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EFFECT OF SGLT2 INHIBITORS IN MYOCARDIAL INFARCTION PATIENTS WITH ACUTE LEFT VENTRICULAR DYSFUNCTION

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ABSTRACT

Myocardial Infarction is a major cause of morbidity and mortality due to the frequent occurrence of acute left ventricular (LV) dysfunction that severely complicates prognosis. The conventional treatment, such as nitrates, beta blockers, ACE inhibitors, statins, antiplatelets and anticoagulants, is symptomatic and reduces the possibility of recurrence but does not completely solve the problem of LV dysfunction development. Sodium-glucose cotransporter-2 (SGLT2) inhibitors have become a potential novel therapeutic agent outside of glucose-lowering activity in recent years. These agents induce natriuresis, osmotic diuresis, positive myocardial energetics and hemodynamic stabilization, which may lower preload, afterload and maladaptive LV remodelling. The literature support shows that dapagliflozin and empagliflozin, the SGLT2 inhibitors, reduce hospitalization due to heart failure as well as diastolic performance and LV mass index and decrease major adverse cardiovascular events (MACE) in diabetic and nondiabetic patients. There are also cardioprotective effects such as smaller infarct size, mitigated LV remodelling and greater ejection fraction as seen in studies with post-MI patients. This review shows that SGLT2 inhibitors might be beneficial as an adjunctive treatment in acute MI with LV dysfunction because they have a potent effect on both short and long-term outcomes. Additional expansive clinical research should be designed to determine therapeutic effect on this population.

KEYWORDS

SGLT2 inhibitors, Dapagliflozin and Ventricular dysfunction.

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INTRODUCTION

Definition of myocardial infraction

A heart attack known as a "myocardial infarction" (MI) is brought on by a build-up of plaque in the inner artery walls, which lowers blood flow to the heart and harms the heart muscles by robbing them of oxygen. Shortness of breath, sweating, nausea, vomiting, an irregular heartbeat, anxiety, weakness, weariness, stress and depression are a few of the

signs and symptoms of MI. Other symptoms include chest tightness that extends from the left arm to the neck. (Lei Lu, Min Liu, *et al*)[1].

CAUSES OF MYOCARDIAL INFRACTION

Myocardial infarction is also known as heart attack, happens when coronary arteries become constricted and clogged by plaque, cholesterol and fat deposits, which causes Thrombus that reduce blood flow to the coronary arteries. The illness atherosclerosis causes the arteries' walls to harden (Kosuge M, Kimura, *et al*)[2]. A build-up of fatty molecules in the coronary arteries is what causes a heart attack. Males are more likely than women to get heart attacks, and the risk increases with age and is typically higher beyond the age of 65 (Valensi, *et al*)[3]. Other risk factors for heart attacks include smoking, high blood pressure, raised cholesterol and LDL, a diet high in saturated fats (meats), obesity, inactivity and diabetes (more sugar in the blood) (Devlin, *et al*)[4]. A family history, a spasm of the arterial walls, a narrowing of the arteries, mental stress, vigorous exercise (such as shovelling snow), exposure to extremely cold weather or air, lifting heavy objects upstairs and drug use are additional risk factors for heart attacks (cocaine or amphetamine misuse) (Hamm, *et al*)[5]. The likelihood of subsequent attacks increases after a single attack. As a result, attention should be made to what is consumed, how much sugar and fat is consumed, how often you exercise, and how well you sleep at night.

EPIDEMOLOGY

The incidence of myocardial infarction, or heart attack, varies by age, gender, and geographic location. The World Health Organization (WHO) estimates that each year, 15 million people worldwide experience a heart attack. In the United States, it is estimated that someone has a heart attack every 40 seconds The incidence of myocardial infarction increases with age, and men are at a higher risk than women (Benjamin, *et al*)[6]. However, after menopause, women's risk of heart attack increases and approaches that of men. The incidence of heart attack also varies by race and ethnicity, with some groups, such as African Americans, Hispanics, and American Indians, having a higher risk than others. In terms of geographic location, developed countries tend to have higher rates of heart attack than developing countries, although this gap is narrowing due to changes in lifestyle factors and increasing access to healthcare in many developing countries. It's important to note that while incidence rates can provide important information about the burden of a disease, they may be affected by elements like modifications to diagnostic standards and advancements in medical treatment. Therefore, it's important to interpret incidence rates in the context of other epidemiological measures and factors that may influence them.

According to data from the World Health Organization, cardiovascular diseases, including MI, accounted for 28% of all deaths in India in 2016. The prevalence of MI varies significantly between different parts of India. According to studies, metropolitan areas have a higher prevalence of MI than rural ones. This could be due to lifestyle changes, such as sedentary behaviour, unhealthy eating habits, and increased stress levels, which are more prevalent in urban areas (Chadwick Jayaraj J, *et al*)[7]. Moreover, those who have risk factors like smoking, diabetes, obesity, and hypertension are more likely to get MI. These risk factors are becoming more common in India due to changing lifestyle habits and increasing urbanization. A study conducted in 2016 found that the incidence of MI was higher in males than females, with males accounting for 70% of MI cases in India. The same study also found that the average age of MI patients in India was lower than in Western countries, with a median age of 53 years for males and 56 years for females (Shaikh R, *et al*)[8]. In terms of treatment, there are disparities between urban and rural areas in terms of access to timely and appropriate medical care for MI. In addition, there is also a lack of awareness among the general population regarding the symptoms and risk factors of MI, which can delay seeking medical attention and worsen outcomes. Overall, MI is a significant public health concern in India and efforts are needed to improve awareness, prevention, and timely treatment of this condition, especially in high-risk populations (Kirby JB, *et al*)[9].

PATHOPHYSIOLOGY

Myocardial ischemia results from an imbalance between oxygen supply and demand. Severe atherosclerosis disease with luminal narrowing of 75% does not result in a decrease in blood flow at rest as plaques build up gradually. However, when cardiac demand is increased (by exercise, tachyarrhythmia, etc.), the flow restriction inhibits an increase in oxygen delivery, which results in ischemia and the onset of angina pectoris (Rehman S, *et al*)[10]. The majority of the time, MI is caused by thrombosis along with coronary atherosclerotic disease. Plaque rupture, which happens when a susceptible plaque's fibrous cap ruptures, exposing the necrotic core to the blood and inducing a potent thrombogenic response, is the most frequent cause of thrombosis (Falk E, *et al*)[11]. Despite the fact that substantial obstructive coronary disease affects the majority of MI patients, there are times when plaque rupture and ulceration can happen without an angiographically obstructive lesion. Non-atherosclerotic MI can be caused by blockage or significant constriction of the coronary arteries due to a wide variety of uncommon diseases (Loftus I, *et al*)[12]. There are several recognised causes of MI that don't include atherosclerotic disease, including coronary artery dissection, prosthetic valve thrombosis, endocarditis-related coronary embolism and autoimmune or infectious arteritis. Pathophysiologic elements that lead to the imbalance between supply and demand are typically involved in the pathophysiology of MI. Coronary vasospasm, endothelial dysfunction, and severe anaemia can all significantly reduce the amount of blood and oxygen given to the myocardial, whether there is an obstructive lesion present or not. Contrarily, conditions associated with an increased requirement for myocardial oxygen (such as thyrotoxicosis, aortic stenosis, or cocaine usage) may cause infarction despite a comparatively little drop in supply. (Sheila, *et al*)[13].

SYMPTOMPS OF MYOCARDIAL INFARCTION

There are several signs and symptoms of a heart attack, including angina and chest pain without any prior warning signs. A "silent heart attack" is a mild heart attack that occasionally goes unreported. (Jan Hopkins, *et al*)[14]. The following are indicators of a heart attack: A number of symptoms include high blood pressure or chest pain, as well as tightness, squeezing, burning sensations, aching and heaviness in the chest for more than 10 minutes, pain in the left shoulder, left arm, up into the neck, or along the jawline, shortness of breath, excessive sweating and dizziness, muscles weakness, nausea or vomiting, choking when inhaling smoke, anxiety or stress, a sense of impending doom, and depression. Yet, a quiet heart attack shows no signs (Goodman SG, *et al*)[15].

PREVENTION OF MYOCARDIAL INFARCTION

Knowing one's risk for coronary artery disease and acting sooner to minimise that risk can help someone avoid having a heart attack. limiting dietary fat, cholesterol and salt; quitting smoking; abstaining from tobacco, alcohol, and drugs; keeping an eye on blood pressure; exercising daily; losing weight; taking an aspirin tablet in the event of chest pain; and lowering anxiety or stress. Cardio protective oestrogen treatment is suggested for menopausal women (Benjamin EJ, *et al*)[16].

DIAGNOSIS OF MYOCARDIAL INFARCTION

The Coronary Care Unit and Management routinely treat patients who have myocardial infarctions or heart attacks at the hospital's emergency room. The patient's medical history, physical examination, and blood pressure are determined by the hospital. An ECG or EKG records a heartbeat or heart rhythm in order to find any irregularities in the heart's blood flow. To ascertain the quantity of proteins and fats that could damage the cardiac muscles, a blood test is also performed. Coronary angiography, or an X-ray of the heart and blood arteries, is done to look for coronary artery stenosis. An artery in the leg or arm is used to insert a tiny catheter into the coronary arteries. After that, a contrast agent is given (Patrono C, *et al*)[17].

TREATMENT FOR MYOCARDIAL INFARCTION

Nitrates

For angina pectoris, myocardial infarction, and congestive heart failure, doctors routinely prescribe organic nitrate esters such glyceryl trinitrate, isosorbide dinitrate and isosorbide-5-mononitrate. Organic nitrate esters directly affect the relaxation of vascular smooth muscles, and the dilation of coronary arteries causes the myocardial to receive more oxygen. Dilated peripheral veins and, to a greater extent, peripheral arteries reduce preload and afterload, which lowers myocardial oxygen demand. The suppression of platelet aggregation is another effect that probably has therapeutic value. Despite effects being noticed on the heart and central nervous system, their potential therapeutic utility has not been researched (Ferreira JC, *et al*)[18].

Beta Blockers

A class of drugs known as beta blockers (Atenolol, propranolol) is frequently prescribed for the treatment of myocardial infarction (heart attack). In myocardial infarction, beta blockers work by preventing the heart's sympathetic nervous system from doing its job. The sympathetic nervous system becomes active during a heart attack, which may cause a rise in blood pressure, heart rate, and cardiac muscle contractility. These consequences may put the heart under more strain and exacerbate the harm a heart attack has done. The beta-adrenergic receptors in the heart, which are triggered by the sympathetic nervous system, are blocked by beta blockers. This causes a drop-in heart rate and a weakening of the force by contracting heart muscle and decrease in blood pressure (Boudonas GE, *et al*)[19].

HMG-COA Reductase Inhibitors

The most commonly used drugs are mainly Simvastatin and Rosuvastatin. A class of medications known as HMGC0-A inhibitors targets the enzyme Hydroxy methyl glutaryl-coenzyme A (HMG-CoA) reductase, which is essential for the liver's manufacture of cholesterol. These medications can decrease the quantity of cholesterol produced in the liver by blocking this enzyme, which lowers levels of LDL (low-density lipoprotein), or "bad" cholesterol. This inhibition causes the liver cells to absorb more LDL cholesterol from the circulation, lowering the level of LDL cholesterol in the blood. This can aid in preventing the artery plaque build-up that can result in heart disease and stroke. By reducing the level of LDL cholesterol in the blood, HMG-CoA inhibitors can help prevent the formation of plaques in the arteries, including the coronary arteries. This can reduce the risk of blockages that can lead to myocardial infarction (Munekazu Yamakuchi, *et al*)[20].

ACE Inhibitors

The four ACE inhibitors that are most frequently used are Captopril, Enalapril, Mesopril, and Lisinopril. By lowering peripheral vascular resistance without correspondingly raising cardiac output, heart rate, or contractility, ACE inhibitors lower blood pressure (Przyklenk K, *et al*)[21]. These medications prevent the enzyme ACE from breaking down the potent vasoconstrictor angiotensin I into angiotensin II. Bradykinin, a peptide that boosts blood vessel production of nitric oxide and prostacyclin, is broken down by ACE as well. Prostacyclin and nitric oxide are both powerful vasodilators. By lowering circulating angiotensin II levels, vasodilation of both arterioles and veins occurs as a result of lessened vasoconstriction (from decreased levels of angiotensin II) and enhanced vasodilation (from increased bradykinin) (Pfeffer MA, *et al*)[22].

Diuretics

Diuretics are frequently prescribed to treat heart failure and acute myocardial infarction (MI) patients in order to alleviate the symptoms of fluid overload, such as weight gain, edoema, and shortness of breath. Diuretics' main mode of action in MI patients is to enhance sodium and water excretion from the body, which lowers fluid volume and preload. They include loop diuretics, thiazide diuretics, and potassium-sparing diuretics, all of which have slightly distinct mechanisms of action (Raftery EB, *et al*)[23]. Loop diuretics like furosemide and bumetanide suppress the Na-K-2Cl cotransporter in the thick ascending limb of the loop of Henle, increasing sodium, chloride, and water excretion. Thiazide diuretics, such as hydrochlorothiazide and chlorthalidone, function on the distal convoluted tubule to improve sodium and water excretion by inhibiting the Na-Cl

cotransporter. Two potassium-saving diuretics, spironolactone and eplerenone, stop aldosterone from functioning in the collecting duct, lowering sodium absorption and potassium output. In addition to their diuretic effects, loop diuretics help improve hemodynamic in MI patients by lowering left ventricular filling pressure, increasing cardiac output and reducing pulmonary congestion. It should be highlighted that diuretics should be used with caution in MI patients since severe diuresis can lead to hypotension, electrolyte abnormalities, and impaired renal function (Roe, *et al*)[24].

Calcium channel blockers

Nifedipine and felodipine are the calcium channel blockers that are most frequently utilised. When the myocardium contracts and smooth muscle remains toned, it is mostly due to the intracellular calcium concentration. Calcium channel antagonists bind to L-type calcium channels in the heart and in the smooth muscle of the coronary and peripheral arteriolar vessels, preventing calcium from moving inward. Vascular smooth muscle relaxes as a result, mostly widening arterioles. Drugs that inhibit calcium channels do not widen veins. This causes the heart rate to decrease and the myocardium's demand for oxygen to decrease (Held P H, *et al*)[25].

Anticoagulants

Anticoagulation therapy plays an important role in the management of myocardial infarction (MI). In MI, a blood clot forms inside one of the coronary arteries, which leads to a blockage and deprives the heart muscle of oxygen-rich blood. Anticoagulation therapy helps to prevent the formation of new blood clots and reduce the risk of further complications (Deepak L, *et al*)[26]. Anticoagulants, such as heparin and low molecular weight heparins (LMWH), are often used in the acute setting to prevent further clot formation and promote reperfusion (restoration of blood flow) to the affected area of the heart. MI patients are at an increased risk of stroke due to blood clots that may dislodge and travel to the brain. Anticoagulation therapy may be used to reduce this risk (Kupo P, *et al*)[27].

Anti-Platelets

The primary antiplatelet agents used in MI are aspirin and P2Y12 inhibitors, such as clopidogrel, prasugrel and ticagrelor. The cyclooxygenase-1 (COX-1) enzyme, which is necessary for the creation of thromboxane A2 (TXA2), a strong platelet activator, is irreversibly inhibited by aspirin. P2Y12 inhibitors work by preventing platelets from activating and aggregating by blocking the adenosine diphosphate (ADP) receptor. Dual antiplatelet therapy (DAPT) with aspirin and a P2Y12 inhibitor is recommended for the treatment of acute coronary syndromes (ACS), including ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI) (Bossard M, *et al*)[28]. DAPT has been shown to reduce the incidence of mortality, stroke, and recurrent MI in people with ACS. High-risk ACS patients undergoing percutaneous coronary intervention may additionally take DAPT in addition to glycoprotein IIb/IIIa inhibitors such abciximab, eptifibatide, and tirofiban (PCI). These drugs reduce platelet aggregation by blocking the last common pathway and they may also be useful in stent thrombosis prevention. The standard of care for individuals with ACS includes antiplatelet medication, which is also essential to the management of MI as a whole (Ortega-Paz L, *et al*)[29].

ROLE OF SGLT2 INHIBITORS IN MYOCARDIAL INFARCTION

One of the most striking manifestations of coronary artery disease (CAD) is myocardial infarction (MI) (Ojha N, *et al*)[30]. Ischemic heart disease is the leading cause of death globally, and its prevalence is rising. Unlike SGLT1 inhibitors, which act similarly in the intestinal mucosa, sodium glucose cotransporter-2 (SGLT2) inhibitor medicines, also known as gliflozins, alter sodium-glucose transport proteins in the nephron. By removing the glucose from the body directly through the urine, it regulates hyperglycaemia (Shubrook, *et al*)[31]. These medications exhibit favourable effects on both renal and cardiovascular conditions. By causing natriuresis and osmotic diuresis, SGLT2 inhibitors help heart failure patients with volume overload. The intravascular overload and arterial blood pressure are significantly reduced by excessive excretion of sodium and plasma glucose (Hsia DS, *et al*)[32]. In type 2 diabetic mellitus (T2DM) individuals with various cardiovascular risk factors or established atherosclerotic cardiovascular

disease, SGLT2i were assessed for their cardiovascular safety. Patients with atherosclerotic cardiovascular disease were the only ones to benefit from SGLT2i's unexpectedly positive benefits on the rate of major adverse cardiovascular events (MACE), which include cardiovascular events, cardiovascular death, and all-cause mortality. It's interesting to note that, rather than atherothrombotic events, the prevention of heart failure (HF) hospitalisation (reduction of 30%) was the main factor in the decrease in cardiovascular events. A reduction in atherosclerotic risk factors, such as through glucose excretion, is also unlikely to account for the favourable effects on mortality and HF hospitalisation, as diabetes is linked to an increased risk of both heart failure with reduced ejection fraction and heart failure with preserved ejection fraction. In addition, it's believed that diabetics are more likely to have left ventricular (LV) hypertrophy and reduced diastolic performance. The fundamental processes by which SGLT2 inhibitors lower the risk of heart failure in patients with diabetes are not fully known, despite the numerous hypotheses that have been put up. It is plausible that the advantages of SGLT2 inhibitors are caused by favourable haemodynamic and metabolic effects on LV function given the quick decrease in heart failure hospitalisation. LV mass index and diastolic performance in persons with type 2 diabetes improve with SGLT2 inhibitor therapy, according to a number of clinical studies investigating the impact of SGLT2 inhibitors on LV structure and function. Moreover, these sglt2 inhibitors may have positive impacts on endothelial function, vascular wall stiffness, myocardial strain and excess labour, albuminuria, and glomerular filtration rate loss through improved tubuloglomerular feedback. These positive effects may improve ejection fraction (Lytvyn Y, *et al*)[33]. Research on the effects of sglt2 inhibitor use in myocardial infarction with left ventricular failure is sparse, despite the availability of numerous research on cardiovascular efficacy in patients with heart failure. Hence, according to our theory, SGLT2 inhibitors may stop myocardial infarction from getting worse by increasing ejection fraction. In order to evaluate the impact of SGLT2 inhibitors in patients with acute myocardial infarction and left ventricular dysfunction, the current study was conducted.

DRUG PROFILE

Drug name: Dapagliflozin

Descripton: Dapagliflozin is used to treat the hyperglycaemia and lower the chance of cardiac failure by eliminating the glucose through urine and reduces the sodium reabsorption. This medication belongs to the Antidiabetic medication under the class of SGLT2 inhibitors.

IUPAC name: (2S, 3R, 4R, 5S, 6R)-2-[4-Chloro-3-(4-ethoxybenzyl) phenyl]-6-(hydroxymethyl) tetrahydro-2H-pyran-3, 4, 5-triol

Brand name: OXRA**,** FRAXIGA, XIGDUO XR

Molecular formula: C21H25ClO6

MOLECULAR STRUCTURE

MOLECULAR WEIGHT: 408.873g/mol

CLASS: Sodium glucose cotransporter-2 inhibitor

PHARMACOLOGICAL CLASS

Mechanism of action

Dapagliflozin increases urine glucose excretion by lowering renal glucose threshold and reducing glucose reabsorption. Moreover, sodium reabsorption is decreased, and salt supply to the distal tubule is increased. These effects may have an impact on a number of physiological processes, including decreasing the heart's preload and afterload and downregulating sympathetic activity.

Absorption: Bioavailbility: 78%

Peak plasma time: 2hr (fasting); ~3hr (with high fat meal)

Peak plasma concentration can be reduced by up to 50% after a high-fat meal.

Metabolism: Metabolism primarily mediated by UGT1A9

Extensively metabolized, primarily to yield dapagliflozin 3-O-glucuronide

Elimination: Half-life: 12.9hr

Excretion: 75% urine; 21% faeces

Adverse effects: >10%

Renal impairment

Overall (1.8-6.7%)

Age ≥65 yr (3.1-14%)

eGFR 30-60mL/min (8-28.3%)

Age ≥65 yr and eGFR 30-60 mL/min (7-35.1%)

1-10%

Nasopharyngitis (6.3-6.6%), female genital mycotic infections (6.9-8.4%), urinary tract infections (4.3-5.7%), and (3.1–4.2%) Back ache

More frequent urination (2.9–3.8%), Mycotic infections in the male genitalia (2.7-2.8%), Vomiting (2.5-2.8%), Flu (2.3-2.7%), a dyslipidaemia of 2.1% to 5%, diarrhoea (1.9-2.2%), Pain in the extremities (1.7–2%), discomfort during urinating (2.1-2.6%).

Volume depletion

In total (0.6-1.1%), Loop diuretic users (0–9.7%; 1.8–2.5%), Individuals under 65 years of age with moderate renal impairment and a GFR of 30 to 60mL/min (0.9 to 1.9%)

<1%

Hypersensitivity (0.3%)

Post marketing Reports

Rash, ketoacidosis, acute kidney injury, renal impairment, pyelonephritis, urosepsis, necrotizing fasciitis of the perineum, hypoglycaemia, acute renal failure

Warnings

Contraindications

Serious hypersensitivity to dapagliflozin (eg, anaphylaxis, angioedema)

Patients on dialysis

Cautions

Genital mycotic infections are possible; uncircumcised males and individuals with a history of genital mycotic infections are especially vulnerable.

Patients on SGLT2 inhibitors have suffered serious urinary tract infections, including urosepsis and pyelonephritis, that required hospitalisation.

Fournier gangrene, or necrotizing fasciitis of the perineum, which has been linked to SGLT2 inhibitor use. If this condition is suspected, stop taking the SGLT2 inhibitor and begin treatment right away with broad-spectrum antibiotics and, if necessary, surgical debridement. Signs and symptoms include tenderness, redness, or swelling of the genitalia or the area from the genitalia to the rectum.

Intravascular volume contraction

Individuals who have both diabetes and renal impairment may be more prone to hypotension as well as acute kidney injury due to volume depletion. Patients with renal impairment (eGFR 60 mL/min/1.73 m2), low systolic blood pressure, receiving loop diuretics, or who are elderly may experience symptomatic hypotension after beginning.

Intravascular volume contraction can cause renal impairment; before starting treatment, take into account any conditions that could put a patient at risk for acute kidney injury, such as hypovolemia, chronic renal insufficiency, CHF, and concurrent medications (such as NSAIDs, ACE inhibitors, and diuretics); you may want to temporarily stop taking dapagliflozin if you experience decreased oral intake or fluid loss. Keep an eye out for acute kidney injury symptoms and if any appear, stop taking the medication right away and start receiving treatment.

Ketoacidosis

Inhibitors of sodium-glucose cotransporter 2 (SGLT2) raise the danger of ketoacidosis in people with type 1 and type 2 diabetes. Before initiating therapy, consider factors that may predispose patients to ketoacidosis, including pancreatic insulin deficiency from any cause, caloric restriction, and alcohol abuse

To prevent euglycemic ketoacidosis, you should think about temporarily stopping dapagliflozin for at least 3 days before your scheduled surgery.

In other clinical conditions that are known to predispose to ketoacidosis (such as prolonged fasting due to acute sickness or post-surgery), consider monitoring for ketoacidosis and temporarily halting therapy; make sure risk factors for ketoacidosis are eliminated before resuming.

Drug interactions overview

Insulin and insulin secretagogues (such as sulfonylureas) raised the risk of hypoglycaemia; therefore, a lower dose of insulin or an insulin secretagogue may be necessary.

Laboratory testing

A rise in LDL cholesterol over placebo.

Use other ways to monitor glycaemic control in patients using SGLT2 inhibitors because SGLT2 inhibitors increase urinary glucose excretion and can result in positive urine glucose tests.

The 1, 5-AG assay is not advised since it is unreliable to assess glycaemic control in patients

using SGLT2 inhibitors; instead, utilise other techniques to keep track of it.

LITERATURE REVIEW

Milton Packer, Stefan D Anker, *et al* 2021, Heart Failure and Preserved Ejection Fraction A side by side examination of the PARAGON-HF and EMPEROR Preserved trials, A side by-side examination of the pattern of effects in 2 large-scale outcomes trials in patients with HFpEF affords an opportunity to evaluate the benefits of neprilysin inhibition and sodium-glucose cotransporter 2 inhibition using the same end points in the same ejection fraction subgroups in comparable patient populations. The magnitude of the reduction in the risk of serious heart failure outcomes appears to be greater with sodium-glucose cotransporter 2 inhibition than with neprilysin inhibition for most patients with HFpEF.

Mark C Petrie, Subodh Verma, 2020

Effect of Dapagliflozin on Worsening Heart Failure and Cardio Vascular death in Patients with Heart Failure with or without Diabetes without Diabetes. In this exploratory analysis of a randomized trial of patients with HFrEF, dapagliflozin compared with placebo, when added to recommended therapy, significantly reduced the risk of worsening heart failure or cardiovascular death independently of diabetes status.

Stefan D Anker, Javed Butler, 2021, Empagliflozin in Heart Failure with Preserved Ejection Fraction, Empagliflozin reduced the combined risk of cardiovascular death or hospitalization for heart failure in patients with heart failure and a preserved ejection fraction, regardless of the presence or absence of diabetes.

Jay H Shubrook, *et al* 2021, Empagliflozin in the treatment of type2 diabetes, Empagliflozin (along with the other SGLT2 inhibitors) is a novel addition to treatment of type 2 diabetes. Empagliflozin has glycemic and nonglycemic benefits. Glycemic benefits are obvious with evidence based on lowering an HbA1c in an insulin-independent mechanism. Nonglycemic benefits include weight loss, blood pressure lowering, and decreased urinary protein excretion.

Danie S Hsia, Owen Grove and William T Cefalu, 2021, An update on SGLT2 inhibitors for the treatment of diabetes mellitus, SGLT2 inhibitors are the newest class of oral antihyperglycemic agents available to treat patients with type 2 diabetes. Their novel mechanism of action makes these medications an intriguing option for mechanism of action makes these medications an intriguing option for patients throughout the natural history of type 2 diabetes and as a possible adjunct therapy for type 1 diabetes with close supervision. Although there are a wide range of side effects including recently identified episodes of ketoacidosis related to SGLT2 inhibitor use, this class may be a good option in the carefully selected patient. Longer term cardiovascular safety trials are ongoing and will ultimately test the staying power of this class of medications.

Faiez Zannadw, *et al*, 2021 SGLT2 inhibitors in patient with heart failure a study of meta-analysis stated that The effects of empagliflozin and dapagliflozin on hospitalisations for heart failure were consistent in the two independent trials and suggest that these agents also improve renal outcomes and reduce all-cause and cardiovascular death in patients with HFrEF.

Yuviliya livityn, *et al*, 2021 the study of sglt2 inhibition in heart failure, potential mechanisms, clinical applications and summary of clinical trials, which states that sglt2 inhibition may emerge as an effective and safe adjunctive therapy for HF; that promotes hemodynamic stability and helps correct volume overload, while avoiding the risks of volume depletion, independent of effects on hyperglycemia. Nevertheless, the mechanisms responsible for the acute cardioprotective effects of SGLT2 inhibition, such as sodium and water homeostasis and plasma volume regulation must be examined in diverse populations, including in patients with and without T2D, and in those with HFpEF and HFrEF. Furthermore, the therapeutic landscape will continue to evolve with the use of new agents that impact circulating volume, such endothelin-1A receptor antagonists (sodium retention) and ARNI (natriuresis). The diabetes research community will also need to focus on understanding how these various agents interact in combination both in terms of blood pressure, albuminuria and cardiorenal benefits and around the potential for adverse effects.

Pieter Martens MD, *et al*, 2020 Promise of SGLT2 Inhibitors in Heart Failure: Diabetes. Study states that the beneficial pleiotropic effects of SGLT-2 inhibitors within the cardiovascular system, together with their favourable safety profile, make this medication class attractive for the treatment of diabetes in patients with HF as well as cardiovascular diseases in general. As the risk for hypoglycemic episodes is low, SGLT-2 inhibitors might even benefit HF patients in the absence of diabetes because they reduce plasma volume expansion, improve natriuretic and diuretic responses, as well as shift the myocardial metabolism toward more favourable energetics.

Ven G. Lim, MBCHB, *et al*, 2019 study states that long-term oral administration of canagliflozin results in significant reduction in myocardial infarct size, irrespective of glucose lowering or the presence of diabetes. This protection appears not to be mediated via a direct effect of canagliflozin upon the myocardium, but via an intermediate signalling mechanism that has yet to be identified. Our study, therefore, provides new in-sights into the potential cardiovascular benefits ofSGLT2 inhibition and even points to a potential and important translational repurposing of these drugs to reduce cardiovascular mortality in nondiabetic patients.

Ioanna Andreadou, *et al*, 2021 SGLT2 inhibitors reduce infarct size in re perfused ischemic heart and improve cardiac function during ischemic episodes. The study states that the main mechanisms involved in the cardio protection of SGLT2 inhibitors, which may lead to new treatment targets in patients with cardiovascular risk factors. Additionally, the elucidation of the possible cardioprotective mechanisms of SGLT2 inhibitors on the diabetic and on the non-diabetic myocardium increase the likelihood of success in terms of translating cardio protection into the clinical setting for patient benefit.

Pasquale Paolisso, *et al*, in 2021 the study of Outcomes in diabetic patients treated with SGLT2-Inhibitors with acute myocardial infarction states that in-hospital and long-term outcomes in a cohort of T2DM patients admitted with AMI, comparing chronic SGLT2-I therapy versus non-SGLT2-I users. The main findings include: A mitigated negative LV remodelling was detected in patients receiving SGLT2-I compared to non-SGLT2-I ones; the use of SGLT2-I was associated with a lower in-hospital cardiovascular death arrhythmic burden and occurrence of contrast-induced acute kidney injury; in SGLT2-I users the composite endpoint (MACE), as well as, cardiovascular mortality and HF-hospitalization were significantly lower compared to no-SGLT2-I patients; after adjusting for all con-founding factors, the use of SGLT2-I was identified as an independent predictor of reduced MACE occurrence and HF-hospitalization.

NEED FOR THE STUDY

SGLT2 inhibitors are medications that are used to lower blood sugar levels. By directly eliminating glucose through urine.

Apart from hyperglycaemic activity SGLT2 inhibitors have renal and cardio protective mechanism SGLT2 inhibitors acts as cardio protective agent by reducing volume over load through natriuresis and osmotic diuresis that leads to improvement of ejection fraction.

Patient with acute left ventricular dysfunction may worsen to heart failure these drugs have the ability to reduces the chance of getting heart failure.

Myocardial infraction patients with left ventricular dysfunction may worsen to heart failure even though with the use of drugs that improving the heart functioning

The effects SGLT2 inhibitors in heart and kidney were likely influenced by their natriuretic and glycosuric properties.

Excessive excretion of plasma sodium and glucose dramatically lowers intravascular overload and arterial blood pressure.

The beneficial effects of this SGLT2 inhibitor may also be attributed to improvements in endothelial function and vascular wall stiffness, a decrease in myocardial stretch and excess work, and the amelioration of albuminuria and glomerular filtration rate loss through improved tubuloglomerular feedback. Our theory is that SGLT2 inhibitors could stop myocardial infarction from getting worse.

AIM AND OBJECTIVES

AIM

To assess the effects of SGLT2 inhibitors in myocardial infarction patients with acute left ventricular dysfunction.

Objectives

To determine the efficacy of SGLT2 inhibitors on Left Ventricular (LV) Ejection fraction through Echocardiogram (ECHO) assessment in test group (Dapagliflozin 5mg once daily with standard therapy) vs. control group (standard therapy).

To assess the efficacy of SGLT2 inhibitors in improving glycaemic control by the measurement of Glycated Haemoglobin (HbA1c) in test vs. control group.

To assess the safety of drugs in both the study population.

To determine the morbidity and mortality in study population**.**

METHODOLOGY

Study design

Prospective observational study.

Site of study

Department of Cardiology. SRM Medical College Hospital and Research Centre, Kattankulathur, Kancheepuram District, Tamil Nadu.

Study period

6 months from OCT 2022 to MARCH 2023.

Sample size

Minimum of 60 people

Group A: 30 patients will receive standard therapy

Group B: 30 patients will receive standard therapy+ dapagliflozin

Ethical issues

None

Inclusion criteria

Diabetic patients with newly diagnosed MI and acute LV dysfunction of both genders aged above 18 years.

Patient willing to participate in the study

Exclusion criteria

Patients with acute exacerbation of heart failure or surgical history from past 6 months.

Patient with comorbidities such as kidney disease, stroke etc.

Patient using SGLT2 inhibitors**.**

Procedure

A Prospective observational study of SGLT2 inhibitors in Myocardial infarction patients with acute LV dysfunction will be carried out with a sample size of 60 patients fora period of six months in a multispecialty tertiary care hospital. Based on the inclusion and exclusion criteria, patients will be assessed and chosen for treatment. Each individual who fits the inclusion criteria and is willing to participate in the study will be asked for their informed consent. Group A patients (Test group) will receive Dapagliflozin-5mg, once daily along with standard therapy (ACE inhibitors, Beta blockers, Nitrates and Diuretics) and Group B patients (Control group) will receive standard therapy alone. Patient demographics and clinical details will be collected by the structured format. The echocardiogram (ECHO) and HbA1c assessment will be performed at the baseline and follow up (3rd month) in both the study groups. The statistical analysis will be performed using SPSS software.

Expected outcomes

SGLT2 Inhibitors may reduce the left ventricular dysfunction in myocardial infarction patients having diabetes.

RESULTS AND DISCUSSION

Demographic variables

The project entitled “Study on the effect of SGLT2 inhibitors in myocardial infarction patients with acute left ventricular dysfunction” was carried out for period of 3 months in tertiary care hospital.

During the study period, a total of 60 patients were included and randomized according to the inclusion and exclusion criteria.

Group A (n= 30) was given with the standard therapy were included and randomized according to the inclusion and exclusion criteria.

Group B (n= 30) was given with the standard therapy and in combination with dapagliflozin (5mg, 10mg) were included and randomized according to the inclusion and exclusion criteria.

The sociodemographic information, clinical characteristics of patients and other study para meters were gathered at the baseline, i.e., during the study enrolment, as well as the 3rd month follow up,

and statistical methods have been used to analyse and interpret the data.

A total of 60 patients were randomly assigned to the therapy groups, with each group having a large number of patients. The entire research, including the follow up period, was completed by all patients. It includes the sociodemographic characteristics.

After statistical analysis, it was shown that the mean age in group A was 56.03± 10.39 years, and the mention the mean of group B is 58±13.42

The χ^2 test was used to analyze the difference in categorical variables in the study population. *Statistically significant difference ($p \leq 0.05$).

Age wise distribution

In our study, patients in Group A and Group B had more number of patients in the age group between 51-60 years. The age wise distribution is represented in the below table.

Distribution based on gender

In Group A 70% of the patients were males and 30% of the female patients, where as in Group B, 56.6% of the patients were males and 43.33% of the patients were females (Table No.3 and Figure No.6).

Distribution based on occupation

According to the occupational distribution, Group A and Group B has same number of employed and unemployed patients i.e., Employed patients are 33.33% and Unemployed patients are 66.66% (Table No.4, Figure No.7).

HbA1c in Group A patients

Table No.5 lists the baseline and follow-up clinical features of the HbA1c. The follow-up group's mean HbA1c was 7.87± 1.634 while the baseline group's average was 6.927± 1.524, with a P value of 0.0001. Traditional approaches classify this difference as very statistically significant.

Left Ventricular Ejection fraction in Group A patients:

Base line and follow up clinical characteristics of ejection fraction are mentioned in the Table No.6. The mean of the base line ejection fraction was 40.53 ± 3.34, while it was 51.80 ± 3.53 for follow up group and the P value was found to be 0.0001. This difference is regulated as very statistically significant by traditional methods.

Left ventricular Ejection Fraction in Group B patients

The baseline and follow-up clinical characteristics of the Ejection Fraction of test group are listed in Table No.7. With a P value of 0.0001, the follow-up group's mean Ejection fraction was 47.13± 4.65 while the baseline groups was 36.47± 5.76. This difference is categorised by conventional methods as very statistically significant**.**

HbA1C in Group A Patients

The baseline and follow-up clinical characteristics of the HA1C of test group are listed in Table No.8. With a P value of 0.0001, the follow-up group's mean HbA1C was 6.763± 0.697 while the baseline group was 7.827± 0.779. This difference is categorised by conventional methods as very statistically significant**.**

Left Ventricular Ejection fraction of A vs. Group B Patients

The baseline and follow-up clinical characteristics of the Ejection fraction of test group and standard group are listed in Table No.9. With a P value of 0.0004, the test group mean Ejection fraction was 47.13± 4.65 while the Standard group was 51.80± 3.53. This difference is categorised by conventional methods as very statistically significant**.** (Figure No.8).

Results of HbA1C of Group A vs. Group B Patients

The baseline and follow-up clinical characteristics of the HbA1C of test group and standard group are listed in Table No.10. With a P value of 0.5428, the test group mean HbA1C was 6.763± 0.697 while the Standard group was 6.927± 1.54. This difference is categorised by conventional methods as not quite statistically significant (Figure No.9).

Length of hospital stay in Group A vs. Group B Patients

The length of the hospital stay between the standard and test group are listed in the Table No.11. The mean of the hospital of standard group was found out to be 6.5±1.8892, Followed by test group is 4.0± 1.1142 and the P value was found out to be 0.0001. The difference is categorised by conventional methods and are statistically significant. (Figure No.10).

Discussion

Participants were enrolled into the trial, according to specific strategy and randomization was done after validating the inclusion criteria. Demographic data indicated that, there was an unequal distribution of gender among the sample population. This equality in male and female ratio supports the importance any demographic research results. Most of the research subject irrespective of whatever group they belonged, seemed to have studied up to have to the high school level or college level and the amount of illiteracy was relatively less. With respect to MI severity, it was noticed that the number of moderate persistent MI was greater than mild persistent MI. The study covered both mild and moderate persistent MI and excluded severe persistent MI patients due to an elevated likelihood of exacerbations and recurrent hospital admissions. Normally, in intervention studies, patient involvement is a critical aspect in getting increased outcomes. As our research population included a larger proportion of educated persons, it led in better patient.

The baseline value of both Standard and Test were observed and the changes of values after starting the treatment of were noted in the excel sheet from day 0 to day 90 by follow up then statistical analysis were carried out "Student t test" and we found that Ejection fraction between standard and test groups were statistically significant difference found between Standard and test groups with the p value is0.0004, Whereas HbA1C between the test and standard were found to be not quite statistically significant between those two groups and the p value was found to be 0.5428 while the Length of hospital stay between the standard and test group was found to be extremely statically significant with the P value of 0.0001.

Table No.1: Demographic characteristics of passive (HBsAg) respondents attending OPD clinics at study areas

Table No.1: Sociodemographic details of the study population

S.No	Characteristics (N=30)	Group A N (%)	Group B N (%)	P Value
1	Age, mean ± SD (Years)	56.03± 4.39	58±5.42	0.087
Age				
2	81-90	2 (6.66%)	1(3.33%)	1
3	71-80	5(16.66%)	3(10%)	
4	61-70	6 (20%)	7(23.33%)	
5	51-60	8(26.66%)	9 (30%)	
6	41-50	4(13.33%)	6(20%)	
7	31-40	3(10%)	2(6.66%)	
8	21-30	2 (6.66%)	2(6.66%)	
Gender				
9	Male	21(70%)	17(56.66%)	1.43
10	Female	9(30%)	13(43.33%)	
Occupation				
11	Employed	10(33.33%	10(33.33%)	1
12	Unemployed	10(66.66%)	20(66.66%)	

*Statistically significant difference ($p \leq 0.05$)

Table No.2: Age wise distribution

S.No	Age (in years)	The number of subjects in group A (n=30)	Percentage of patients (%)	The number of subjects in group B (n=30)	Percentage of patients (%)
1	81-90	2	6.66%	1	3.33%
2	71-80	5	16.66%	3	10%
3	61-70	6	20%	7	23.33%
4	51-60	8	26.66%	9	30%
5	41-50	4	13.33%	6	20%
6	31-40	3	10	2	6.66%
7	21-30	2	6.66%	2	6.66%

Table No.3: Distribution based on gender

S.No	Gender	Total number of subjects in group A (n=30)	Percentage of patients (%)	Total number of subjects in group B (n=30)	Percentage of subjects (%)
1	Male	21	70%	17	56.66%
2	Female	9	30%	13	43.33%

Table No.4: Distribution based on occupation

S.No	Occupation	Total number of subjects in group A (n=30)	Percentage of patients (%)	Total number of subjects in group B (n=30)	Percentage of subjects (%)
1	Employed	10	33.33%	10	33.33%
2	Unemployed	20	66.66%	20	66.66%

Table No.5: Base line and follow up results of HbA1C

S.No	HbA1C	Group A (Base line) (n=30)	Group A (Follow up) (n=30)	P value
1	Mean	7.87	6.927	0.0001*
2	Standard Deviation	1.634	1.524	
3	SEM	0.298	0.278	

Values are expressed in mean± standard deviation. *Statistically significant difference ($p \leq 0.05$)

Table No.6: Ejection fraction of base line group and follow up group

S.No	Ejection fraction	Group A (Base line) (n=30)	Group A (Follow up) (n=30)	P value
1	Mean	40.53	51.80	0.0001*
2	Standard Deviation	3.34	3.53	
3	SEM	0.61	0.64	

Values are expressed in mean± standard deviation. *Statistically significant difference ($p \leq 0.05$)

Table No.7: Base line and follow up results of ejection fraction in test group

S.No	Ejection Fraction	Group B (Base line) (n=30)	Group B (Follow up) (n=30)	P value
1	Mean	36.47	47.13	0.0001*
2	Standard Deviation	5.76	4.65	
3	SEM	1.05	0.85	

Values are expressed in mean± standard deviation. *Statistically significant difference ($p \leq 0.05$)

Table No.8: Baseline and follow up results of HbA1C in Group A Patients

S.No	HbA1C	Group A (Base line) (n=30)	Group A (Follow up) (n=30)	P value
1	Mean	7.827	6.763	0.0001*
2	Standard Deviation	0.779	0.697	
3	SEM	0.142	0.127	

Values are expressed in mean± standard deviation. *Statistically significant difference ($p \leq 0.05$)

Table No.9: Left Ventricular Ejection Fraction of Group A vs. Group B Patients

S.No	Difference	Group A (n=30)	Group B (n=30)	P value
1	Mean	51.80	47.13	0.0004*
2	Standard Deviation	3.53	4.65	
3	SEM	0.64	0.85	

Values are expressed in mean± standard deviation. *Statistically significant difference ($p \leq 0.05$)

Table No.10: Results of HbA1C of both test and standard group

S.No	Difference	Group A (n=30)	Group B (n=30)	P value
1	Mean	6.927	6.763	0.5428
2	Standard Deviation	1.54	0.697	
3	SEM	0.278	0.127	

Values are expressed in mean± standard deviation. *Statistically significant difference ($p \leq 0.05$)

Table No.11: Length of hospital stay in Group A vs. Group B Patients

S.No	Difference	Group A (in days)	Group B (in days)	P value
1	Mean	6.5	4.0	0.0001*
2	Standard Deviation	1- .8892	1.1142	
3	SEM	0.3449	0.2034	

Values are expressed in mean± standard deviation. *Statistically significant difference ($p \leq 0.05$)

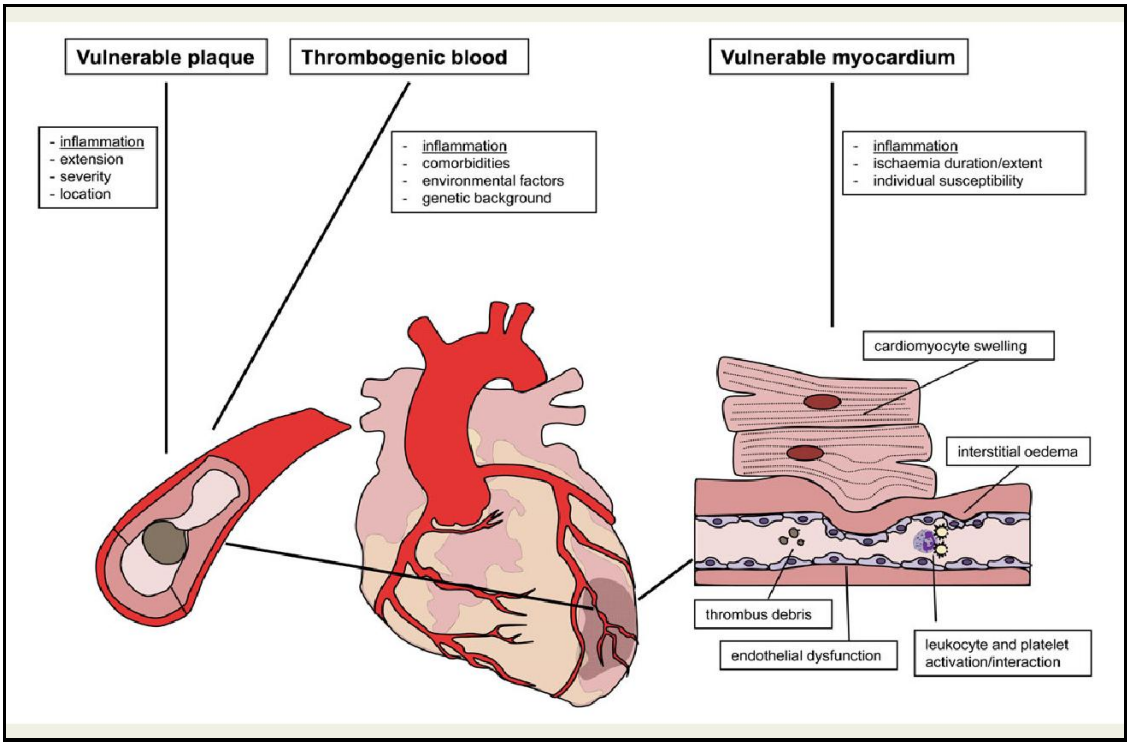

Figure No.1: Pathophysiology of myocardial infarction

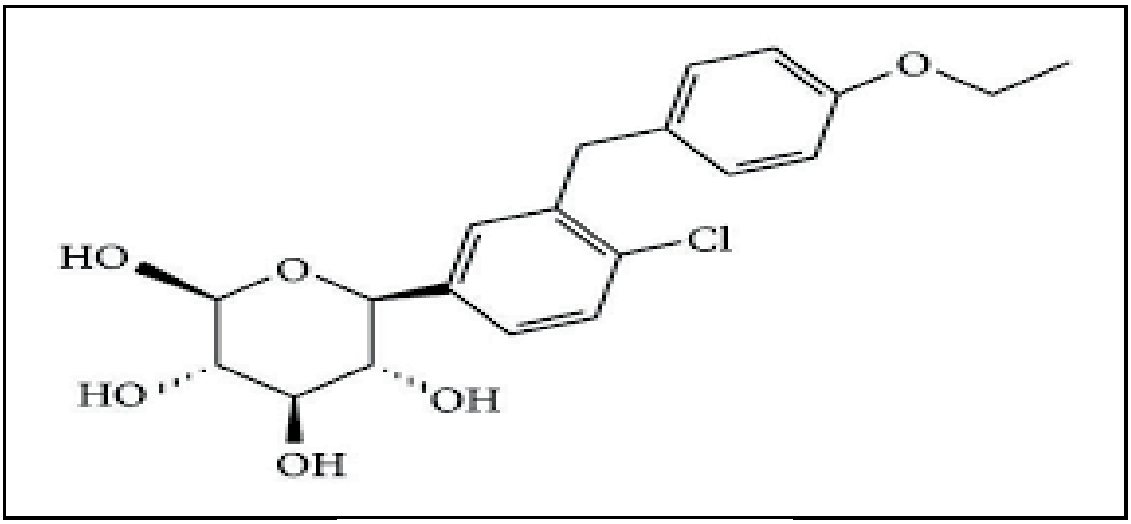

Figure No.2: Molecular structure

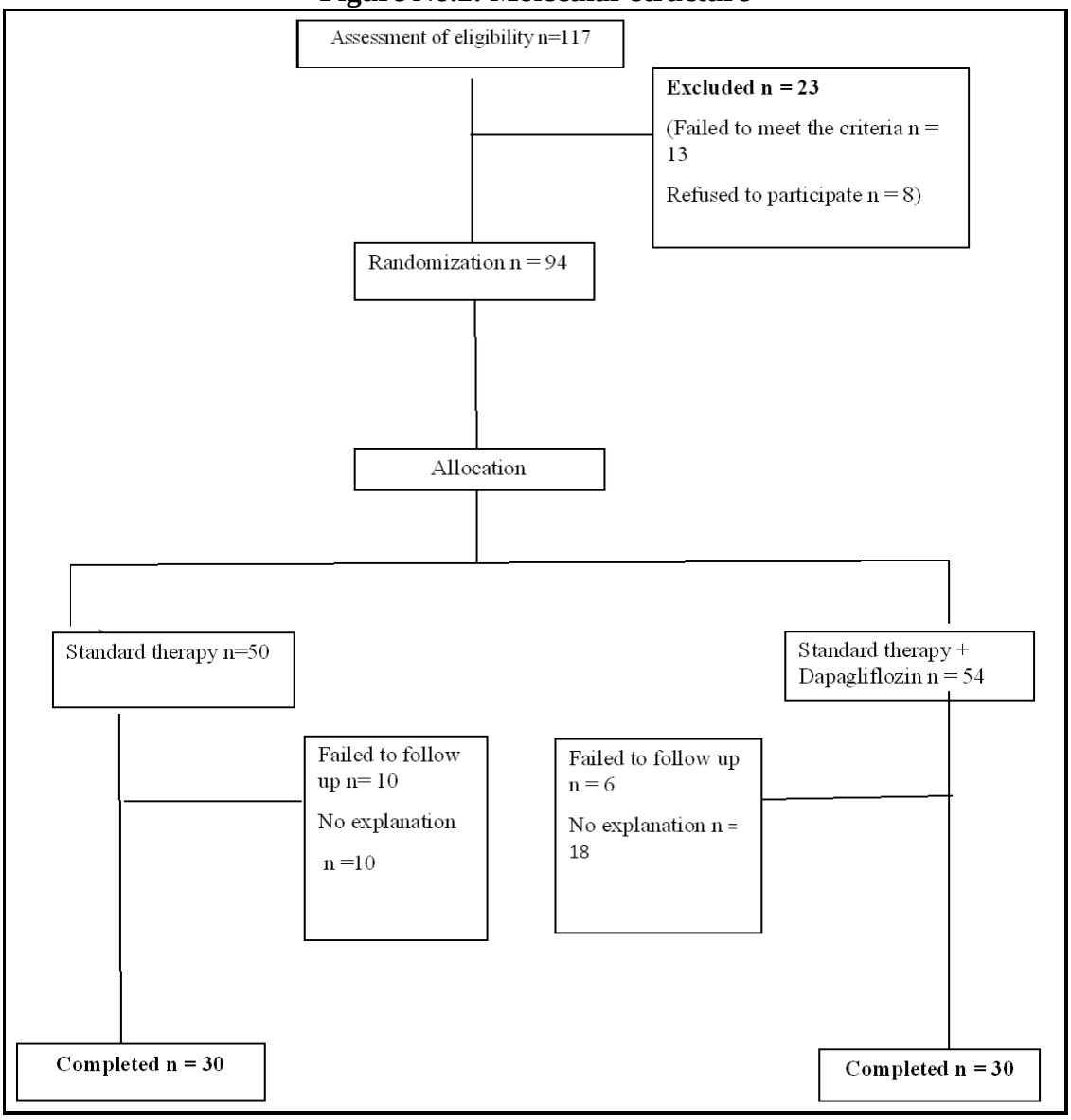

Figure No.3: Selection of Patients

PLAN OF WORK

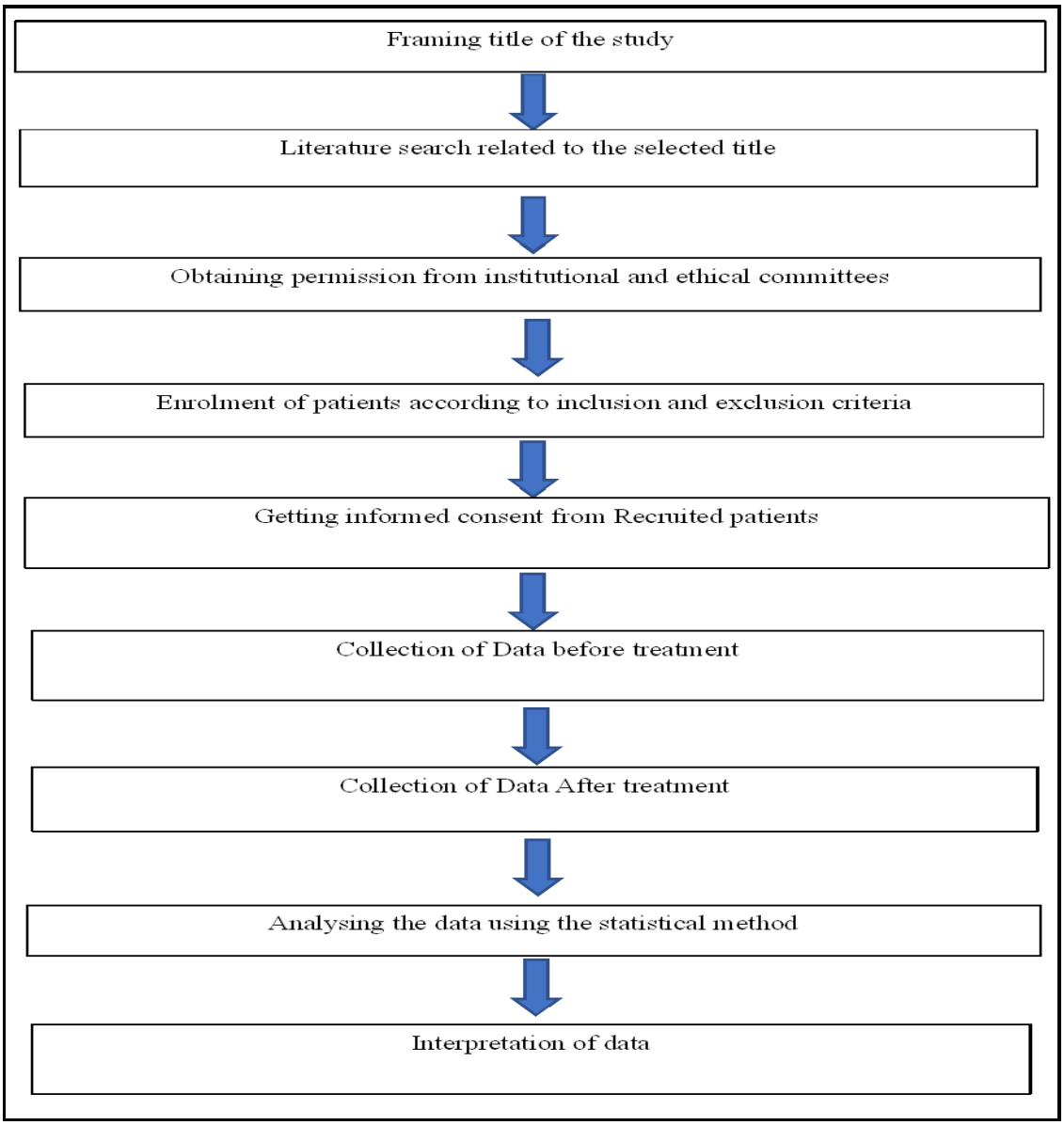

Figure No.4: Plan of work

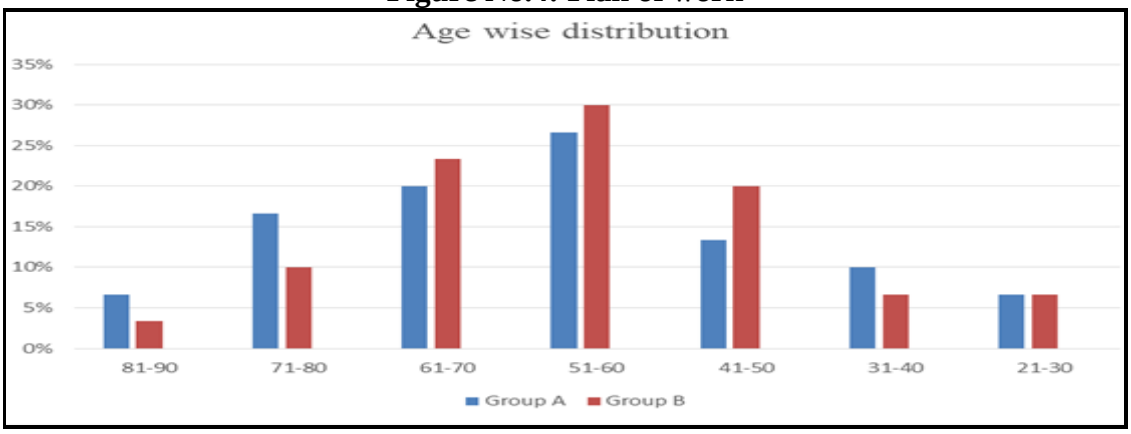

Figure No.5: Age wise distribution

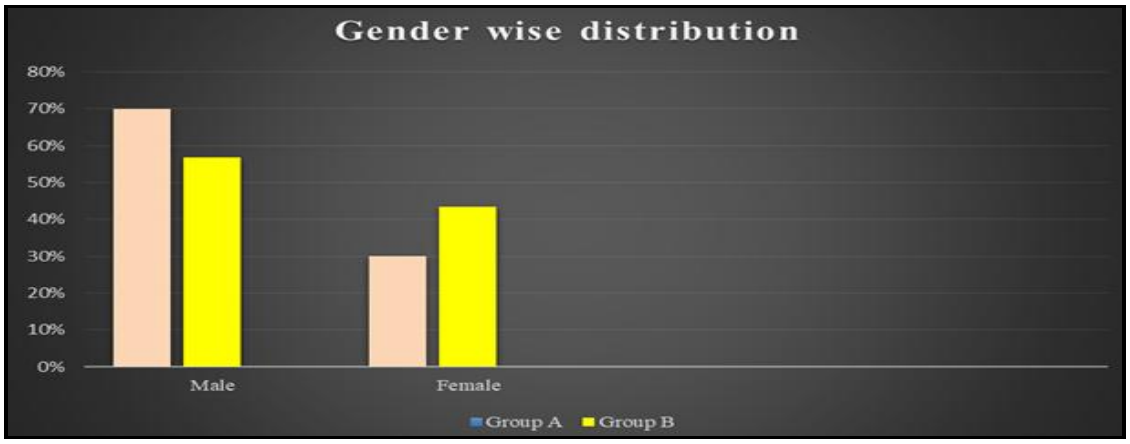

Figure No.6: Gender wise distribution

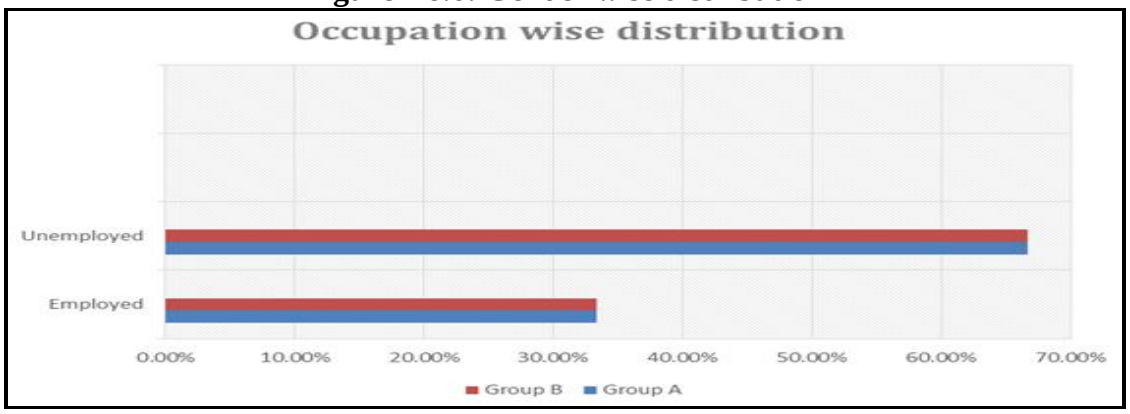

Figure No.7: Occupation wise distribution

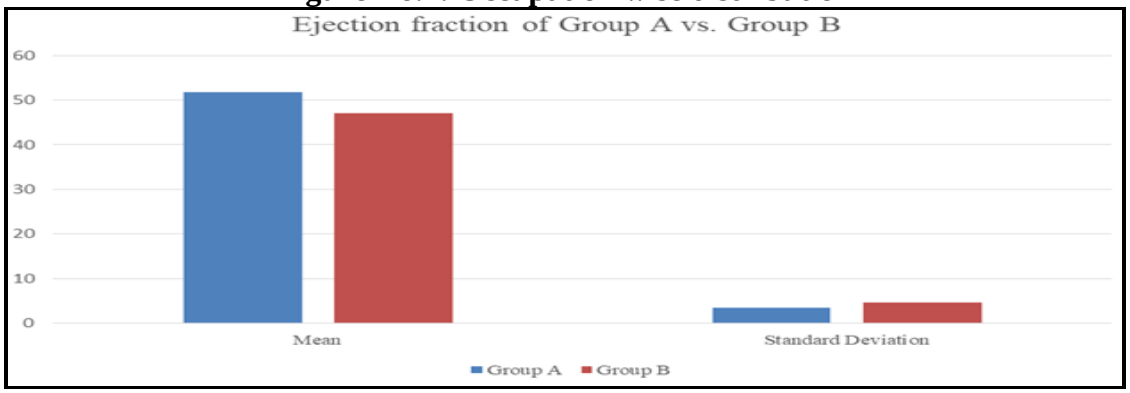

Figure No.8: Ejection Fraction of Group A and Group B

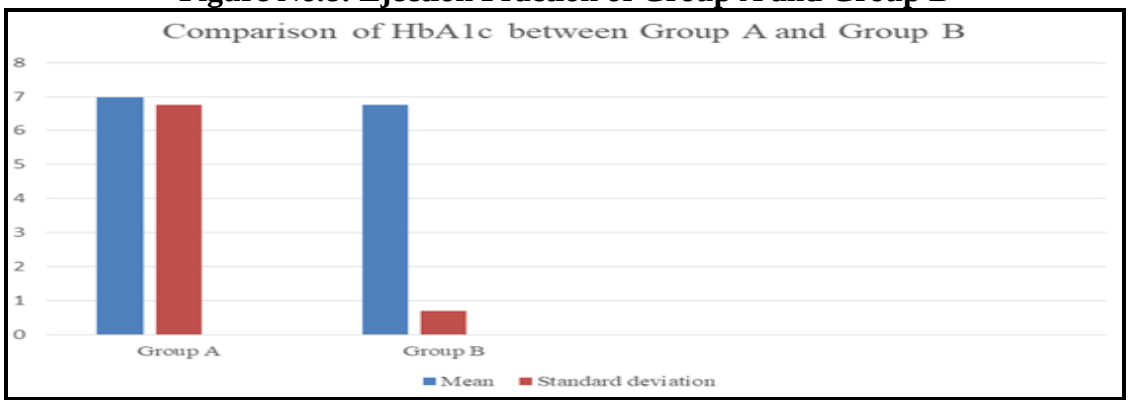

Figure No.9: HbA1c of Group A and Group B

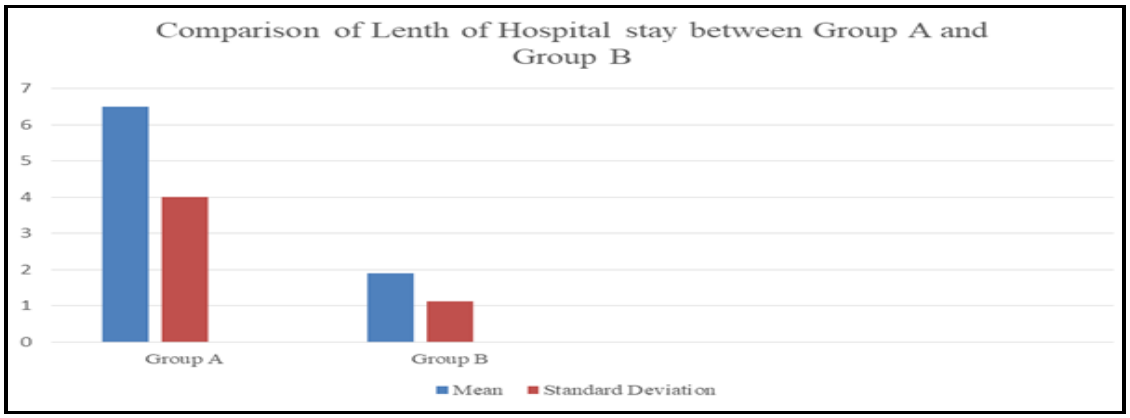

Figure No.10: Length of hospital stay between Group A and Group B

CONCLUSION

The results of this study concluded that there was significant improvement of Left ventricular ejection fraction and reduction in length of hospital stay in dapagliflozin treated group compared to the conventional treatment care in myocardial infarction patients. Thus dapagliflozin acts as a potential therapeutic option for lowering the risk of myocardial infarction and enhancing the patient health outcomes. Further research is required to verify these findings and to clarify the dapagliflozin's underlying mechanisms of action in the management of myocardial infarction.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

BIBLIOGRAPHY

1. Lu L, Liu M, Sun R, Zheng Y, Zhang P. Myocardial Infarction: Symptoms and treatments, *Cell Biochem Biophys*, 72(3), 2015, 865-867.
2. Kosuge M, Ishikawa T, Ebina T, Hibi K, Tsukahara K, *et al*. Differences between men and women in terms of clinical features of ST-segment elevation acute myocardial infarction, *Circulation Journal*, 70(3), 2006, 222-226.
3. Valensi P, Lorgis L, Cottin Y. Prevalence, incidence, predictive factors and progno-sis of silent myocardial infarction: A review of the literature, *Archives of Cardiovascular Diseases*, 104(3), 2011, 178-188.
4. Devlin R J, Henry J A. Clinical review: Major consequences of illicit drug consumption, *Critical Care*, 12(1), 2008, 202.
5. Hamm C W, Bax J, Boersma E, Bueno H, *et al*. ESC guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation: The task force for the management of acute coronary syndromes (ACS) in patients presenting without persistent ST-segment elevation of the European society of cardiology (ESC), *European Heart Journal*, 32(23), 2011, 2999-3054.
6. Benjamin E J, Alonso A, Bittencourt M S, Callaway C W, Carson A P, Virani S S. Heart disease and stroke statistics-2019 update: A report from the American Heart Association, *Circulation*, 139(10), 2019, e56-e528.
7. Chadwick Jayaraj J, Davatyan K, Subramanian S S, *et al*. Epidemiology of Myocardial Infarction, *Intech Open*, 2019.
8. Shaikh R, Khan J. Clustering of lifestyle risk factors among adult population in India: A cross-sectional analysis from 2005 to 2016, *Plos One*, 16(1), 2021, e0244559.
9. Kirby J B, Yabroff K R. Rural-Urban differences in access to primary care: Beyond the usual source of care provider, *Am J Prev Med*, 58(1), 2020, 89-96.

10. Rehman S, Khan A, Rehman A. Statpearls, *Statpearls Publishing, Treasure Island (FL), Physiology, Coronary Circulation*, 2022.
11. Falk E, Shah P K, Fuster V. Coronary plaque disruption, *Circulation*, 92(3), 2015, 657-671.
12. Loftus I. Mechanisms of vascular disease: A Reference book for vascular specialists, *Adelaide (AU): University of Adelaide Press*, 2011.
13. Sheila Cano-Carrillo, Estefania Lozano-Velasco, Juan Manuel Castillo-Casas, Cristina Sanchez-Fernandez, Diego Franco. The Role of ncRNAs in cardiac infarction and regeneration, *Journal of Cardiovascular Development and Disease*, 10(3), 2023, 123.
14. John Hopkins Medicine. School of Medicine, *Baltimore, MD, USA*, 2014.
15. Goodman S G, Steg P G, Eagle K A, Fox K A, Lopez-Sendon J, Montalescot G, Budaj A, Kennelly B M, Gore J M, Allegrone J, Granger C B, Gurfinkel E P. Grace Investigators, The diagnostic and prognostic impact of the redefinition of acute myocardial infarction: Lessons from the Global Registry of Acute Coronary Events (GRACE), *Am Heart J*, 151(3), 2006, 654-660.
16. Benjamin E J, Virani S S, Callaway C W, Chamberlain A M, Chang A R, Cheng S, Chiuve S E, Cushman M. American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee, *Heart Disease and Stroke Statistics-2018 Update: A Report From the American Heart Association, Circulation*, 137(12), 2018, e67-e492.
17. Patrono C, Morais J, Baigent C, Collet JP, Fitzgerald D, Halvorsen S, Rocca B, Siegbahn A, Storey R F, Vilahur G. Antiplatelet agents for the treatment and prevention of coronary Atherothrombosis, *J Am Coll Cardiol*, 70(14), 2017, 1760-1776.
18. Ferreira J C, Mochly-Rosen D. Nitroglycerin use in myocardial infarction patients, *Circ J*, 76(1), 2012, 15-21.
19. Boudonas G E. β-Blockers in coronary artery disease management, *Hippokratia*, 14(4), 2018, 231-235.
20. Munekazu Yamakuchi, James J M, Greer, Scott J. Cameron, Kenji Matsushita, Craig N. Morrell, Karen Talbot-Fox, William M. Baldwin, David J. Lefer, Charles J. HMG-CoA reductase inhibitors inhibit endothelial exocytosis and decrease myocardial infarct size, *Circulation Research*, 96(11), 2018, 1185-1192.
21. Przyklenk K, Kloner R A. "Cardioprotection" by ACE-inhibitors in acute myocardial ischemia and infarction? *Basic Res Cardiol*, 88(1), 1993, 139-154.
22. Pfeffer M A. ACE inhibitors in acute myocardial infarction: Patient selection and timing, *Circulation*, 97(22), 1998, 2192-2194.
23. Raftery E B. Haemodynamic effects of diuretics in heart failure, *Br Heart J*, 72(2), 2018, S44-47.
24. Roe M T, Messenger J C, Weintraub W S, Cannon C P, Fonarow G C, Dai D, *et al*. Treatments, trends, and outcomes of acute myocardial infarction and percutaneous coronary intervention, *Journal of the American College of Cardiology*, 56(4), 2010, 254-263.
25. Held P H, Yusuf S, Furberg C D. Calcium channel blockers in acute myocardial infarction and unstable angina: An overview, *British Medical Journal*, 299(6709), 2019, 1187-1192.
26. Deepak L. Bhatt, Jean-Sebastien Hulot, David J. Moliterno, Robert A. Harrington. Antiplatelet and anticoagulation therapy for acute coronary syndromes, *Circulation Research*, 114(12), 2014, 1929-1943.
27. Kupo P, Szakacs Z, Csanyi B, Borbas J, Tringer A, Varga G, Balasko M, Sepp R, Hegyi P, Bálint A, Komócsi A. Direct Anticoagulants and risk of myocardial infarction, a Multiple treatment network meta-analysis, *Angiology*, 71(1), 2020, 27-37.
28. Bossard M, Gao P, Boden W, Faxon D, Budaj A, Pais P, Di Pasquale G, Valentin V, Flather M, Moccetti T, Yusuf S, Mehta S R. Antiplatelet therapy in patients with myocardial infarction without obstructive coronary artery disease, *Heart*, 107(21), 2021, 1739-1747.

29. Ortega-Paz L, Galli M, Capodanno D, Brugaletta S, Angiolillo D J. The Role of Antiplatelet therapy in patients with MINOCA, *Front Cardiovasc Med,* 8, 2022, 821297.
30. Ojha N, Dhamoon A S. Myocardial infarction, *Stat Pearls, Treasure Island (FL): Stat Pearls Publishing,* 2022.
31. Shubrook, Jay, Baradar-Bokaie, Babak, Adkins, Sarah. Empagliflozin in the treat ment of type 2 diabetes till date, *Drug Design, Development and Therapy,* 9, 2015, 5793-5780.
32. Hsia D S, Grove O, Cefalu W T. An update on sodium-glucose co-transporter-2 inhibitors for the treatment of diabetes mellitus, *Curr Opin Endocrinol Diabetes Obes,* 24(1), 2017, 73-79.
33. Lytvyn Y, Bjornstad P, Udell J A, Lovshin J A, Cherney D Z I. Sodium glucose cotransporter-2 inhibition in heart failure: Potential mechanisms, *Clinical Applications and Summary of Clinical Trials, Circulation,* 136(17), 2017, 1643-1658.
34. Yusuf S, Hawken S, Dans T, Avezum A, Lanas F, McQueen M, Pais P, Varigos J, Lisheng L. Inter heart study investigators, effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the Inter heart study): Case-control study, *Lancet,* 364(9438), 2018, 937-952.

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