Bhatt DL, Hernandez AF, Anker SD, Harrington J, Jones WS, Mattheus M, Petrie MC, Steubl D, Sumin M, Thanam V, Udell JA, Butler J. Secondary analysis of the EMPACT-MI trial reveals cardiovascular-kidney efficacy and safety of empagliflozin after acute myocardial infarction. Nat Cardiovasc Res. 2025 Jun;4(6):761-772. https://doi.org/10.1038/s44161-025-00657-7 Epub 2025 Jun 13. PMID: 40514435; PMCID: PMC12170341.

19. Sourij C, Aziz F, Tripolt NJ, Siller-Matula J, Pferschy PN, Kolesnik E, Wallner M, Eyileten C, Postula M, Oulhaj A, Sourij H, von Lewinski D; EMMY study group. Effects of empagliflozin in women and men with acute myocardial infarction: An analysis from the EMMY trial. Hellenic J Cardiol. 2024 Jan-Feb;75:3-8. https://doi.org/10.1016/j.hjc.2023.05.007 Epub 2023 May 24. PMID: 37236318.

20. Benedikt M, Mangge H, Aziz F, Curcic P, Pailer S, Herrmann M, Kolesnik E, Tripolt NJ, Pferschy PN, Wallner M, Zirlik A, Sourij H, von Lewinski D. Impact of the SGLT2-inhibitor empagliflozin on inflammatory biomarkers after acute myocardial infarction - a post-hoc analysis of the EMMY trial. Cardiovasc Diabetol. 2023 Jul 5;22(1):166. https://doi.org/10.1186/s12933-023-01904-6 PMID: 37407956; PMCID: PMC10324245.

21. Khani E, Aslanabadi N, Mehravani K, Rezaei H, Afsharirad H, Entezari-Maleki T. Empagliflozin Effects in Patients with ST-Elevation Myocardial Infarction Undergoing Primary PCI: The EMI-STEMI Randomized Clinical Trial. Am J Cardiovasc Drugs. 2024 Sep;24(5):673-684. https://doi.org/10.1007/s40256-024-00662-4 Epub 2024 Jul 5. PMID: 38969953.

22. Dayem KA, Younis O, Zarif B, Attia S, AbdelSalam A. Impact of dapagliflozin on cardiac function following anterior myocardial infarction in non-diabetic patients - DACAMI (a randomized controlled clinical trial). Int J Cardiol. 2023 May 15;379:9-14. https://doi.org/10.1016/j.ijcard.2023.03.002 Epub 2023 Mar 6. PMID: 36889650

23. Sourij C, Aziz F, Tripolt NJ, Siller-Matula J, Pferschy PN, Kolesnik E, Wallner M, Eyileten C, Postula M, Oulhaj A, Sourij H, von Lewinski D; EMMY study group. Effects of empagliflozin in women and men with acute myocardial infarction: An analysis from the EMMY trial. Hellenic J Cardiol. 2024 Jan-Feb;75:3-8. https://doi.org/10.1016/j.hjc.2023.05.007 Epub 2023 May 24. PMID: 37236318.

24. Baharvand F, Mehran R, Di Muro FM, Mohammadi A, Aghajankhah M, Parvaneh S, Parsa NA, Hassanipour S, Aboutaleb E, Jenab Y, Aliabadi SB. Empagliflozin in STEMI Patients: A Randomized Controlled Trial on Left Ventricular Recovery and Cardiovascular Outcomes. Am J Cardiovasc Drugs. 2026 Jul 17. https://doi.org/10.1007/s40256-026-00814-8 Epub ahead of print. PMID: 42467386.

25. Shimizu W, Kubota Y, Hoshika Y, Mozawa K, Tara S, Tokita Y, Yodogawa K, Iwasaki YK, Yamamoto T, Takano H, Tsukada Y, Asai K, Miyamoto M, Miyauchi Y, Kodani E, Ishikawa M, Maruyama M, Ogano M, Tanabe J; EMBODY trial investigators. Effects of empagliflozin versus placebo on cardiac sympathetic activity in acute myocardial infarction patients with type 2 diabetes mellitus: the EMBODY trial. Cardiovasc Diabetol. 2020 Sep 25;19(1):148. https://doi.org/10.1186/s12933-020-01127-z PMID: 32977831; PMCID: PMC7519555.

26. Tripolt NJ, Kolesnik E, Pferschy PN, Verheyen N, Ablasser K, Sailer S, Alber H, Berger R, Kaulfersch C, Leitner K, Lichtenauer M, Mader A, Moertl D, Oulhaj A, Reiter C, Rieder T, Saely CH, Siller-Matula J, Weidinger F, Zechner PM, von Lewinski D, Sourij H; EMMY study group. Impact of EMpagliflozin on cardiac function and biomarkers of heart failure in patients with acute MYocardial infarction-The EMMY trial. Am Heart J. 2020 Mar;221:39-47. https://doi.org/10.1016/j.ahj.2019.12.004 Epub 2019 Dec 12. PMID: 31901799. [20]

27. Afsharirad H, Ghaffari S, Javanshir E, Allord S, Khani E, Entezari-Maleki T. Dapagliflozin Effects in Patients With ST-Elevation Myocardial Infarction Undergoing Primary Percutaneous Coronary Intervention: The DAPA-STEMI Randomized Clinical Trial. Am J Ther. 2026 Jul-Aug 01;33(4):e292-e301. https://doi.org/10.1097/MJT.0000000000002077 Epub 2026 Feb 19. PMID: 41711508.

28. Macías-Cervantes HE, Guardado-Mendoza R, González LJ, Bautista-López GR, Hernández-Tizapa K, Carrillo-Torres MÁ, Fernández-Yáñez G, Hinojosa-Gutiérrez LR, Bernal-Ruiz EA, Cárdenas-Muñoz ME, Nava-Cabrera JI, Caporal-Trejo LC, Emigdio-Loeza A, Hernández-González MA, Macías-Cervantes MH. Dapagliflozin in acute myocardial infarction with type 2 diabetes: a randomized clinical trial. Curr Probl Cardiol. 2026 Jul 18;51(10):103401. https://doi.org/10.1016/j.cpcardiol.2026.103401 Epub ahead of print. PMID: 42471097.

29. Daoulah A, Jamjoom A, Arafat AA, Yousif N, Almahmeed W, Arabi A, Panduranga P, Lotfi A, Abdirahman Kahin M, Aloui HM, Kanbr O, Alswuaidi J, Alamro B, Alshehri M, Alharbi W, Alzahrani B, Al Obaikan S, Alshali KZ, Alenezi A, Al Maashani S, Rajan R, Qutub MA, Balghith M, Hassan T, Alqahtani AM, Abdulhabeeb IAM, Ghani MA, Fathey Hussien A, Shawky AM, Elmahrouk Y, Seraj S, Elmahrouk A. Sodium-Glucose Cotransporter 2 Inhibitors as Discharge Medications in Survivors of Acute Myocardial Infarction Complicated by Cardiogenic Shock. Shock. 2026 Jun 30. https://doi.org/10.1097/SHK.0000000000002904 Epub ahead of print. PMID: 42380740.

30. Deng L, Wang J, Deng Y, Huang J, Gu Q, Chen Q, Pan L, Wei J, Wang Q, Sun L. Effect of dapagliflozin on malignant ventricular arrhythmias in elderly after acute myocardial infarction: a propensity score-matched cohort study. Eur J Clin Pharmacol. 2025 Jun;81(6):839-851. https://doi.org/10.1007/s00228-025-03832-8 Epub 2025 Apr 1. PMID: 40167624.

31. Jiang Y, Jia S, Tian D, Qiang H, Zhao H, Chen X, Su X, Jia X. Association of In-Hospital Dapagliflozin Initiation with Favorable left Ventricular Remodeling in Patients with Acute Myocardial Infarction and Heart Failure: A Retrospective Cohort Study. Cardiovasc Drugs Ther. 2026 Jul 1. https://doi.org/10.1007/s10557-026-07904-4 Epub ahead of print. PMID: 42384323.

32. Chen J, Chang J, Shi Q, Li X, Wang L, Zhao H. Cardiovascular protective effect of sodium-glucose cotransporter 2 inhibitors on patients with acute coronary syndrome and type 2 diabetes mellitus: a retrospective study. BMC Cardiovasc Disord. 2023 Oct 7;23(1):495. https://doi.org/10.1186/s12872-023-03542-y PMID: 37805494; PMCID: PMC10559512.

33. Adel SMH, Jorfi F, Mombeini H, Rashidi H, Fazeli S. Effect of a low dose of empagliflozin on short-term outcomes in type 2 diabetics with acute coronary syndrome after percutaneous coronary intervention. Saudi Med J. 2022 May;43(5):458-464. https://doi.org/10.15537/smj.2022.43.5.20220018 PMID: 35537720; PMCID: PMC9280595.

34. Salem HSE, El-Mawardy RM, Zahran ME, Bastawy IM, Aziz MF, Attia AE. Early Dapagliflozin in Non-diabetic Acute Myocardial Infarction Patients Post-PCI: Effects on Cardiovascular Outcomes and Left Ventricular Remodeling (EARLY DAPA-AMI). J Saudi Heart Assoc. 2025 Oct 31;37(4):9. https://doi.org/10.37616/2212-5043.1464 PMID: 41847669; PMCID: PMC12991818.

35. Schwegel N, Strohhofer C, Kolesnik E, Oltean S, Hüttmair A, Pipp C, Benedikt M, Verheyen N, Gollmer J, Ablasser K, Wallner M, Santner V, Tripolt N, Pferschy P, Zechner P, Alber H, Siller-Matula JM, Kopp K, Zirlik A, Aziz F, Sourij H, von Lewinski D. Impact of empagliflozin on cardiac structure and function assessed by echocardiography after myocardial infarction: a post-hoc sub-analysis of the emmy trial. Clin Res Cardiol. 2025 May;114(5):629-639. https://doi.org/10.1007/s00392-024-02523-1 Epub 2024 Sep 16. PMID: 39297940; PMCID: PMC12058928.

36. Quach HT, Nguyen ATK, Dinh BQ, Nguyen TM, Bui HH, Tran TN, Ho TD, Pham AL, Nguyen SV. Favorable association between early initiation of sodium-glucose cotransporter-2 inhibitors and in-hospital prognosis in acute myocardial infarction. PLoS One. 2026 Mar 27;21(3):e0345315. https://doi.org/10.1371/journal.pone.0345315PMID: 41894348; PMCID: PMC13028360.

37. Hoshika Y, Kubota Y, Mozawa K, Tara S, Tokita Y, Yodogawa K, Iwasaki YK, Yamamoto T, Takano H, Tsukada Y, Asai K, Miyamoto M, Miyauchi Y, Kodani E, Maruyama M, Tanabe J, Shimizu W. Effect of Empagliflozin Versus Placebo on Plasma Volume Status in Patients with Acute Myocardial Infarction and Type 2 Diabetes Mellitus. Diabetes Ther. 2021 Aug;12(8):2241-2248. https://doi.org/10.1007/s13300-021-01103-0 Epub 2021 Jul 8. PMID: 34236577; PMCID: PMC8342682.