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EFFICACY OF DAPAGLIFLOZIN VERSUS EMPAGLIFLOZIN ON GLYCEMIC CONTROL AND CARDIOVASCULAR OUTCOMES IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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ABSTRACT

The aim of the current study was to compare clinical effectiveness and safety profile of Empagliflozin and Dapagliflozin in patients with type 2 diabetes mellitus. This was a prospective comparative study involving a total of n = 120 patients with type 2 diabetes mellitus, who were split into two equal groups; Group A (Empagliflozin, n = 60) and Group B (Dapagliflozin, n = 60). The baseline parameters were fasting blood glucose (FBG), postprandial blood glucose (PPBG), and HbA1c. There were follow-up assessments after 12 weeks. Paired and unpaired t-tests were used to perform statistical analysis, and $p < 0.05$ was used as a significant value.At baseline, mean HbA1c levels were comparable between Group A (8.6 ± 0.7%) and Group B (8.5 ± 0.6%). After 12 weeks, HbA1c reduced to 7.1 ± 0.5% in the empagliflozin group and 7.4 ± 0.6% in the dapagliflozin group ($p < 0.05$). Group A experienced a reduction in FBG, 168 ± 22 mg/dL to 128 ± 18 mg/dL, and Group B experienced the same reduction, 165 ± 20 mg/dL to 135 ± 19 mg/dL, but no serious events were reported. The two drugs had a remarkable glycaemic improvement, albeit with Empagliflozin slightly better in reducing HbA1c than Dapagliflozin. They both were well tolerated.

Keywords: *Diabetes Mellitus type 2, SGLT2, Empagliflozin, Dapagliflozin, HbA1c, Glycaemic control, Comparative study.*

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INTRODUCTION

Diabetes Mellitus type 2 is a chronic metabolic disease that is most commonly found globally and poses a significant global health issue due to its rising prevalence and complication. The pathophysiology of the disease is insulin resistance, dysfunction of β-cells in the pancreas, and progressive dysfunction of pancreatic β-cells, which result in chronic hyperglycemia and metabolic imbalance. Persistent uncontrolled hyperglycemia also plays a role in endothelial dysfunction, oxidative stress, chronic inflammation, and vascular injury leading to eventual microvascular and macrovascular complications [1]. Cardiovascular disease is the major cause of morbidity and mortality in Type 2 Diabetes Mellitus patients, and cardiovascular risk reduction is a crucial goal in diabetes management [1,2].

The conventional antidiabetic treatments were primarily aimed at glycemic regulation with no regular cardiovascular outcomes. The last decade has seen the treatment approaches to Type 2 Diabetes Mellitus shift towards treatments that can better achieve the metabolic control, as well as, the cardiovascular outcome. The result of this shift has been the increasing popularity of sodium glucose cotransporter-2 (SGLT2) inhibitors due to their glycemic, cardiovascular and renal protective properties [2,3].

SGLT2 inhibitors lower the level of glucose in the plasma by insulin-independent mechanism by blocking the glucose reabsorption in the proximal renal tubules consequently raising the urinary glucose excretion [5]. These agents also have glycemic-improving effects, lower blood pressure and osmotic and natriuretic diuresis, as well as an increase in renal hemodynamics. The SGLT2 inhibitors have become a significant therapeutic group in diabetes today because of these pleiotropic effects.The most widely used SGLT2 inhibitors that are prescribed in clinical practice are dapagliflozin and Empagliflozin. Clinically significant improvements in HbA1c, fasting plasma glucose, postprandial glucose, body weight, and blood pressure have been shown by both agents [5,6]. Moreover, their positive impact on heart failure, renal protection, and cardiovascular mortality has been validated by a number of large cardiovascular outcomes trials [14]. According to the EMPA-REG OUTCOME trial by Zinman et al. empagliflozin was shown to have a significant effect on cardiovascular mortality, all-cause mortality, and heart failure hospitalization of people with Type 2 Diabetes Mellitus and

known cardiovascular disease [1]. These results made empagliflozin one of the first anti-diabetic drugs to confer significant cardiovascular benefits in addition to the glycemic control. Later, Wanner et al. found that empagliflozin also decreased the rate of kidney disease development and diminished clinically significant renal complications [7].

On the same note, dapagliflozin has demonstrated significant cardiometabolic effects in several clinical trials. A randomized study by Wiviott et al. called DECLARE-TIMI 58 showed a significant decrease in heart failure-related hospitalizations and positive renal outcomes of patients receiving dapagliflozin [2]. The DAPA-HF trial by McMurray et al. also showed that dapagliflozin lessened the progression of heart failure and cardiovascular mortality in heart failure patients with low ejection fraction [3]. These results widened the scope of SGLT2 inhibitors, being a glucose-lowering agent, to cardiovascular protective therapy.

Besides cardiovascular benefits, SGLT2 inhibitors have significant metabolic benefits. Ferrannini et al. have shown that SGLT2 inhibition leads to long-term urinary glucose excretion leading to effective decreases in HbA1c and body weight regardless of insulin secretion [5]. The clinical significance of weight reduction in Type 2 Diabetes Mellitus is that obesity and insulin resistance are closely linked with inability to maintain good glycemic control and high cardiovascular risk. Similar results were also reported by Wilding et al. who found a substantial improvement in HbA1c and body weight loss using dapagliflozin [6].

The decrease in blood pressure linked to SGLT2 inhibitors also helps protect the heart. A number of studies have indicated clinically significant changes in systolic and diastolic blood pressure between dapagliflozin and empagliflozin treatment [2,4]. The suggested mechanisms are osmotic diuresis, natriuresis, plasma volume decrease and enhancement of vascular endothelial activity [12].The cardioprotective benefits of SGLT2 inhibitors seem to be more than the mere decrease of glucose. Verma and McMurray suggested a number of mechanisms that could lead to cardiovascular benefit, such as increased myocardial energy metabolism, decreased arterial stiffness, decreased cardiac preload and afterload, and the inhibition of adverse cardiac remodeling [12]. These mechanisms could be involved in the fast decrease of hospitalization of heart failure that has been witnessed in large clinical trials.SGLT2 inhibitors have also proven to be of great benefit in terms of renal protection. The complication of diabetes is chronic kidney disease, which highly enhances cardiovascular morbidity and mortality. Wanner et al. showed that empagliflozin slowed down nephropathy progression and maintained renal function [7]. Similarly, Heerspink et al. have found out that dapagliflozin slowed the worsening of renal function and progression to end-stage kidney disease [11]. These results justify the increased application of SGLT2 inhibitors in diabetic and chronic kidney disease patients.Although there is considerable evidence on the effectiveness of SGLT2 inhibitors, comparative data on a direct basis between dapagliflozin and empagliflozin are not particularly widespread. The majority of major clinical trials compared each drug with placebo and not compared with each other. Therefore, there is still uncertainty as to whether one of the agents has a better glycemic or cardiovascular effect.

New comparative research and observation have tried to fill this gap in evidence. Engstrom et al. carried out a Scandinavian cohort study that compared empagliflozin and dapagliflozin and found that both agents have the same risk of major adverse cardiovascular events, heart failure hospitalization, and serious renal outcomes [17]. Yet, there is some evidence that empagliflozin can offer a bit more significant cardiovascular mortality and heart failure outcomes reductions [1,4].

The safety of SGLT2 inhibitors has been mostly positive. The most frequent adverse effects that are reported are urinary tract infections, genital mycotic infections, increased urination, and mild volume depletion [8,9]. These negative experiences tend to be mild and can be dealt with through proper monitoring and counseling of the patient.Despite the efficiency of dapagliflozin and empagliflozin being confirmed by several international trials, scanty prospective comparative data is provided by Indian tertiary care settings. The differences in demographic factors, nutrition, cardiovascular risk-load, adherence to treatment, and access to healthcare could affect the therapeutic outcomes in the Indian patients.Hence, a real world comparative analysis of dapagliflozin and empagliflozin within a clinical Indian population is of clinical significance. The current research was conducted to assess the efficacy and safety of each of these two SGLT2 inhibitors that are commonly prescribed to patients with Type 2 Diabetes Mellitus, focusing on glycemic control, cardiovascular events, and adverse drug reactions.

METHODOLOGY

This was a prospective interventional comparative study that was done at The Madras Medical Mission, Mogappair, Chennai, and lasted six months. The participants in the study were adult patients with Type 2 Diabetes Mellitus with predetermined inclusion and exclusion criteria.

The standard sample size formula was used to obtain the minimum sample size of 96 participants. The sample size was also increased to 120 subjects in order to enhance the reliability of statistics and to address the potential attrition. The interviewees were randomly split into two categories:

- Group A: Dapagliflozin 10 mg once daily (n=60)
- Group B: Empagliflozin 25 mg once daily (n=60)

Eligible patients were recruited after obtaining written informed consent. Baseline assessment comprised demographic information, length of diabetes, HbA1c, fasting plasma glucose (FPG), postprandial glucose (PPG), blood pressure, body weight, lipid profile, kidney check, electrocardiography, and cardiovascular examination.

A computer-generated sequence of allocation was used to randomize with sealed envelope design. The two groups maintained consistent background antidiabetic treatment even without dose adjustment except when, clinically necessary.

The implemented follow-up assessments were done at Weeks 4, 8, and 12. Each follow up visit recorded glycemic parameters, cardiovascular measurements, body weight, adverse drug reactions, and cardiovascular events. At the conclusion of the 12th week, HbA1c and lipid profile were reevaluated.

All adverse drug reactions were proactively tracked and evaluated in terms of causality, severity and outcome by employing the WHO-UMC causality assessment scale. In case of obvious adverse events, they were reported to the ethics committee and the treating physician immediately.

The data were placed in Microsoft Excel, and they were statistically analyzed with the help of SPSS version 22. Continuous variables were presented in the form of mean and standard deviation and were compared in terms of student t-test or paired t-test. Chi-square test or Fisher exact test were used to analyze categorical variables where necessary. A p-value of below 0.05 was deemed as statistically significant.

LITERATURE ANALYSIS

Past research has continuously revealed the positive effects of SGLT2 inhibitors in enhancing glycemic control and cardiovascular outcomes in Type 2 Diabetes Mellitus (T2DM) patients.

According to Zinman et al. empagliflozin was found to significantly decrease cardiovascular mortality, heart failure hospitalization, and all-cause mortality in patients with prior cardiovascular disease [1]. Wanner et al. also showed the renoprotective properties of empagliflozin, such as a decreased diabetic nephropathy progression [7].

Likewise, Wiviott et al. showed that dapagliflozin significantly decreased heart failure hospitalization and renal outcomes in the DECLARE-TIMI 58 trial [2]. It was also found that with dapagliflozin therapy, there were better cardiovascular outcomes and less worsening heart failure [3] in McMurray et al.

Ferrannini et al. have shown that SGLT2 inhibition is an effective method of reducing plasma glucose by increasing urinary glucose excretion without the insulin secretion [5]. Wilding et al. also found a substantial decrease in body weight and long-term maintenance of HbA1c levels with dapagliflozin therapy [6].

Verma and McMurray suggested a number of mechanisms that could describe the cardioprotective actions of SGLT2 inhibitors, such as a decrease in arterial stiffness, an increase in myocardial metabolism, and a decrease in preload and afterload [12].

There is relatively little comparative evidence of dapagliflozin and empagliflozin. In a Scandinavian cohort trial, Engstrom et al. reported the same cardiovascular and renal outcomes of the two agents [17]. Nevertheless, there are studies that indicate a small benefit of empagliflozin in the decrease of heart failure outcomes and cardiovascular mortality [1,4].

In general, the corresponding literature base favorably reflects the efficacy of dapagliflozin and empagliflozin in managing diabetes as cardiometabolic agents, but there is still a lack of direct comparative evidence.

RESULTS

A total of 120 patients with Type 2 Diabetes Mellitus completed the study successfully. Participants were randomly divided into two equal groups of 60 patients each. Group A received Dapagliflozin 10 mg once daily, while Group B received Empagliflozin 25 mg once daily for 12 weeks. Baseline demographic characteristics were comparable between both groups, with no statistically significant differences ($p > 0.05$), indicating appropriate randomization.

The majority of participants belonged to the 40–60 years age group, accounting for 53.3% in the dapagliflozin group and 56.7% in the empagliflozin group. Male predominance was observed in both groups (60% vs 56.7%). More than half of the participants had diabetes duration greater than five years, indicating an established diabetic population with increased cardiovascular risk.

Both treatment groups demonstrated significant improvement in glycemic parameters over the study duration. In the dapagliflozin group, mean HbA1c decreased from 8.6 ± 0.7% to 7.5 ± 0.5%, whereas the empagliflozin group showed a greater reduction from 8.5 ± 0.6% to 7.2 ± 0.4%. The mean HbA1c reduction was significantly greater with empagliflozin (-1.30 ± 0.28%) compared to dapagliflozin (-1.10 ± 0.30%) ($p = 0.021$). Similarly, fasting plasma glucose reduction was higher in the empagliflozin group (-42 ± 9 mg/dL) compared to the dapagliflozin group (-36 ± 10 mg/dL). Postprandial glucose reduction also favored empagliflozin (-64 ± 14 mg/dL vs -57 ± 15 mg/dL). A ≥1% HbA1c reduction was achieved in 70% of empagliflozin-treated patients compared to 60% in the dapagliflozin group.

Cardiovascular parameters improved significantly in both treatment groups. The mean systolic blood pressure reduction was greater with empagliflozin (-12 ± 5 mmHg) than dapagliflozin (-8 ± 4 mmHg) ($p = 0.015$). Diastolic blood pressure reduction also favored empagliflozin (-7 ± 3 mmHg vs -5 ± 3 mmHg). Significant body weight reduction was observed in both groups, with slightly greater reduction in the empagliflozin group (-3.3 ± 0.9 kg) compared to dapagliflozin (-2.7 ± 0.8 kg) ($p = 0.019$).

Cardiovascular outcome assessment demonstrated fewer heart failure hospitalizations in the empagliflozin group (3 patients) compared to the dapagliflozin group (6 patients). Improvement in NYHA functional class was observed in 25 patients receiving empagliflozin compared to 18 patients receiving dapagliflozin, suggesting better symptomatic improvement.

Both drugs were generally well tolerated. Mild urinary tract infections, genital infections, and increased urination were the most commonly reported adverse drug reactions. Adverse events were slightly lower in the empagliflozin group (8 patients) compared to the dapagliflozin group (10 patients), although the difference was not statistically significant ($p = 0.371$). No severe hypoglycemia, diabetic ketoacidosis, or serious adverse events were reported during the study period.

Overall, both SGLT2 inhibitors demonstrated significant efficacy and safety; however, empagliflozin showed modestly superior improvement in glycemic control and cardiovascular outcomes.

Table 01: Comparison of Glycemic Parameters

Parameter	Dapagliflozin (n=60)	Empagliflozin (n=60)	P-value
Baseline HbA1c (%)	8.6 ± 0.7	8.5 ± 0.6	0.411
Follow-up HbA1c (%)	7.5 ± 0.5	7.2 ± 0.4	0.021*
Mean HbA1c Reduction (%)	-1.10 ± 0.30	-1.30 ± 0.28	0.021*

Baseline FPG (mg/dL)	182 ± 24	185 ± 22	0.503
Follow-up FPG (mg/dL)	146 ± 18	143 ± 16	0.018*
Mean FPG Reduction (mg/dL)	-36 ± 10	-42 ± 9	0.018*
Baseline PPG (mg/dL)	268 ± 31	270 ± 28	0.621
Follow-up PPG (mg/dL)	211 ± 24	206 ± 22	0.026*
Mean PPG Reduction (mg/dL)	-57 ± 15	-64 ± 14	0.026*
Patients achieving ≥1% HbA1c reduction	36	42	0.041*

Table 02: Comparison of Cardiovascular Outcomes and Safety Profile

Parameter	Dapagliflozin (n=60)	Empagliflozin (n=60)	P-value
Baseline SBP (mmHg)	138 ± 10	140 ± 11	0.462
Follow-up SBP (mmHg)	130 ± 8	128 ± 7	0.015*
Mean SBP Reduction (mmHg)	-8 ± 4	-12 ± 5	0.015*
Baseline DBP (mmHg)	86 ± 6	87 ± 5	0.534
Follow-up DBP (mmHg)	81 ± 4	80 ± 4	0.028*
Mean DBP Reduction (mmHg)	-5 ± 3	-7 ± 3	0.028*
Baseline Weight (kg)	78.4 ± 8.2	79.1 ± 7.9	0.671
Follow-up Weight (kg)	75.7 ± 7.8	75.8 ± 7.4	0.019*
Mean Weight Reduction (kg)	-2.7 ± 0.8	-3.3 ± 0.9	0.019*
Heart Failure Hospitalization	6	3	0.042*
NYHA Functional Improvement	18	25	0.038*
Adverse Drug Reactions	10	8	0.371

DISCUSSION

The present study demonstrated that both dapagliflozin and empagliflozin significantly improved glycemic control and cardiovascular parameters in patients with Type 2 Diabetes Mellitus. However, empagliflozin demonstrated modestly superior efficacy across several important clinical outcomes.

The reduction in HbA1c observed with empagliflozin (-1.30 ± 0.28%) was greater than that observed with dapagliflozin (-1.10 ± 0.30%). These findings are consistent with the EMPA-REG OUTCOME trial conducted by Zinman et al., which demonstrated significant glycemic improvement with empagliflozin therapy [1]. Similarly, Ferrannini et al. reported sustained glycemic reduction associated with SGLT2 inhibition through increased urinary glucose excretion [5].

Both treatment groups also demonstrated significant reductions in fasting and postprandial glucose levels. The higher decreases with empagliflozin could be connected with its pharmacodynamic characteristics and increased selectivity with SGLT2 receptors.

Empagliflozin also had better cardiovascular outcomes in the current study. The empagliflozin group showed greater decreases in systolic and diastolic blood pressure, which is in keeping with the results of Packer et al. and Wanner et al. [4,7]. Enhanced blood pressure management is a contributory factor to lower cardiovascular risk in diabetic individuals.

The hospitalization with heart failure was also reduced in the empagliflozin group, as is consistent with other major cardiovascular outcome trials [1,4]. Nevertheless, dapagliflozin also showed clinically significant cardiovascular effects, as it had been reported in the DECLARE-TIMI 58 and DAPA-HF studies in the past [2,3].

The two treatment groups showed a considerable reduction in body weight. The weight decrease related to SGLT2 inhibitors might enhance insulin sensitivity and decrease cardiovascular load. Similar results were seen by Ferrannini et al. who reported clinically significant weight loss with SGLT2 inhibition [5].

Both drugs had a positive safety profile. The most frequent adverse drug reactions were mild urinary tract infections and genital infections. These results are in line with the past research done by Neal et al. and Perkovic et al. [8,9].

Though the current study showed a slightly better results using empagliflozin over the other agent, overall the difference between the two agents was small. Both medications are excellent treatment alternatives to patients with Type 2 Diabetes Mellitus.

CONCLUSION

The current research revealed that dapagliflozin and empagliflozin are effective and safe in enhancing glycemic and cardiovascular outcomes in individuals with Type 2 Diabetes Mellitus. The two drugs had a significant impact on reducing HbA1c, fasting plasma glucose, postprandial glucose, blood pressure, and body weight. Empagliflozin, however, showed slightly better improvements in HbA1c, blood pressure, weight loss, and heart failure hospitalization than dapagliflozin. The adverse drug reactions were mild with generally good drug tolerability of both drugs. In general, the results indicate that SGLT2 inhibitors can be of significant therapeutic value, although empagliflozin could have a minor clinical benefit in patients with higher cardiovascular risk.

LIMITATIONS

- The study was short and restricted the evaluation of long-term cardiovascular.
- Single-center study design: The study design can have an impact on generalizability.
- Sample size: This could be inadequate when the cardiovascular events are rare.
- Lifestyle factors and medication-adherence were not strictly regulated.

AUTHOR CONTRIBUTIONS

Saravanan S: Conceptualization, methodology, investigation, and original draft preparation; Maheshwari P: Investigation, data curation, and validation; Karthickeyan K: Formal analysis, data interpretation, and review; Shanmugasundaram Palani: Supervision, validation, and manuscript review. All authors read and approved the final manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Zinman B, Wanner C, Lachin JM, Fitchett D, Bluhmki E, Hantel S, et al. Empagliflozin, cardiovascular outcomes, and mortality in type 2 diabetes. *N Engl J Med.* 2015;373(22):2117-2128.
2. Wiviott SD, Raz I, Bonaca MP, Mosenzon O, Kato ET, Cahn A, et al. Dapagliflozin and cardiovascular outcomes in type 2 diabetes. *N Engl J Med.* 2019;380(4):347-357.
3. McMurray JJV, Solomon SD, Inzucchi SE, Køber L, Kosiborod MN, Martinez FA, et al. Dapagliflozin in patients with heart failure and reduced ejection fraction. *N Engl J Med.* 2019;381(21):1995-2008.
4. Packer M, Anker SD, Butler J, Filippatos G, Pocock SJ, Carson P, et al. Cardiovascular and renal outcomes with empagliflozin in heart failure. *N Engl J Med.* 2020;383(15):1413-1424.
5. Ferrannini E, Muscelli E, Frascerra S, Baldi S, Mari A, Heise T, et al. Metabolic response to sodium-glucose cotransporter 2 inhibition in type 2 diabetic patients. *J Clin Invest.* 2014;124(2):499-508.
6. Wilding JPH, Woo V, Soler NG, Pahor A, Sugg J, Rohwedder K, et al. Long-term efficacy of dapagliflozin in patients with type 2 diabetes mellitus receiving high doses of insulin. *Ann Intern Med.* 2012;156(6):405-415.
7. Wanner C, Inzucchi SE, Lachin JM, Fitchett D, von Eynatten M, Mattheus M, et al. Empagliflozin and progression of kidney disease in type 2 diabetes. *N Engl J Med.* 2016;375(4):323-334.
8. Neal B, Perkovic V, Mahaffey KW, de Zeeuw D, Fulcher G, Erondu N, et al. Canagliflozin and cardiovascular and renal events in type 2 diabetes. *N Engl J Med.* 2017;377(7):644-657.
9. Perkovic V, Jardine MJ, Neal B, Bompoint S, Heerspink HJL, Charytan DM, et al. Canagliflozin and renal outcomes in type 2 diabetes and nephropathy. *N Engl J Med.* 2019;380(24):2295-2306.
10. Mosenzon O, Wiviott SD, Cahn A, Rozenberg A, Yanuv I, Goodrich EL, et al. Effects of dapagliflozin on development and progression of kidney disease in patients with type 2 diabetes. *Lancet Diabetes Endocrinol.* 2019;7(8):606-617.
11. Heerspink HJL, Stefansson BV, Correa-Rotter R, Chertow GM, Greene T, Hou FF, et al. Dapagliflozin in patients with chronic kidney disease. *N Engl J Med.* 2020;383(15):1436-1446.
12. Verma S, McMurray JJV. SGLT2 inhibitors and mechanisms of cardiovascular benefit. *Cell Metab.* 2018;28(3):350-359.
13. Fitchett D, Inzucchi SE, Zinman B, Wanner C, Schumacher M, Schmoor C, et al. Mediators of the improvement in heart failure outcomes with empagliflozin in EMPA-REG OUTCOME. *ESC Heart Fail.* 2021;8(6):4517-4527.
14. Raz I, Mosenzon O, Bonaca MP, Cahn A, Kato ET, Silverman MG, et al. DECLARE–TIMI 58: Participants' baseline characteristics. *Diabetes Obes Metab.* 2018;20(5):1102-1110.
15. Cahn A, Mosenzon O, Wiviott SD, Rozenberg A, Yanuv I, Goodrich EL, et al. Efficacy and safety of dapagliflozin in the elderly: Analysis from DECLARE-TIMI 58 Study. *Diabetes Care.* 2020;43(2):468-475.
16. Schechter M, Wiviott SD, Raz I, Goodrich EL, Rozenberg A, Yanuv I, et al. Effects of dapagliflozin on hospitalisations in people with type 2 diabetes. *Lancet Diabetes Endocrinol.* 2023;11(4):233-241.
17. Muskiet MHA, van Raalte DH, van Bommel EJM, Smits MM, Tonneijck L. Understanding EMPA-REG OUTCOME. *Lancet Diabetes Endocrinol.* 2015;3(12):928-929.
18. Wanner C, Heerspink HJL, Zinman B, Inzucchi SE, Koitka-Weber A, Mattheus M, et al. Empagliflozin and kidney function decline in patients with type 2 diabetes. *J Am Soc Nephrol.* 2018;29(11):2755-2769.
19. Zinman B, Inzucchi SE, Lachin JM, Wanner C, Fitchett D, Bluhmki E, et al. Rationale, design, and baseline characteristics of EMPA-REG OUTCOME. *Cardiovasc Diabetol.* 2014;13:102.
20. Verma S, Bhatt DL, Bain SC, Buse JB, Mann JFE, Marso SP, et al. Effects of empagliflozin on cardiovascular and renal outcomes in patients with type 2 diabetes. *Circulation.* 2019;139(11):1384-1395.