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Real-World Clinical and Cardio-Renal Outcomes with Dapagliflozin in Type 2 Diabetes: Evidence from Southern India

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Abstract

Background: Managing type 2 diabetes (T2D) is challenging, and doctors often need treatments that help with more than just blood sugar control. Dapagliflozin is one such medication, offering benefits for heart, kidney, and metabolic health. Yet, real-world evidence on dapagliflozin use and perspectives among physicians in India is limited. Therefore, this study aims to understand real-world clinical and cardio-renal outcomes with dapagliflozin in the management of T2D from Southern India.

Methods: A questionnaire-based survey was conducted among physicians in southern India. It comprised 24 questions addressing the use of dapagliflozin in clinical practice and its effect on blood pressure, Hemoglobin A1c (HbA1C), fasting blood glucose, estimated glomerular filtration rate (eGFR), and its overall safety profile. Descriptive analysis was performed, and outcomes were expressed as percentages.

Result: A total of 251 physicians were included in this study. Physicians reported significant clinical benefits from the use of dapagliflozin in routine practice. Most physicians (60.56%) observed an average HbA1c reduction of 1.1-1.5% within three months, with evident glycemic improvement often seen by 2-4 weeks. Combination therapy of dapagliflozin with metformin was common (93.63%). Dapagliflozin was frequently prescribed for adults aged 41-60 years. Among hypertensive patients, more than half of the physicians (60.56%) reported a 5-10 mmHg reduction in blood pressure. According to 60.16% of physicians, the key cardiovascular benefit was a reduction in major adverse cardiac events. Renal observations of physicians (69.72%) reported an initial mild decrease in eGFR followed by stabilization, and improved proteinuria in many patients. Metabolic improvements such as reduced triglycerides and increased high-density lipoprotein cholesterol were also reported (50.60%). Adverse events were infrequent, and most physicians (66.93%) had not encountered diabetic ketoacidosis.

Conclusion: The survey demonstrated that physician's favour dapagliflozin for managing T2D in a wide range of patients, and it is found to be both effective and well-tolerated in routine practice.

Keywords: Sodium Glucose Cotransporter-2 Inhibitor; Type 2 Diabetes; Dapagliflozin

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1. Introduction

Type 2 diabetes (T2D) is the predominant form of diabetes and results primarily from a combination of insulin resistance and inadequate insulin secretion. It continues to be a major global health challenge, with the number of affected adults aged 20-79 projected to rise from the current 537 million to approximately 783 million by 2045 [1]. India has the second-largest number of people living with diabetes in the world. In 2021, about 74.9 million adults aged 20-79 had diabetes, and this number is expected to rise to nearly 125 million by 2045 [2].

Inadequate management of diabetes can lead to several serious health problems, such as damage to the eyes, kidneys, and nerves; a higher risk of heart disease, stroke, and foot complications; and greater susceptibility to infections [3]. Dapagliflozin (BMS-512148) is an oral sodium-glucose cotransporter 2 (SGLT2) inhibitor developed for managing T2DM. It targets SGLT2, a transporter found predominantly in the kidneys, to help regulate blood glucose levels [4]. Metformin monotherapy often fails to achieve or sustain adequate glycemic control. Even patients who initially reach target levels typically require additional therapies over time because of the progressive nature of T2DM [5]. Combining dapagliflozin with metformin produced greater improvements in metabolic syndrome measures than using either drug alone [6].

The DAPA-HF trial, the first to study patients with heart failure with reduced ejection fraction, both with and without T2DM, found that dapagliflozin reduces the risk of CV death or heart-failure hospitalization by 26% [7]. Previous randomized clinical trials of dapagliflozin showed lower HbA1c across various stages of T2D. The drug has also been associated with modest weight loss and slight reductions in BP. These positive outcomes have been seen whether dapagliflozin is used alone or alongside other therapies, including metformin (both immediate- and extended-release), sulfonylureas, dipeptidyl peptidase-4 (DPP-4) inhibitors, and insulin [8]. Despite dapagliflozin's clear benefits, some concerns still exist about its long-term safety, especially the risks of diabetic ketoacidosis and genital infections, though these infections are usually mild, easy to treat, and rarely serious [9].

Therefore, this study evaluates real-world clinical and cardiorenal outcomes of dapagliflozin in patients with T2D, and aims to assess patient characteristics, achievement of glycemic targets, metabolic effects, and safety outcomes.

2. Methods

2.1. Study design

A questionnaire-based, multicentre study was conducted to assess dapagliflozin in real-world practice for managing T2DM and cardiovascular outcomes across southern India. All results and findings in this report are derived from expert opinions.

2.2. Study questionnaire

The study questionnaire was developed using clinical guidelines, published literature, and expert insights. It comprised 24 questions addressing T2DM and cardiovascular outcomes, renal and metabolic effects, patient treatment response, and symptom relief. The questionnaire targeted data from the last 10 patients with T2DM and a cardiovascular history who were treated with dapagliflozin. The study protocol was approved by the Independent Ethics Committee (ACEAS - Independent Ethics Committee; Date of approval: 07 March 2025).

2.3. Data collection method

Participating physicians received a brief explanation of the study and instructions for completing the questionnaire. The questionnaire was administered either in person or via online platforms, depending on the physician's preference.

2.4. Data analysis

Responses to questions were entered into Microsoft Excel. Descriptive analysis was performed, and the outcome was presented as percentages.

3. Results

A total of 251 physicians from southern India (18.33% Andhra Pradesh, 45.02% Karnataka, 2.79% Kerala, 23.90% Tamil Nadu, and 9.96% Telangana) participated in this study. Approximately 40.00% reported a common HbA1C range of 8.1-9.0% before starting dapagliflozin treatment, and 35.06% reported a range of 7.0-8.0%. A significant proportion of

physicians (35.86%) observed 1.1-1.5% of average HbA1C reduction after three months of dapagliflozin therapy. Most physicians (37.05%) reported 31-50 mg/dL as the most common fasting blood glucose (FBG) level improvement range seen in patients on dapagliflozin. Around 44.62% of physicians observed significant glycemic improvement after 2-4 weeks of starting dapagliflozin treatment.

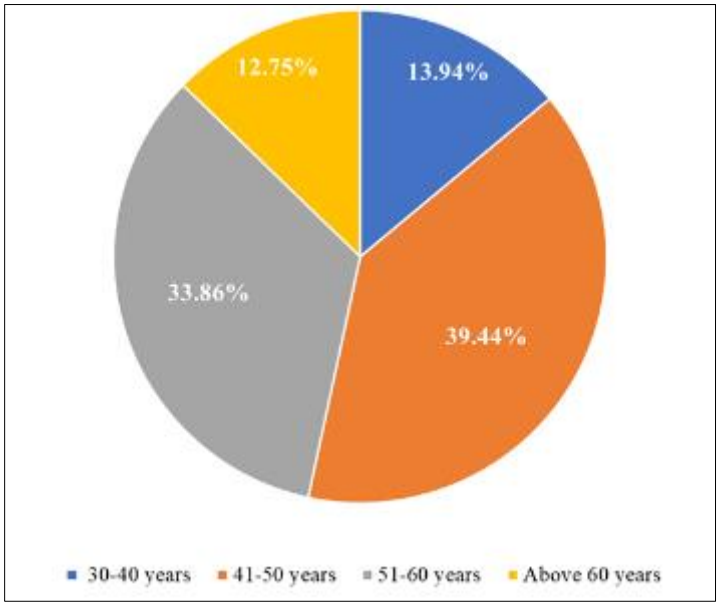
About 59.36% of physicians most frequently prescribed a combination therapy of metformin alongside dapagliflozin. Most of physicians (49.00%) reported that 9-10 patients achieved the target of HbA1c (<7%) after dapagliflozin initiation (Table 1).

Table 1 Physicians' response to glycemic profile and drug treatment

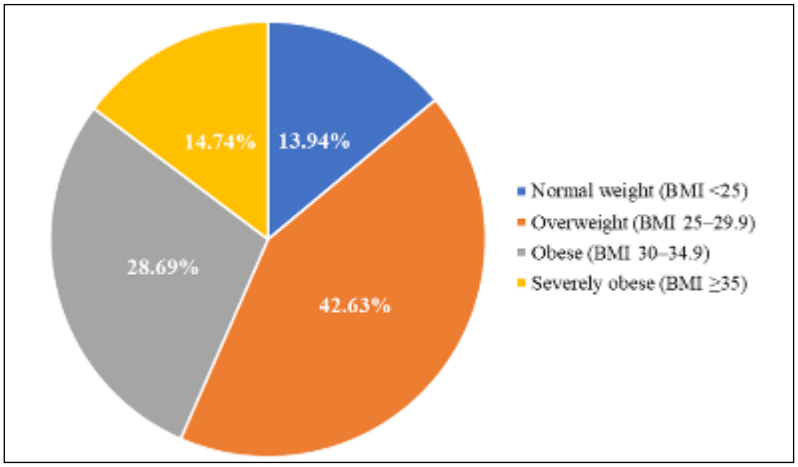
Parameters	Response of Physicians (N=251)
Common HbA1c range before starting	
<7.0%	23 (9.16)
7.0-8.0%	88 (35.06)
8.1-9.0%	99 (39.44)
Above 9.0%	41 (16.33)
HbA1c reduction after 3 months	
<0.5%	22 (8.76)
0.5-1.0%	70 (27.89)
1.1-1.5%	90 (35.86)
Above 1.5%	69 (27.49)
FBG improvement range	
<10 mg/dL	32 (12.75)
10-30 mg/dL	65 (25.90)
31-50 mg/dL	93 (37.05)
Above 50 mg/dL	61 (24.30)
Time to significant glycemic improvement	
Within 1 week	60 (23.90)
2-4 weeks	112 (44.62)
5-8 weeks	50 (19.92)
Above 8 weeks	29 (11.55)
Most common combination therapy	
Metformin	149 (59.36)
DPP-4 inhibitors	47 (18.73)
Sulfonylureas	34 (13.55)
Insulin	21 (8.37)
Patients achieving target HbA1c <7%	
0-2 patients	18 (7.17)
3-5 patients	42 (16.73)
6-8 patients	68 (27.09)
9-10 patients	123 (49.00)

Data represented as n (%).
DPP-4 Inhibitor, dipeptidyl peptidase-4 inhibitor

Nearly 40.00% prescribed dapagliflozin to the 41-50 years age group, and 33.86% physicians prescribed it for the 51-60 years age group. Approximately 42.63% of physicians reported that 25-29.9 (overweight), the most frequent BMI category of patients who were prescribed dapagliflozin (Figure 1 a, b).



a] Age group



b] BMI category

Figure 1 Profile of patients recently prescribed dapagliflozin by physicians

Among physicians, 45.42% reported a 5-10 mmHg decrease in BP, whereas 24.30% reported a reduction of less than 5 mmHg in hypertensive diabetic patients receiving dapagliflozin. Most physicians (43.82%) reported that 9-10 patients experienced improvement in heart failure symptoms with dapagliflozin. A significant proportion of physicians (39.84%) observed a reduced hospitalization for heart failure most common cardiovascular benefit in patients after initiating dapagliflozin.

Half of physicians (50.60%) occasionally (1-3 patients) observed a reduction in peripheral oedema, and 39.04% observed it frequently (4-7 patients) after starting dapagliflozin. Most physicians (44.62%) reported a mild reduction in eGFR initially, then stabilization, and 35.46% reported significant improvement in proteinuria as the most common effect of dapagliflozin on kidney function. Approximately, 37.45% experienced in 6-8 patients and 33.86% experienced in 9-10 patients weight loss (>2 kg) after three months on dapagliflozin. Most of the physicians (39.04%) experienced an average weight loss of 4-6 kg, while 37.85% physicians experienced 2-4 kg in patients on dapagliflozin. A significant number of physicians (43.43%) reported slowed progression impact among patients with chronic kidney disease (CKD), with dapagliflozin.

Half of the physicians (50.60%) experienced reduced triglycerides, and 47.41% experienced improved HDL cholesterol as the most common metabolic effect of dapagliflozin apart from glycemic control (Table 2).

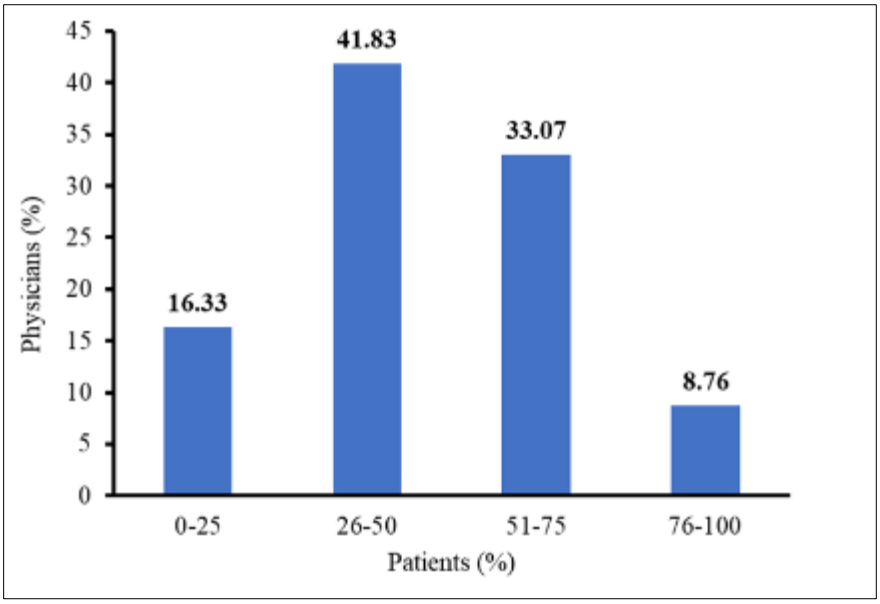
Table 2 Reported cardiovascular, renal, and metabolic effects of dapagliflozin

Parameters	**Response of Physicians (N=251)**
BP impact in hypertensives	
Reduced by <5 mmHg	61 (24.30)
Reduced by 5-10 mmHg	114 (45.42)
Reduced by above 10 mmHg	50 (19.92)
No change	26 (10.36)
Improvement in heart failure symptoms	
0-2 patients	20 (7.97)
3-5 patients	57 (22.71)
6-8 patients	64 (25.50)
9-10 patients	110 (43.82)
Common CV benefit observed	
Reduced hospitalization for heart failure	100 (39.84)
Improved blood pressure control	78 (31.08)
Lower incidence of major adverse cardiac events	55 (21.91)
No noticeable cardiovascular benefits	18 (7.17)
Frequency of reduced peripheral oedema	
Occasionally (1-3 patients)	127 (50.60)
Frequently (4-7 patients)	98 (39.04)
Very often (8-10 patients)	26 (10.36)
Never	0
Effect on kidney function	
Mild reduction in eGFR initially, then stabilization	112 (44.62)
Significant improvement in proteinuria	89 (35.46)
No effect	36 (14.34)
Worsening renal function	14 (5.58)
Patients with >2 kg weight loss	
0-2 patients	19 (7.57)
3-5 patients	53 (21.12)
9-10 patients	85 (33.86)
6-8 patients	94 (37.45)
Average weight loss	
<2 kg	44 (17.53)
2-4 kg	95 (37.85)
4-6 kg	98 (39.04)

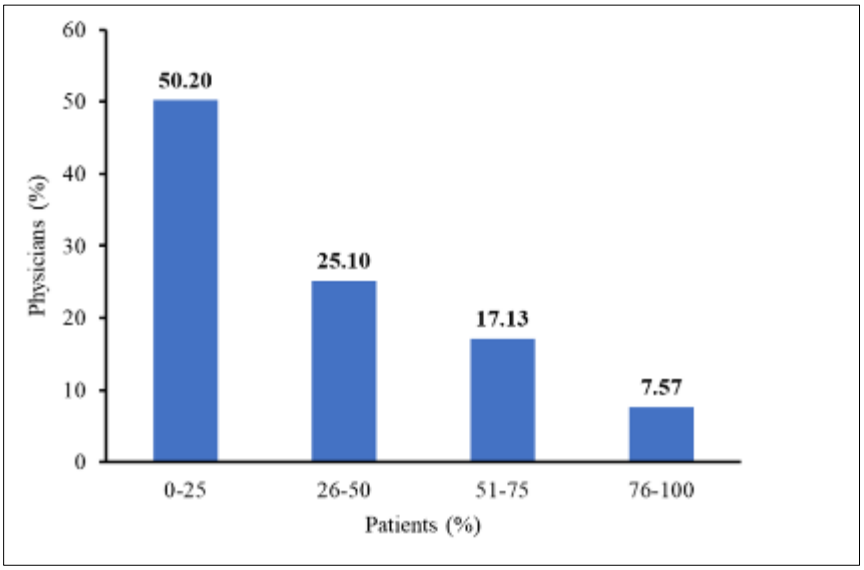
Above 6 kg	14 (5.58)
Impact in CKD patients	
Slowed progression of CKD	109 (43.43)
Improved albuminuria	76 (30.28)
No change	54 (21.51)
Worsened renal function	12 (4.78)
Other metabolic effects (beyond glycemia)	
Reduced triglycerides	93 (37.05)
Improved HDL cholesterol	85 (33.86)
No metabolic effects	20 (7.97)
Increased LDL cholesterol	16 (6.37)
All of the above	37 (14.74)

Data represented as n (%). CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; HDL, high-density lipoprotein; LDL, low-density lipoprotein

About 41.83% of physicians reported that 26-50 % of their patients on dapagliflozin had a history of CVD. Half of physicians (50.20%) reported that 0-25% of patients had a history of heart failure before starting dapagliflozin (Figure 2 a, b).



a] History of cardiovascular disease



b] History of heart failure

Figure 2 Cardiovascular history of patients recently prescribed dapagliflozin by physician

Around 47.81% of physicians observed that there is no adverse event reported among patients on dapagliflozin. The majority of physicians (65.34%) reported that none of the patients had discontinued dapagliflozin due to its side effects. A majority of physicians (71.71%) preferred the management approach of antifungal/antibacterial treatment while continuing dapagliflozin in genital infections. More than half of physicians (58.57%) experienced affected hydration status, like mild fluid loss with stable electrolytes, with dapagliflozin. Nearly 70.00% never encountered any cases of DKA in patients on dapagliflozin (Table 3).

Table 3 Physicians' response to safety and tolerability of dapagliflozin

Parameters	Response of Physicians (N=251)
Most common adverse event	
Genital infections	71 (28.29)
Dehydration	40 (15.94)
Hypoglycemia	20 (7.97)
None	120 (47.81)
Discontinuation due to side effects	
0 patients	164 (65.34)
1-2 patients	63 (25.10)
3-4 patients	17 (6.77)
Above 5 patients	7 (2.79)
Management of genital infections	
Antifungal/antibacterial treatment while continuing Dapagliflozin	180 (71.71)
Switching to another SGLT2 inhibitor	28 (11.16)
Discontinuation of Dapagliflozin	23 (9.16)
Dose reduction	20 (7.97)
Effect on hydration	
Mild fluid loss with stable electrolytes	147 (58.57)
No effect	59 (23.51)
Increased dehydration risk in the elderly	28 (11.16)
Severe dehydration requiring intervention	17 (6.77)
Any DKA cases	
Rarely (1 case)	52 (20.72)
Occasionally (2–3 cases)	27 (10.76)
Frequently (Above 3 cases)	4 (1.59)
Never	168 (66.93)

Data represented as n (%).
SGLT2 Inhibitor, sodium-glucose co-transporter 2 inhibitor

4. Discussion

The current study offers valuable insights into the real-world clinical use and perceived effectiveness of oral dapagliflozin in the treatment of T2DM. According to physicians, the majority of patients receiving dapagliflozin come within the overweight range (BMI 25-29.9 kg/m^2). This aligns with findings from Oyama et al., who also reported prescribing it mainly to patients with a BMI of 25-<30 kg/m^2 [10]. An average 1.1-1.5% decrease in HbA1c after three months of dapagliflozin was observed. whereas a significant 0.8% reduction in HbA1c was found for the same time point in a previous study [8]. In this study, physicians reported 31-50 mg/dL as the most common FBG level improvement range seen in patients on dapagliflozin. This aligns with a previous study, which reported that dapagliflozin significantly lowered the FPG by 33 mg/dL [11].

The present study demonstrates, physicians most often prescribed dapagliflozin together with metformin. This is in line with evidence showing that people with T2D not well controlled on metformin alone by adding dapagliflozin improve blood sugar and support steady weight reduction for nearly two years [12].

In this study, a significant proportion (41.83%) of physicians reported that 26-50 % of their patients on dapagliflozin had a history of CVD. Similarly, Sonesson C et al. showed that patients with CVD found no sign of CV events with the dapagliflozin [13].

According to the current study, around 50.20% physicians reported that 0-25% of patients had a history of heart failure before starting Dapagliflozin. This is in line with a study including high CV risk patients [13].

In this survey, physicians observed a 5-10 mmHg decrease in BP, while some reported a smaller (<5 mmHg) reduction with dapagliflozin in hypertensive patients. This corresponds to findings that showed SGLT2 inhibitors lowered 24-hour systolic BP by about 5 mmHg [14]. The majority of physicians reported a mild reduction in eGFR initially, followed by stabilisation, and significant improvement in proteinuria as the most common renal effect of dapagliflozin. Similarly, dapagliflozin reduces the risk for adverse renal outcomes in people with T2D, including a reduction in deterioration of the eGFR and progression to ESKD [15].

A significant proportion of (66.93%) physicians never encountered any cases of DKA in patients on dapagliflozin. In contrast to this, clinical trials have reported a higher incidence of DKA among patients using SGLT2 inhibitors, including dapagliflozin [9].
Around 37.05% of physicians experienced reduced triglycerides, and 33.86% experienced improved HDL cholesterol, as the most common metabolic effects of dapagliflozin, apart from glycemic control. This is in line with a study showing favourable trends that were observed in the modulation of lipid profile (total cholesterol, LDL, HDL, and triglycerides) with dapagliflozin [9].

A large proportion of physicians observed that there is no common adverse event reported among patients on dapagliflozin. In contrast to this, an earlier study shows that the higher rates of DKA and urinary tract infections (UTIs) [9].

This study has several important limitations. First, the survey sample was restricted to physicians practising in Southern India, which may limit the applicability of the findings to broader populations. Second, the cross-sectional, questionnaire-based design prevents assessment of causal relationships and long-term clinical outcomes. Additionally, the survey did not distinguish between newly initiated and long-term dapagliflozin users, restricting evaluation of treatment duration–dependent effects. Finally, the absence of patient-reported outcomes limits the ability to assess real-world tolerability, symptom burden, and quality-of-life impacts associated with dapagliflozin therapy.

5. Conclusion

The findings from this study demonstrated significant improvements in blood sugar, fasting glucose, HbA1C, BP, kidney function, and lipid profile. Dapagliflozin was commonly combined with metformin and was generally well-tolerated, with few doctors reporting side effects. Looking ahead, these real-world insights support the continued and expanding use of dapagliflozin as part of a comprehensive, long-term strategy for improving outcomes in patients with T2DM, particularly those with cardiovascular or renal risk.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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