

## EXPERT PERSPECTIVES AND PREFERENCES IN THE MANAGEMENT OF HYPERTENSION WITH ASSOCIATED COMORBIDITIES IN INDIAN SETTINGS

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### Abstract

**Objectives:** To assess clinician's perspectives and preferences in the management of hypertension (HTN) with associated comorbidities, with particular emphasis on chronic kidney disease (CKD), diabetes mellitus (DM), resistant HTN, and the use of combination therapies such as telmisartan + cilnidipine in routine clinical practice.

**Methods:** This nationwide, cross-sectional study included clinical experts involved in the management of hypertension across routine clinical settings in India. Data were collected using a structured questionnaire assessing comorbidities, treatment preferences, challenges in HTN management, and clinician-reported outcomes associated with antihypertensive therapies. Data were analyzed using descriptive statistics, with categorical variables expressed as frequencies and percentages and presented in tables and figures.

**Results:** A total of 989 clinicians participated in the survey. Nearly half (48.13%) of the clinicians identified dyslipidemia as the most commonly observed comorbidity in HTN patients. In hypertensive patients with DM, 64% of clinicians stated that angiotensin receptor blockers (ARBs) are the preferred first-line treatment. About 55% of the respondents reported that ARBs are the preferred first-line drug class in hypertensive patients with CKD. Pedal edema was identified as the most common side effect associated with antihypertensive therapy by 57% of clinicians. Approximately 73% of respondents reported frequently recommending the telmisartan + cilnidipine combination therapy in routine practice. Half (50.35%) of the clinicians reported superior blood pressure (BP) control as the major benefit associated with

telmisartan + cilnidipine therapy. About 65% of respondents rated telmisartan + cilnidipine as more effective compared with other ARB + calcium channel blockers (CCBs) combinations. Furthermore, 64% of respondents considered improved cardiovascular (CV) and renal protection as the primary advantage of preferring telmisartan + cilnidipine over beta-blockers + diuretics in diabetic hypertensive patients.

**Conclusion:** Dyslipidemia is the most common comorbidity in hypertension. ARBs are the preferred first-line therapy in patients with diabetes and CKD. Pedal edema was the most commonly reported adverse effect associated with antihypertensive therapy. The telmisartan + cilnidipine combination is frequently recommended because of its superior BP control, better effectiveness, and enhanced CV and renal protection.

**Keywords:** Hypertension, chronic kidney disease, diabetes mellitus, telmisartan, cilnidipine, combination therapy, antihypertensive agents, cardio-renal protection

## **Introduction**

Hypertension (HTN) is a major contributor to non-communicable diseases and remains one of the leading causes of premature mortality worldwide, accounting for nearly 12.8% of all global deaths.<sup>1,2</sup> In India, hypertension represents a significant public health challenge, with an estimated 220 million adults affected by the condition.<sup>1,3,4</sup>

Hypertension commonly coexists with several metabolic and cardiovascular (CV) comorbidities, particularly dyslipidemia, diabetes mellitus (DM), chronic kidney disease (CKD), and coronary artery disease (CAD).<sup>5,6,7</sup> Dyslipidemia is among the most frequently associated comorbid conditions in HTN patients and substantially enhances the risk of atherosclerotic cardiovascular disease (ASCVD).<sup>8,9</sup> Similarly, DM and CKD frequently coexist with HTN because of shared pathophysiological mechanisms such as endothelial dysfunction, insulin resistance, inflammation, and activation of the renin–angiotensin–aldosterone system (RAAS).<sup>5,6</sup>

Combination therapy with telmisartan and cilnidipine has emerged as an effective strategy for managing HTN, especially in patients with associated metabolic and renal comorbidities.<sup>10,11</sup> Telmisartan, an angiotensin II receptor blocker (ARB), lowers blood pressure (BP) by selectively blocking angiotensin II type-1 (AT1) receptors, thereby preventing vasoconstriction, aldosterone secretion, sodium retention, and sympathetic activation. It also exhibits partial PPAR- $\gamma$  agonistic activity, improving insulin sensitivity and providing CV and

renal protective effects.<sup>12</sup> Cilnidipine is a dual L/N-type calcium channel blocker (CCBs) used in hypertension management. It inhibits calcium influx into vascular smooth muscle and sympathetic nerve terminals, producing vasodilation and reducing sympathetic overactivity. Cilnidipine lowers BP, decreases proteinuria, and provides renal and CV protection, particularly in patients with DM and CKD.<sup>13</sup>

Despite increasing clinical use of this combination in India, limited studies are available regarding clinician preferences and perceived benefits associated with telmisartan + cilnidipine therapy in hypertensive patients with comorbid conditions. Therefore, the present survey was conducted to assess clinician-reported patterns in the management of HTN with associated comorbidities, with particular emphasis on treatment preferences, use of ARBs and CCBs, and perceived clinical benefits of telmisartan + cilnidipine combination therapy in routine clinical practice.

## **Methodology**

A cross-sectional study was carried out among clinicians involved in the management of HTN with associated comorbidities in the major Indian cities from June 2025 to December 2025. The study was performed in accordance with Bangalore Ethics, an Independent Ethics Committee (ECR/355/Indt/KA/2022), which was recognized by the Indian Regulatory Authority, the Drug Controller General of India.

An invitation was sent to leading clinicians in managing HTN with associated comorbidities in the month of March 2025 for participation in this Indian survey. About 989 clinicians from major cities of all Indian states, representing the geographical distribution, shared their willingness to participate and provide necessary data.

The questionnaire booklet titled the TECTONIC (Telmisartan and Cilnidipine Combination for Targeted Outcomes in Nephro and Integrated Cardio protection in Hypertensives- Expert Perspective Study) was sent to the clinicians who were interested in participating in the survey. The study questionnaire comprising 23-items questions focused on disease burden, associated comorbidities, treatment approaches, and challenges encountered in hypertension management. The survey instrument was designed to assess clinician perspectives on hypertension management, particularly in patients with comorbid conditions such as CKD, DM, dyslipidemia, and resistant hypertension. The questionnaire assessed the prevalence of

comorbidities, factors influencing the selection of antihypertensive therapy, and commonly encountered barriers to achieving optimal BP control.

The survey further explored clinicians' preferences for antihypertensive agents, including ARBs, angiotensin-converting enzyme (ACE) inhibitors, CCBs, beta-blockers, and combination therapies. Particular emphasis was placed on the use of cilnidipine and telmisartan + cilnidipine combination therapy in patients with hypertension, CKD, and DM. Clinicians' perceptions regarding the efficacy, safety, cardio-renal protective benefits, and tolerability of these therapies were also assessed.

Additionally, the questionnaire evaluated monitoring practices such as renal function assessment, frequency of recommending combination or triple-drug therapy, and the incidence of adverse effects associated with antihypertensive medications. The survey also captured clinician opinions regarding the advantages of cilnidipine over conventional CCBs and the impact of telmisartan + cilnidipine therapy on renal outcomes.

Reliability, as determined by a split-half test (coefficient alpha), was adequate but should be improved in future versions of the questionnaire. A study of criterion validity was undertaken to test the questionnaire and to develop methods of testing the validity of measures of Physicians' Perspectives. However, the extraneous variables in this include the clinician's experience, usage of the newer drugs, etc. The two criteria used were the doctors' perspectives from the clinical practice and the assessment of an external assessor and statistician. Clinicians had the option to skip questions as desired and were instructed to complete the survey independently, without peer consultation. Before participating in the survey, all respondents provided written informed consent.

### **Statistical analysis**

Survey responses were analyzed using descriptive statistical methods. Categorical variables were summarized as frequencies and percentages. Data were presented in the form of tables and figures prepared using Microsoft Excel (version 2409, build 16.0.18025.20030).

### **Results**

A total of 989 clinicians participated in the survey. Approximately 38% of the respondents reported that 31–40% of their patients with HTN had associated comorbid conditions in routine

clinical practice. Nearly half (48.13%) of the clinicians identified dyslipidemia as the most commonly observed comorbidity in HTN patients (Table 1).

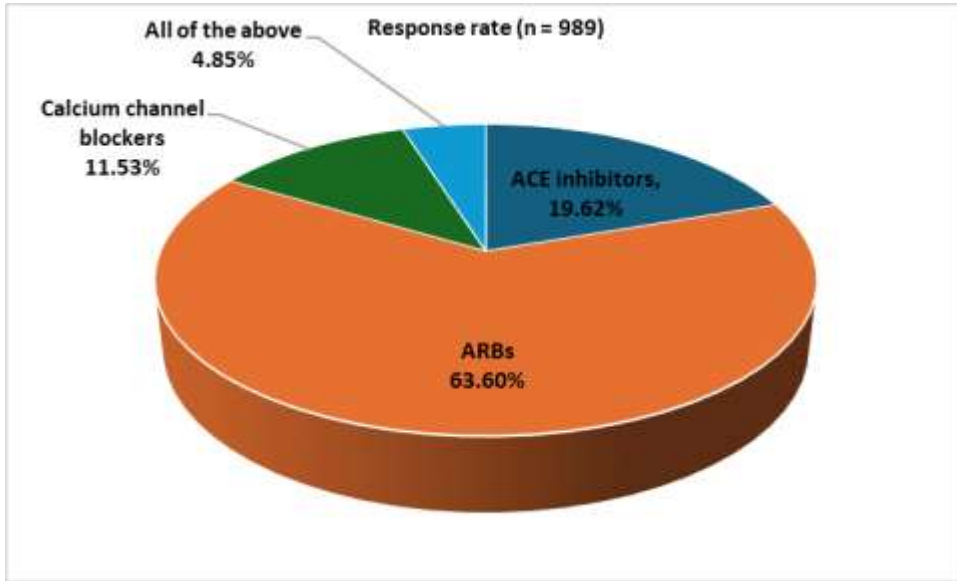
**Table 1: Distribution of responses on most common comorbidities observed in patients with HTN**

Comorbidity	Response rate (n = 989)
Dyslipidemia	48.13%
Diabetes mellitus	29.42%
Chronic kidney disease	10.82%
Coronary artery disease	4.85%
Stroke/ neurological disorders	1.62%
All of the above	5.16%

Around 47% of the participants considered CKD as the most challenging comorbidity while selecting antihypertensive therapy. Approximately 48% of clinicians stated occasionally encountering hypertension with proteinuria in their practice.

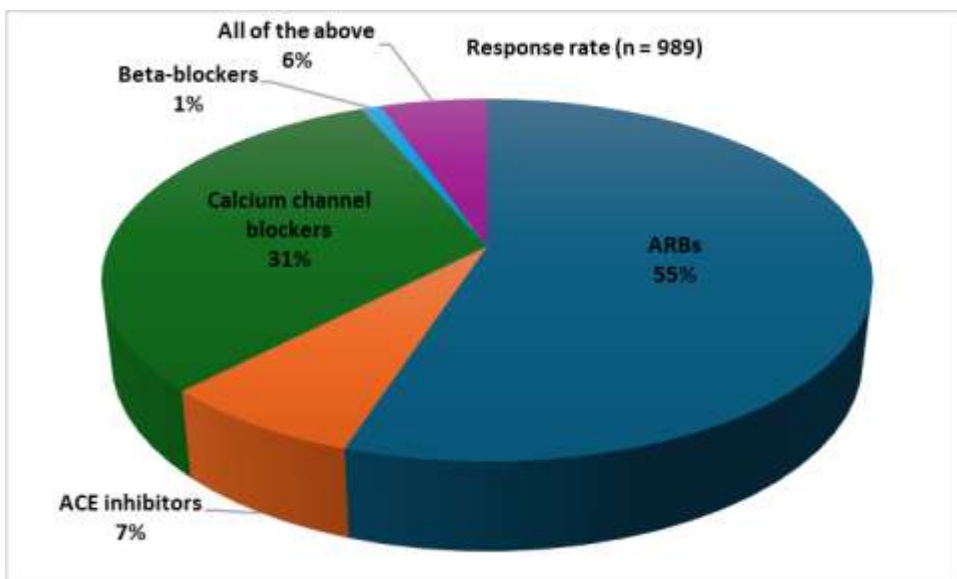
Nearly 49% of respondents considered cardio-renal protective benefits as the most important factor while choosing an antihypertensive regimen. More than half (57.23%) of the clinicians indicated that resistant HTN is most commonly observed among patients aged 40–59 years. According to 55% of the participants, drug adherence is the most common challenge in HTN management. About 64% of clinicians indicated ARBs as the preferred first-line treatment in hypertensive patients with DM.

**Fig. 1: Distribution of responses on preferred first-line treatment for HTN patients with DM**



A majority (69.67%) of respondents reported frequently recommending combination therapy for HTN management. More than half (51.47%) of clinicians identified medication non-compliance as the most common reason for uncontrolled HTN. Approximately 42% of respondents reported assessing renal function every 6 months in HTN patients. Around 47% of clinicians routinely used serum creatinine testing to evaluate kidney function in HTN patients. Approximately 55% of experts identified ARBs as the preferred first-line drug class for HTN patients with CKD (Fig. 2).

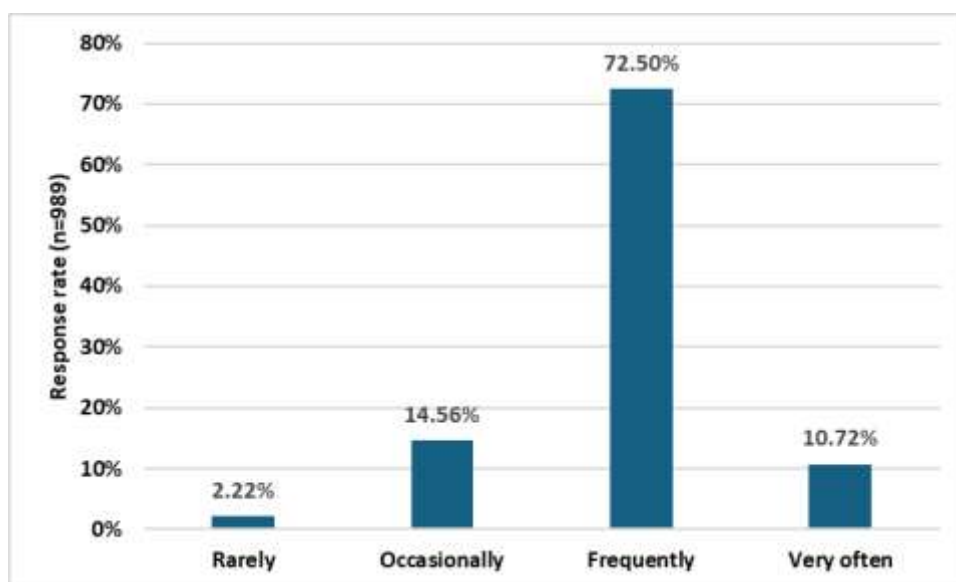
**Fig. 2: Distribution of responses on preferred first-line drug class for HTN patients with CKD**



Approximately 45% of clinicians reported occasionally encountering patients requiring triple-drug therapy for HTN management. About 29% of participants identified elderly patients as the group benefiting most from combination therapy for HTN management. According to 57% of clinicians, pedal edema was the most common side effect associated with antihypertensive therapy.

More than half (54.9%) of the respondents considered dual L/N-type calcium channel blocking activity as the major advantage of cilnidipine over conventional CCBs. A substantial proportion of clinicians (47%) agreed that cilnidipine causes less pedal edema compared to amlodipine. Around 73% of respondents reported frequently recommending the telmisartan + cilnidipine combination therapy in routine practice (Fig. 3). Half (50.35%) of the clinicians stated superior BP control as the major benefit associated with telmisartan + cilnidipine therapy (Table 2). Compared with other ARB + CCB combinations, approximately 65% of practitioners rated telmisartan + cilnidipine as more effective (Fig. 4).

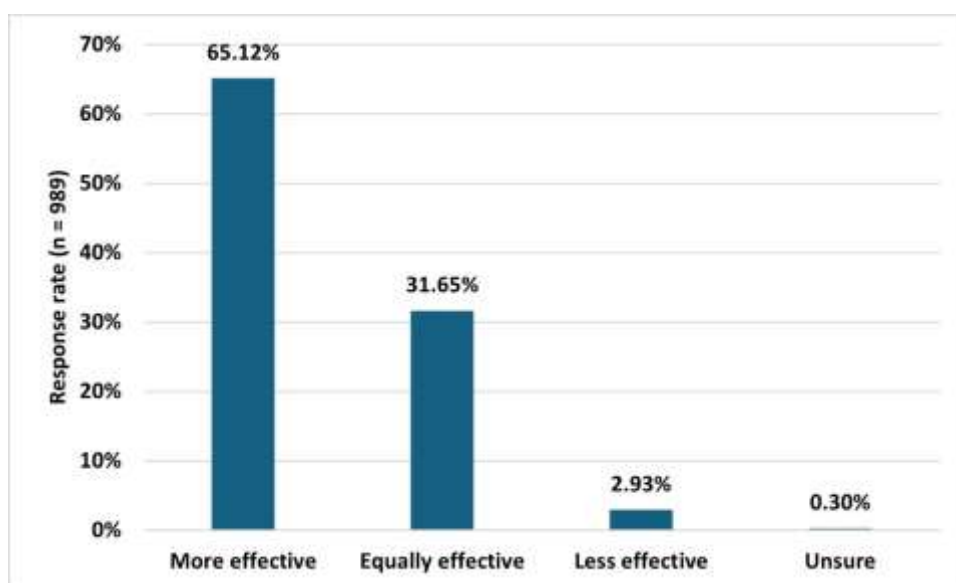
**Fig. 3: Distribution of responses on the frequency of recommending telmisartan + cilnidipine combination therapy**



**Table 2: Distribution of responses on the benefits observed with telmisartan + cilnidipine combination therapy in clinical practice**

Benefits	Response rate (n = 989)
Superior BP control	50.35%
Cardio-renal protective benefits	7.58%
All of the above	42.06%

**Fig. 4: Distribution of responses comparing the effectiveness of telmisartan + cilnidipine with other ARB + CCB combinations**



In patients with CKD, 42% of clinicians reported that telmisartan + cilnidipine slows the progression of CKD. Around 64% of respondents considered improved CV and renal protection as the primary advantage of preferring telmisartan + cilnidipine over beta-blockers + diuretics in diabetic hypertensive patients (Table 3).

**Table 3: Distribution of responses on the advantages of preferring telmisartan + cilnidipine over beta-blockers + diuretics in diabetic hypertensive patients**

Advantages	Response rate (n = 989)
Improved cardiovascular and renal protection	64.31%
Reduced risks of cardiovascular events	9.3%

Decreased risk of hyperglycemia	2.02%
All of the above	24.37%

## Discussion

The findings of this nationwide clinician survey provide important insights into clinical practices in hypertension management, particularly among patients with associated cardiometabolic and renal comorbidities. Dyslipidemia emerged as the most commonly observed comorbidity among HTN patients, highlighting the close interrelationship between hypertension and metabolic risk factors and emphasizing the need for comprehensive CV risk assessment and integrated management strategies in routine clinical practice. These findings are consistent with previous studies. Noh et al. reported that dyslipidemia was present in 57.6% of HTN patients, making it one of the most prevalent comorbid conditions associated with hypertension.<sup>14</sup> Similarly, Kumari et al. demonstrated a high prevalence of dyslipidemia (62%) among newly diagnosed HTN patients, underscoring the frequent coexistence of lipid abnormalities and HTN.<sup>15</sup> Dalal et al. further showed that HTN commonly coexists with dyslipidemia and DM in Indian clinical practice, thereby increasing the overall CV risk burden.<sup>16</sup>

Another important clinical finding of the current survey was the preference for ARBs as the first-line treatment in HTN patients with DM. Similarly, many respondents also identified ARBs as the preferred first-line drug class in HTN patients with CKD. These findings are in line with existing evidence supporting the cardio-renal protective benefits of RAAS blockade. Brenner et al., in the RENAAL study, demonstrated that ARBs significantly reduced the risk of doubling of serum creatinine levels, end-stage renal disease, and hospitalization for heart failure in patients with type 2 diabetes (T2DM) and nephropathy.<sup>17</sup> Similarly, Lewis et al., in the IDNT study, showed that ARBs were superior in slowing the progression of diabetic nephropathy among hypertensive patients with T2DM.<sup>18</sup> Tamura et al. reported that ARBs and ACE inhibitors are recommended as first-line antihypertensive agents in patients with diabetic CKD and proteinuric CKD.<sup>19</sup> Likewise, Kalaitzidis and Elisaf stated that ACE inhibitors are considered first-line therapy in CKD, while ARBs are recommended in patients intolerant to ACE inhibitors.<sup>20</sup> Robert Toto also highlighted that ARBs or ACE inhibitors should be

considered first-line pharmacological therapy in hypertensive CKD patients, particularly in those with DM or proteinuria.<sup>21</sup>

Pedal edema was identified by many clinicians in the current survey as the most common adverse effect associated with antihypertensive therapy. This finding is consistent with previous evidence highlighting the high incidence of edema with CCB therapy. Makani et al. reported that peripheral edema is a common adverse effect of CCB therapy, with a significantly higher incidence among patients receiving CCBs compared with placebo or control groups.<sup>22</sup> Similarly, Matthew Weir described pedal edema as one of the most frequently observed adverse effects of dihydropyridine CCBs used in HTN management.<sup>23</sup> Liang et al. further demonstrated that peripheral edema, particularly lower-limb edema, is commonly associated with dihydropyridine CCBs such as amlodipine and nifedipine.<sup>24</sup> Likewise, Loulios et al. reported that ankle or pedal edema may occur in up to 30% of patients receiving CCBs, making it one of the most frequently observed adverse drug reactions.<sup>25</sup>

The majority of respondents in the current survey reported frequently recommending the telmisartan + cilnidipine combination in routine clinical practice. This finding reflects growing clinical acceptance of this combination for effective BP control, particularly in patients with cardiometabolic comorbidities. A cross-sectional study by Rajwanth Pratap Mathur reported that a large proportion of clinicians preferred the telmisartan + cilnidipine combination in HTN patients, especially among those with DM and other comorbid conditions, owing to its effective BP control and organ-protective benefits.<sup>26</sup> Similarly, Reddy et al. compared telmisartan + cilnidipine with telmisartan + amlodipine and demonstrated significant BP reduction with the telmisartan + cilnidipine combination, supporting its routine clinical use.<sup>27</sup> Furthermore, Sawant et al., in the START ABPM study, highlighted the antihypertensive effectiveness of cilnidipine and telmisartan using ambulatory BP monitoring, thereby supporting the rationale for combining these agents in routine hypertension management.<sup>28</sup>

Nearly half of the clinicians in the current survey reported superior BP control as the major benefit associated with the telmisartan + cilnidipine combination therapy. Furthermore, compared with other ARB + CCB combinations, many respondents rated the telmisartan + cilnidipine combination as more effective. These findings are supported by previous clinical evidence demonstrating the antihypertensive efficacy and cardio-renal benefits of this combination. Kario et al. demonstrated that a single-pill combination of cilnidipine and an ARB significantly reduced morning home systolic BP and pulse pressure in patients with

uncontrolled HTN.<sup>29</sup> Similarly, Sawant et al., in the START ABPM study, reported significant reductions in ambulatory systolic and diastolic BP with telmisartan and cilnidipine therapy, highlighting effective 24-hour BP control and improved BP endpoints.<sup>28</sup> Hiremath et al. further emphasized that the telmisartan + cilnidipine combination provides effective BP reduction along with cardio-renal protective benefits in patients with hypertension, CKD, and DM.<sup>30</sup> Similarly, Mukesh Madhukar Shete reported cilnidipine as a next-generation CCB and reported that it offers several advantages over conventional L-type CCBs, including lower incidence of pedal edema, reduced reflex tachycardia, better control of proteinuria, and enhanced renal protection, thereby supporting its preference in combination regimens with ARBs such as telmisartan.<sup>31</sup>

Majority of the current survey experts considered improved CV and renal protection as the primary advantage of preferring the combination of telmisartan and cilnidipine over beta-blocker + diuretic combinations in hypertensive patients with DM. Morimoto et al. demonstrated that cilnidipine significantly reduced urinary albumin excretion and improved arterial stiffness compared with amlodipine, suggesting superior renal and vascular protective effects in HTN patients.<sup>32</sup> Similarly, Aritomi et al. showed that combination therapy with cilnidipine and an ARB significantly suppressed proteinuria and slowed the progression of diabetic nephropathy compared with amlodipine + ARB therapy, highlighting additive renoprotective benefits.<sup>33</sup> Soeki et al. further reported that cilnidipine exerted significant renoprotective and antioxidant effects, including reduction in proteinuria, thereby supporting its cardio-renal protective profile.<sup>34</sup> In addition, Hinoi et al. demonstrated that telmisartan improved coronary microcirculation and insulin resistance in HTN patients, contributing additional CV and metabolic protective benefits relevant to diabetic HTN.<sup>35</sup>

This survey has several strengths, including a large sample size of 989 clinicians and nationwide participation, providing valuable insights into hypertension management in patients with CKD, DM, and other cardiometabolic comorbidities. The study comprehensively evaluated clinician perspectives on the efficacy, safety, cardio-renal protective benefits, and tolerability of cilnidipine and telmisartan + cilnidipine therapy, along with clinical practices, combination therapy use, renal monitoring, and adverse effects. However, the study also has certain limitations. As a questionnaire-based cross-sectional survey, the findings relied on self-reported clinician opinions and are therefore subject to recall and reporting bias. The absence of patient-level clinical data and objective outcome measures limits causal interpretation, while

the lack of long-term follow-up and subgroup analyses restricts assessment of long-term clinical outcomes and regional variations in practice patterns.

### Conclusion

ARBs are widely preferred as first-line therapy in HTN patients with DM and CKD because of their established cardio-renal protective benefits. The telmisartan + cilnidipine combination is frequently recommended in routine clinical practice and is perceived to provide effective BP control, improved tolerability, and enhanced CV and renal protection compared with other antihypertensive combinations. The survey findings highlight the preference for individualized combination therapies aimed at optimizing BP control and reducing cardio-renal risk in high-risk hypertensive patients.

### Acknowledgement

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