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Clinicians' preferences and perspectives on the management of type 2 diabetes mellitus in Indian settings

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Abstract

Objective: To gather clinicians' preferences and perspectives on managing type 2 diabetes mellitus (T2DM) in Indian settings, with a focus on combination therapies, prescription patterns, factors affecting glycemic control, and treatment adherence strategies.

Methodology: This cross-sectional study utilized a multiple-response questionnaire consisting of 23 questions on feedback, clinical observations, prescription practices, and experiences of specialists in managing T2DM in routine settings. Data analysis was performed using descriptive statistics.

Results: The study included 442 clinicians, with 52% of respondents reporting that aggressive weight reduction and lifestyle modifications are the most common management approaches for young patients (<45 years) with HbA1c >7%. According to 30% of clinicians, lack of awareness is a key factor contributing to poor glycemic control in patients with T2DM. Approximately 77% reported that vildagliptin is the most frequently preferred gliptin for young T2DM patients (<45 years). As noted by 72% of clinicians, the combination of vildagliptin + dapagliflozin is the most commonly chosen DPP4 inhibitor used alongside dapagliflozin. Regarding the use of a fixed-dose single-pill combination of vildagliptin + dapagliflozin, 48% of respondents reported prescribing it to 11–25% of their patients. Around 36% of participants stated that this combination is particularly favored for T2DM patients with comorbid atherosclerotic cardiovascular disease (ASCVD). The majority (93.67%) of clinicians identified voglibose as the preferred drug for patients with high postprandial blood glucose (PPBG). Approximately 61% preferred adding voglibose to glimepiride + metformin in cases of high PPBG, uncontrolled HbA1c on dual therapy, or poor lifestyle adherence.

Conclusion: This study indicates a preference for a combination-based, patient-centric approach to T2DM management, with vildagliptin and dapagliflozin emerging as key therapeutic choices among clinicians. Enhancing patient awareness and adherence remains a critical challenge. It also highlights the need for targeted interventions to improve glycemic control and optimize treatment strategies in Indian settings.

Keywords: Type 2 Diabetes; Vildagliptin; Voglibose; Chronic Kidney Disease

1. Introduction

Diabetes remains one of the top ten causes of mortality worldwide and significantly impacts healthcare systems and economies due to its associated complications, including atherosclerotic cardiovascular disease (ASCVD), chronic kidney disease (CKD), and microvascular complications [1,2]. Undiagnosed diabetes further increases the risk of adverse outcomes, as individuals without proper management are more likely to develop severe complications [3]. According to the 10th edition of the Diabetes Atlas, the prevalence of diabetes among individuals aged 20-39 increased

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from 2.9% in 2013 to 3.8% in 2021 [4]. By 2045, the global burden of diabetes is projected to reach 700 million, affecting approximately 11% of the world's population [2]. Young-onset T2DM is particularly concerning, as it is associated with greater insulin resistance, a more rapid decline in β-cell function, and an earlier onset of complications, leading to increased morbidity and mortality compared to late-onset T2DM [4].

In India, the diabetes epidemic has escalated rapidly, with the number of affected individuals rising from 33 million in 2000 to 72 million in 2021 [5]. Projections indicate that this number will reach 125 million by 2045, positioning India as one of the countries with the highest diabetes burden [6]. Currently, India ranks second only to China, with 77 million individuals with diabetes [2]. More than half of patients fail to reach the recommended glycated hemoglobin (HbA1c) target of ≤7%, highlighting the urgent need for improved management strategies [7].

Current treatment strategies emphasize a patient-centered approach, integrating lifestyle modifications and pharmacotherapy tailored to individual needs. Metformin remains the first-line antidiabetic drug, but for those who cannot tolerate it, fixed-dose combinations (FDCs) of other oral antidiabetic agents (OADs) are widely used. These include dipeptidyl peptidase-4 inhibitors (DPP4i), which enhance incretin hormone action; sodium-glucose co-transporter-2 inhibitors (SGLT2i), which promote renal glucose excretion; sulfonylureas (SUs), which stimulate insulin release; glucagon-like peptide-1 (GLP-1) receptor agonists, which enhance glucose-dependent insulin secretion; and voglibose, an alpha-glucosidase inhibitor that delays carbohydrate digestion to reduce postprandial glucose spikes [8-10].

Combination therapies improve glycemic control, reduce side effects, and enhance adherence [11]. FDCs simplify treatment by reducing pill burden and enhancing adherence [12]. Among these, DPP4i (e.g., vildagliptin) and SGLT2i (e.g., dapagliflozin) are preferred due to their complementary mechanisms and cardiometabolic benefits [13,14]. This study aims to gather clinicians' perspectives and preferences regarding T2DM management in Indian settings, with an emphasis on combination therapies, prescription patterns, factors affecting glycemic control, and treatment adherence strategies.

2. Materials and Methods

We carried out a cross-sectional study among physicians in treating diabetes mellitus in the major Indian cities from June 2024 to December 2024.

2.1. Questionnaire

The questionnaire booklet titled VISTA (Vildagliptin Combinations and Voglibose combinations in treatment of Type 2 diAbetes: Expert Perspective study) was sent to the clinicians who were interested in participating in this study. The VISTA study questionnaire included 23 questions addressing current feedback, prescription practice, clinical observations, and specialists' experiences in managing T2DM in routine practice. The study was conducted after receiving approval from Bangalore Ethics, an Independent Ethics Committee, which is recognized by the Indian Regulatory Authority, the Drug Controller General of India.

2.2. Participants

An invitation was sent to leading doctors in managing diabetes mellitus in the month of March 2024 for participation in this Indian survey. About 442 physicians from major cities of all Indian states, representing the geographical distribution, shared their willingness to participate and provide necessary data. The clinicians were allowed to skip any questions they did not wish to answer. They were instructed to answer the questionnaire on their own, without contacting any of their colleagues. A written informed consent was obtained from all the study participants before the initiation of the study.

2.3. Statistical analysis

The data were analyzed using descriptive statistics. Categorical variables were presented as percentages to provide a clear insight into their distribution. The frequency of occurrence and the corresponding percentage were used to represent the distribution of each variable. To visualize the distribution of the categorical variables, graphs and pie charts were created using Microsoft Excel 2019 (version 16.0.17928.20114).

3. Results

The study involved 442 clinicians, with approximately 60% reporting that 11–20% of their young patients (<45 years) have T2DM. According to 52% of the clinicians, the most common management approaches for young patients (<45 years) with HbA1c >7% are aggressive weight reduction and lifestyle modification (Table 1).

Table 1 Distribution of responses to the preferred approach for managing young patients (<45 years) with HbA1c >7%

Approach	Response rate (n = 442)
Focus on aggressive weight reduction and lifestyle modification	52.04%
Intensive pharmacotherapy	8.14%
Individualized approach	38.91%
Combination of lifestyle management and aggressive therapy	0.23%
All of the above	0.68%

Approximately 61% of respondents stated that 26–50% of patients with diabetes require two or more drugs for diabetes management. More than half (57.01%) reported that 6–15% of uncontrolled T2DM patients have renal complications. According to 30% of clinicians, a lack of awareness is a key factor contributing to poor glycemic control in T2DM patients (Table 2).

The majority of the participants (64.71%) reported using physical counseling methods, such as atlas handouts, to educate patients and improve treatment compliance. According to 77% of respondents, vildagliptin is the most commonly preferred gliptin in young T2DM patients (<45 years) (Figure 1).

Table 2 Distribution of responses to the factors contributing to poor glycemic control in patients with T2DM

Factors	Response rate (n = 442)
Affordability of medication	9.73%
Multiple pills and inertia to medication	14.71%
Lack of awareness	30.32%
Missed follow-up visits	14.71%
Noncompliance with medication	22.85%
All of the above	6.56%
Uncontrolled diet	0.23%
Lack of adherence to diet therapy and exercise	0.23%
Other contributing factors	0.23%
Poor lifestyle	0.45%

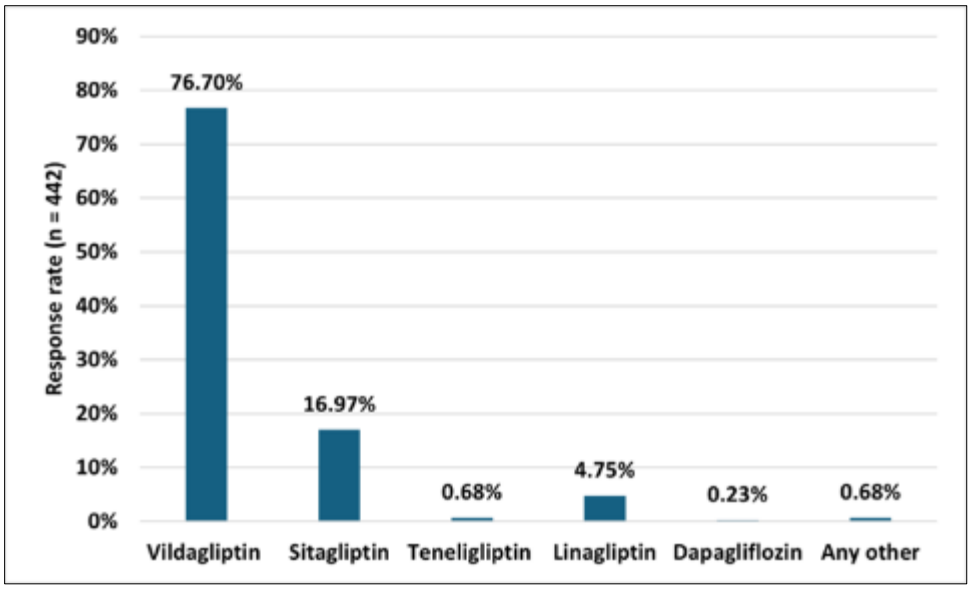

Figure 1 Distribution of responses to the most commonly preferred gliptin in young T2DM patients (<45 years)

More than half (54.75%) of clinicians stated that they use vildagliptin in approximately 21–30% of their patients compared to other gliptins. According to 53% of participants, the preferred formulation of vildagliptin is 100 mg sustained release taken once daily. About 44% of clinicians preferred the once-daily vildagliptin formulation for newly diagnosed young diabetic individuals. The majority (80.09%) reported that dapagliflozin is the most commonly used add-on drug in patients not controlled on vildagliptin-metformin combination therapy. Approximately 38% of participants noted that vildagliptin causes less glycemic variation than sulfonylureas, while 33% stated that it helps preserve beta-cell function. Around 56% of clinicians preferred using a vildagliptin-metformin combination in patients with HbA1c levels between 7.5% and 8.5%. As reported by 72% of clinicians, vildagliptin is the most commonly preferred DPP4i with dapagliflozin (Table 3).

Table 3 Distribution of responses to the most commonly preferred DPP4i with dapagliflozin

DPP4i	Response rate (n = 442)
Vildagliptin	71.95%
Sitagliptin	20.14%
Linagliptin	7.69%
Teneligliptin	0.23%

About 48% of participants reported preferring a FDC single-pill combination of vildagliptin + dapagliflozin in approximately 11 to 25% of patients, while 43% indicated preference in 26 to 50% of patients (Table 4). Approximately 42% stated that the advantage of the vildagliptin + dapagliflozin FDC extends beyond glycemic control. The single-pill combination is preferred for T2DM patients with comorbid ASCVD by 36% of clinicians, while 31% reported prescribing it in T2DM patients with comorbid CKD (Figure 2).

Table 4 Distribution of responses to clinicians' preference for a FDC single-pill combination of vildagliptin + dapagliflozin among T2DM patients

Proportions	Response rate (n = 442)
<10%	7.92%
11-25%	47.51%
26-50%	42.53%
51-75%	2.04%

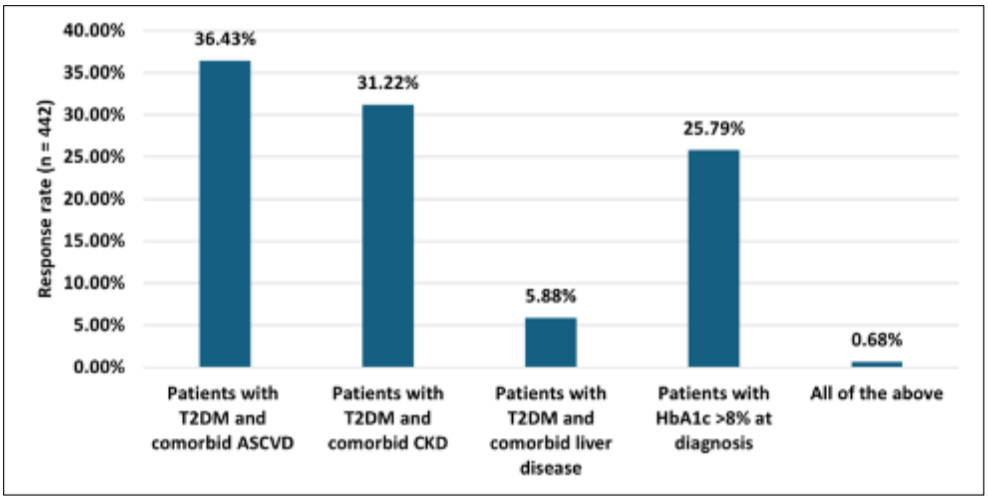

Figure 2 Distribution of response to patients using a single-pill combination of vildagliptin + dapagliflozin based on clinical subgroups

As reported by 55% of clinicians, PPBG control is a major concern in approximately 11 to 25% of diabetic patients. According to 52% of respondents, about 11 to 20% of diabetic patients with high PPBG adhere to dietary modifications, such as low carbohydrate intake. The majority (93.67%) reported that voglibose is the preferred drug for patients with high PPBG (Figure 3).

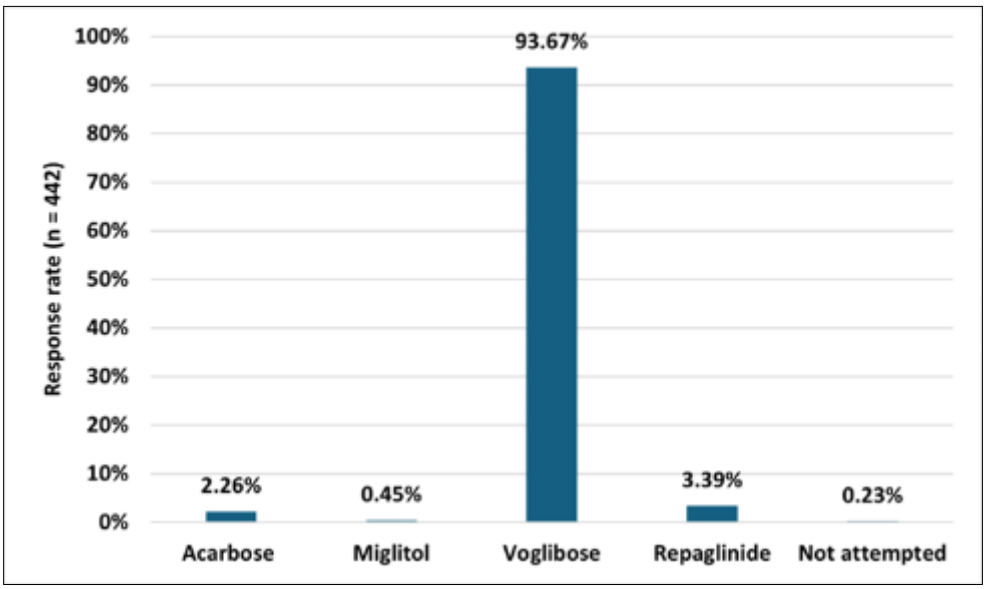

Figure 3 Distribution of response to the preferred drug in patients with high PPBG

Approximately 46% of participants preferred a single-pill combination of voglibose + glimepiride + metformin in 21 to 30% of patients, while 44% preferred it in about 11 to 20% of patients. About half (50.45%) reported using this triple-drug combination at HbA1c levels of 8 to 9%. Approximately 61% of clinicians preferred adding voglibose to glimepiride + metformin for patients with high PPBG, uncontrolled HbA1c on dual therapy, and poor lifestyle adherence (Table 5).

Table 5 Distribution of responses to the preferred patient profiles for adding voglibose to glimepiride + metformin

Patient profiles	Response rate (n = 442)
Patients with high PPBG	17.87%
Patients with uncontrolled HbA1c on dual therapy	19.91%
Patients with poor lifestyle adherence	1.36%
All of the above	60.86%

4. Discussion

The study highlights the predominant reliance on lifestyle modification and vildagliptin-based regimens for managing young T2DM patients, with combination therapies like vildagliptin + dapagliflozin preferred for enhanced glycemic control. Aggressive weight reduction and lifestyle modification emerged as the most common approach for young patients (<45 years) with HbA1c >7%. Kumari et al. demonstrated that structured counseling on diet, physical activity, and behavior modification significantly improved glycemic control in Indian T2DM patients over 12 months, with reductions in fasting blood sugar (175.5 ± 32.3 to 144.7 ± 17.6 mg/dL), postprandial blood sugar (275.5 ± 61.0 to 199.0 ± 48.3 mg/dL), and HbA1c (9.3 ± 1.5% to 8.4 ± 1.3%). These findings reinforce the effectiveness of lifestyle interventions in managing diabetes [15]. Similarly, Mehra et al. emphasized that sustainable lifestyle interventions, including diet and physical activity, significantly reduced HbA1c levels and medication dependence, reinforcing the value of personalized lifestyle strategies in diabetes management [16].

The study respondents identified a lack of awareness as a key factor contributing to poor glycemic control in T2DM patients. Consistent with this, Wangnoo et al. highlighted that lack of awareness is a significant challenge in diabetes care in India, often resulting in inadequate disease control and underscoring the need for enhanced education and awareness programs [17]. Similarly, Badedi et al. demonstrated a strong association between poor knowledge and inadequate glycemic control, reporting that T2DM patients with insufficient knowledge are 3.92 times more likely to experience difficulty in managing their blood sugar levels compared to those with better awareness [18]. These findings emphasize the critical role of patient education in improving diabetes outcomes.

The majority of current clinicians preferred vildagliptin for young T2DM patients (<45 years). Lauster et al. reported the drug's efficacy in reducing HbA1c, fasting plasma glucose, prandial glucose, and glucagon secretion while enhancing beta-cell function [19]. Pan and Wang found that vildagliptin improves glycemic control, preserves α- and β-cell function, reduces lipotoxicity and insulin resistance, and is well-tolerated, weight-neutral, and associated with a low risk of hypoglycemia and cardiovascular events [20].

According to the present survey, vildagliptin in combination with dapagliflozin is the most commonly preferred DPP-4 inhibitor. Maladkar et al. emphasized that the combined use of vildagliptin and dapagliflozin can synergistically reduce HbA1c levels while minimizing the risk of hypoglycemia and weight gain. Their study also highlighted that this combination effectively targets six of the eight core defects in the "ominous octet" of T2DM pathophysiology, supporting its rationale as a therapeutic approach [21].

In the present survey, clinicians preferred a fixed-dose single-pill combination of vildagliptin + dapagliflozin, particularly for patients with T2DM and comorbid ASCVD or CKD. An expert opinion-based consensus by Agrawala et al. also supported this combination as a suitable treatment option for a broad range of Indian T2DM patients [22]. Similarly, a previous survey by the current authors highlighted vildagliptin's efficacy and tolerability, recommending its use in patients with comorbidities or higher HbA1c levels for improved glycemic control [23]. Agrawala et al. further demonstrated that the vildagliptin-dapagliflozin FDC is effective across diverse T2DM populations, including those with ASCVD, heart failure, elderly patients, and individuals with obesity [22]. Additionally, a randomized study by Phrommintikul et al. compared dapagliflozin and vildagliptin, evaluating their impact on cardiometabolic parameters in T2DM patients with coronary artery disease [24].

In the present survey, voglibose emerged as the preferred choice for patients with high PPBG levels. Parmar et al. similarly demonstrated that early initiation of voglibose-based FDC effectively manages T2DM in such patients [25]. The VICTORY study by Kalra et al. further confirmed that voglibose, whether as monotherapy or add-on therapy, significantly reduces HbA1c, FBG, and PPBG while being well-tolerated in real-world T2DM settings [26]. Clinicians in the current survey favored adding voglibose to glimepiride + metformin for patients with high PPBG, uncontrolled HbA1c on dual therapy, and poor lifestyle adherence. Supporting this, a previous survey by current authors involving 879 Indian clinicians revealed that 92% endorsed this combination for effectively managing glycemic parameters, including FBG, PPBG, HbA1c, nocturnal hypoglycemia, and glycemic variability [27]. Additionally, a retrospective study by Shamanna et al. highlighted that the combination of 1 mg glimepiride, 500 mg metformin, and 0.2 mg voglibose is commonly prescribed in both newly diagnosed and long-standing T2DM cases, reinforcing its effectiveness in routine practice [28].

The current study findings provide valuable insights into clinicians' preferences and prescribing practices for managing T2DM in India, particularly in the selection of combination therapies and treatment strategies. The key strengths include its large sample size and the use of a structured, validated questionnaire to collect data from a diverse group of clinicians. However, some limitations must be considered. The study relies on expert opinion, which may introduce bias due to variations in individual clinical experience and prescribing preferences. Additionally, the survey-based methodology may not fully capture emerging treatment trends or evolving clinical evidence. Another limitation is the lack of direct patient data, as it is based solely on clinician perspectives rather than real-world patient outcomes. These factors should be considered when interpreting the results. Future research should include prospective studies or real-world observational data to validate clinician-reported findings and provide a more comprehensive understanding of optimal treatment strategies for T2DM in India.

5. Conclusion

This study highlights clinician preferences in T2DM management in India, emphasizing lifestyle modifications, early combination therapy, and fixed-dose regimens like vildagliptin-dapagliflozin. Lack of awareness remains a key barrier to glycemic control, underscoring the need for better patient education. The preference for vildagliptin and dapagliflozin combination therapy reflects its perceived efficacy in improving glycemic outcomes and managing comorbid conditions such as ASCVD and CKD. Clinicians favor voglibose for postprandial hyperglycemia and combination therapies for improved outcomes, guiding patient-centric diabetes care strategies.

Compliance with ethical standards

Acknowledgments

We would like to thank all the clinical practitioners who participated in this study.

Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of ethical approval

The study was conducted after receiving approval from Bangalore Ethics, an Independent Ethics Committee, which is recognized by the Indian Regulatory Authority, the Drug Controller General of India.

Statement of informed consent

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

Author contributions

Both authors contributed equally.

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