



Comparative Efficacies of Amlodipine-Telmisartan Versus Cilnidipine-Telmisartan in the Management of Hypertension

Jyoti Kumari Upadhyay¹, Hemant Kumar Garg², Dharendra kumar Shukla³

¹Ph.D. Scholar, Department of Pharmacology, NIMS Jaipur, Rajasthan

²Professor, Department of Pharmacology, NIMS Jaipur, Rajasthan

³Professor, Department of General Medicine, Saraswati Medical College, Unnao

(Received: 16 April 2025)

Revised: 20 May 2025

Accepted: 21 July 2025

KEYWORDS

Blood Pressure, Amlodipine, Cilnidipine, Telmisartan, Heart Rate, Combined Treatment.

Abstract:

Background: Hypertension is a common cardiovascular issue that necessitates efficient pharmacological management to avoid complications. Calcium channel blockers together with angiotensin receptor blockers are frequently recommended. This research sought to evaluate the effectiveness of Amlodipine-Telmisartan compared to Cilnidipine-Telmisartan in treating hypertension.

Methods: A total of 100 patients with hypertension were recruited and evenly split into two groups. Group A was administered Amlodipine-Telmisartan, while Group B was given Cilnidipine-Telmisartan. Baseline and post-treatment metrics such as systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate, pulse rate, and body mass index (BMI) were assessed. Statistical analysis was performed on the data to compare the treatment outcomes.

Results: The age group most frequently affected was 56-60 years in both categories. The average baseline SBP was comparable between Group A (166.34 mmHg) and Group B (166.46 mmHg), with reductions after treatment to 130.72 mmHg and 128.14 mmHg, respectively. DBP reduced from 93.16 mmHg to 79.18 mmHg in Group A and from 97.52 mmHg to 80.7 mmHg in Group B. Although the decreases in SBP and DBP were not statistically significant ($p = 0.18$ and $p = 0.17$), Group B exhibited a statistically significant heart rate reduction ($p = 0.00$).

Conclusion: Amlodipine-Telmisartan and Cilnidipine-Telmisartan are both effective in reducing blood pressure. Cilnidipine-Telmisartan showed a notably greater decrease in heart rate, likely resulting from its effect on both L-type and N-type calcium channels. This renders it a favored option for hypertensive patients needing heart rate regulation. Additional long-term research is suggested to assess the enduring cardiovascular advantages of these combinations.

Introduction: Hypertension poses a noteworthy public health issue worldwide, playing a substantial role in cardiovascular disease and death [1]. About 1.28 billion persons between the ages of 30 and 79 worldwide have hypertension, according to the World Health Organisation (2023), yet only 42% of them are diagnosed and treated [2]. Even with a range of antihypertensive medications, achieving optimal blood pressure (BP) control is insufficient in a significant number of patients. This highlights the

importance of investigating more effective and better-tolerated combination treatments, especially for moderate to severe hypertension.

The renin-angiotensin system (RAS) is crucial in the pathophysiology of hypertension, and telmisartan, a blocker of angiotensin II receptors (ARB), has become a preferred choice because of its extended half-life, beneficial metabolic characteristics, and protective effects on organs [3]. Nevertheless, monotherapy frequently proves



inadequate, and current guidelines advise combining it with calcium channel blockers (CCBs) for better blood pressure management and lowered cardiovascular risk. Within CCBs, dihydropyridine compounds like amlodipine and cilnidipine are commonly utilized because of their strong vasodilating effects [4]. Amlodipine is effective but often linked to side effects such as leg swelling [5]. Cilnidipine, a more recent CCB, exhibits dual blocking activity on L-type and N-type calcium channels, providing possible advantages such as lowered sympathetic activity and decreased fluid retention [6]. The comparative effectiveness and tolerability of telmisartan paired with various CCBs continues to be a subject of clinical interest. While separate combinations of telmisartan with amlodipine or cilnidipine have been examined, direct comparative information regarding their effectiveness and safety remains scarce and ambiguous. Recent studies indicate that cilnidipine might provide greater proteinuria reduction, improved heart rate management, and decreased sympathetic overactivity relative to amlodipine, although additional confirmation in controlled environments is essential [7, 8].

Therefore, this research seeks to evaluate the effectiveness and safety characteristics of Amlodipine-Telmisartan compared to Cilnidipine-Telmisartan in treating hypertension. A randomized, open-label, parallel-group study design was utilized to assess the variations in systolic and diastolic BP during a specified treatment duration, as well as to evaluate adverse events. This study aims to offer evidence-based recommendations for clinicians in improving hypertension management strategies by tackling the existing knowledge gaps and directly comparing these frequently used combinations

Methodology: This study aimed to assess the safety and efficacy of two fixed-dose combination therapies for managing hypertension: amlodipine-telmisartan and cilnidipine-telmisartan. The study protocol was reviewed and approved by the Institutional Ethics Committee (IEC) prior to the commencement of the

study. All participants will provide written informed consent in their primary language after being thoroughly informed about the nature, aims, potential advantages, and risks associated with the study. To maintain anonymity, each participant will be assigned a unique identification number. All personal information and medical records will be kept confidential, with access restricted to only authorized personnel.

Study Design: This was a prospective, randomized, interventional clinical trial with parallel groups and an open-label approach. Randomisation reduces selection bias and ensures comparability between study groups, while open-label methods facilitate the monitoring of adverse effects and real-world relevance.

Study Population: The study was conducted on individuals with essential hypertension attending the outpatient department of General Medicine at Saraswati Medical College, Unnao. The target group includes male and female patients with high blood pressure, aged 35 to 70 years, who are either recently diagnosed or inadequately treated on monotherapy.

Sample Size: The study enrolled 100 participants, divided into 50 for each treatment group. **Inclusion Criteria:** Patients diagnosed with essential hypertension, regardless of gender, aged between 35 and 70, were qualified to take part in the study. The qualifying participants either had uncontrolled hypertension despite single-drug treatment or had recently been diagnosed. Each participant must consent to adhere to the study's protocols and provide written informed consent.

Exclusion Criteria: Patients who had secondary hypertension, a history of myocardial infarction, stroke, or heart failure during the previous six months, or chronic renal disease with an estimated glomerular filtration rate (eGFR) of less than 60 ml/min/1.73 m² were not allowed to participate in the trial. Additionally excluded were people who were currently receiving concomitant antihypertensive polytherapy, were pregnant or nursing, or had a history of hypersensitivity to any of the research medications.



Data collection: Participants were randomly assigned to one of two treatment groups. Group A had received a combination of Amlodipine 5 mg and Telmisartan 40 mg once daily, while Group B had received Cilnidipine 10 mg and Telmisartan 40 mg once daily. The treatment duration was 12 weeks, with follow-up visits scheduled at baseline, 4 weeks, 8 weeks, and 12 weeks. At each visit, data will be collected through a structured process. Blood pressure will be measured using a calibrated digital sphygmomanometer, with three readings taken at five-minute intervals in a sitting position, and the average will be recorded. Heart rate will be assessed using an automated monitor. Adverse events were monitored and participants were specifically queried about common side effects such as pedal edema, dizziness, flushing, headache, and fatigue.

Data analysis: Data analysis was conducted using SPSS version 28.0. Descriptive statistics was including mean \pm standard deviation (SD) for continuous variables and frequencies with percentages for categorical variables. Inferential statistics was t-test to compare the mean reduction in systolic and diastolic blood pressure between the two groups. A p-value of less than 0.05 will be considered statistically significant.

Results: The current study involved 100 patients with hypertension, split evenly into two groups of 50. Group A was administered Amlodipine-Telmisartan combination treatment, whereas Group B was given

Cilnidipine-Telmisartan. The distribution of patients by age is presented in Table 1 and Figure 1. The greatest proportion of hypertensive patients in Group A was observed in the 56-60 year age range (30%), followed by the 66-70 year range (20%). In Group B, the age group of 56-60 years (26%) was the most prominent, followed by the 46-50 years group (16%) and the 51-55 years group (14%). The fewest patients were recorded in the 35-40 years age category, with 0% in Group A and 4% in Group B. Table 2 and figure 2 demonstrate that the average baseline SBP was similar in both groups (166.34 mmHg in Group A compared to 166.46 mmHg in Group B), decreasing to 130.72 mmHg in Group A and 128.14 mmHg in Group B following treatment. The average baseline DBP was greater in Group B (97.52 mmHg) than in Group A (93.16 mmHg), with post-treatment values decreasing to 80.7 mmHg and 79.18 mmHg, respectively. A slight drop in heart rate was noted in both groups, but Group B exhibited a larger decrease (from 86.16 to 80.62 bpm) in comparison to Group A (85.12 to 84.12 bpm). The average pulse rate stayed almost the same in both groups. The BMI of individuals in Group A was marginally greater (26.21) compared to Group B (25.61). In the statistical analysis, the decrease in SBP and DBP among the two groups was not statistically significant ($p = 0.18$ and $p = 0.17$, respectively) shown in table 3 and figure 3.

Table 1: Frequency distribution of age of hypertensive patients managed by Amlodipine-Telmisartan versus Cilnidipine-Telmisartan

Age (In Yrs.)	hypertensive patients managed by Amlodipine-Telmisartan		hypertensive patients managed by Cilnidipine-Telmisartan	
	n = 50	%	n = 50	%
35-40	0	0%	2	4%
41-45	2	4%	7	14%
46-50	7	14%	8	16%
51-55	8	16%	7	14%
56-60	15	30%	13	26%
61-65	8	16%	8	16%
66-70	10	20%	5	10%



Figure 1: showing the Frequency distribution of age of hypertensive patients managed by Amlodipine-Telmisartan versus Cilnidipine-Telmisartan

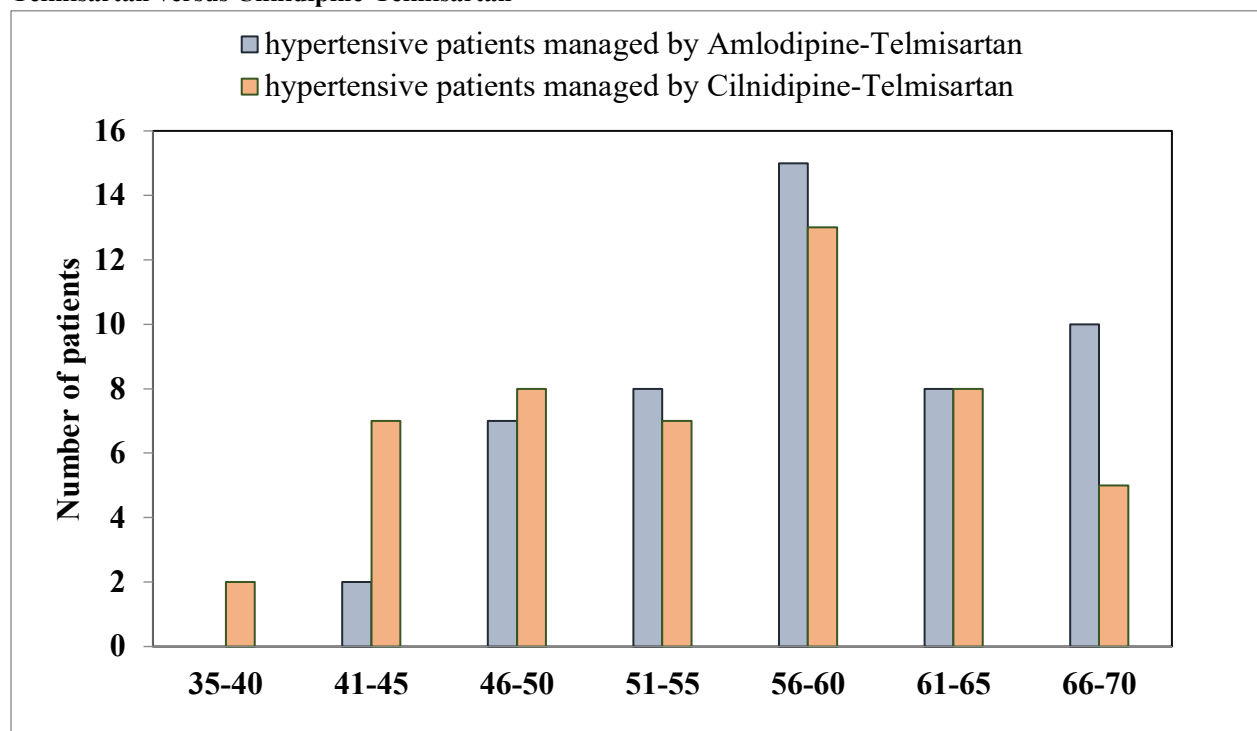


Table 2: Showing the comparative analysis of blood pressure, heart rate, pulse rate and body mass index (BMI) of hypertensive patients managed by Amlodipine-Telmisartan versus Cilnidipine-Telmisartan

Parameter	Group A (Amlodipine + Telmisartan)	Group B (Cilnidipine + Telmisartan)
Sample Size (n)	50	50
Gender Distribution (M/F)	25 / 25	31 / 19
Mean BMI	26.21	25.61
Mean SBP Before (mmHg)	166.34	166.46
Mean SBP After (mmHg)	130.72	128.14
Mean DBP Before (mmHg)	93.16	97.52
Mean DBP After (mmHg)	79.18	80.7
Mean Heart Rate Before	85.12	86.16
Mean Heart Rate After	84.12	80.62
Mean Pulse Rate	84.61	85.10



Figure 2: Showing the comparative analysis of blood pressure, heart rate, pulse rate and body mass index (BMI) of hypertensive patients managed by Amlodipine-Telmisartan versus Cilnidipine-Telmisartan

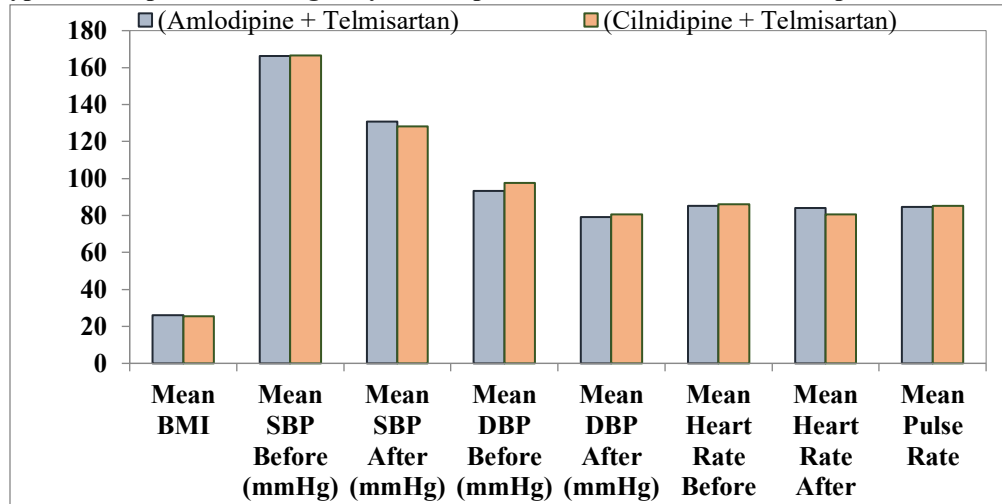
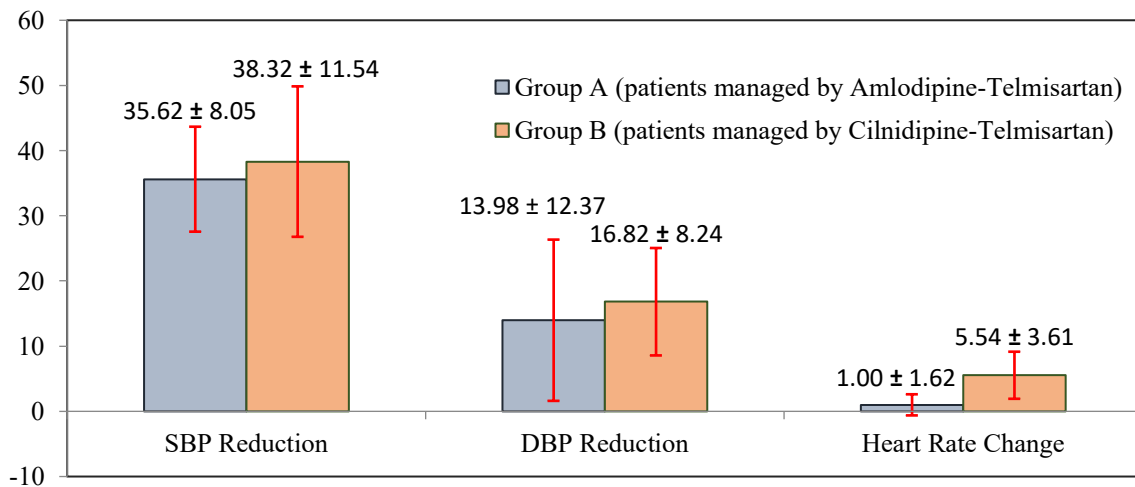


Table 3: Showing the Statistical Comparison between Group A (patients managed by Amlodipine-Telmisartan) versus Group B (patients managed by Cilnidipine-Telmisartan)

Parameter	Group A Mean ± SD	Group B Mean ± SD	p-value	Interpretation
SBP Reduction	35.62 ± 8.05	38.32 ± 11.54	0.18	Statistically not significant
DBP Reduction	13.98 ± 12.37	16.82 ± 8.24	0.17	statistically not significant
Heart Rate Change	1.00 ± 1.62	5.54 ± 3.61	0.00**	Statistically highly significant

Figure 3: Showing the Statistical Comparison between Group A (patients managed by Amlodipine-Telmisartan) versus Group B (patients managed by Cilnidipine-Telmisartan)





Discussion: Hypertension continues to be a critical public health concern worldwide and is a key risk factor for cardiovascular disease and death [9]. This research sought to evaluate the effectiveness of two frequently utilized combination therapies, Amlodipine-Telmisartan and Cilnidipine-Telmisartan, in controlling hypertension. In the current study, 100 hypertensive patients were evenly divided into two treatment groups. The age distribution revealed that most patients in both groups fell within the 56-60 years age range, suggesting that middle-aged to older individuals still constitute a significant portion of the hypertensive population. This aligns with previous research, indicating that age-related changes in blood vessels lead to a higher occurrence of hypertension among older individuals [10].

Both groups showed a significant decrease in systolic (SBP) and diastolic blood pressure (DBP) following treatment. The average baseline SBP was similar in both groups (Group A: 166.34 mmHg; Group B: 166.46 mmHg), with a post-treatment decrease to 130.72 mmHg in the Amlodipine-Telmisartan group and 128.14 mmHg in the Cilnidipine-Telmisartan group. Likewise, DBP fell in both groups, with Group B experiencing a marginally larger decrease. Nonetheless, the differences in blood pressure changes were not statistically significant, indicating that both treatment plans are similarly effective in managing blood pressure [11-12].

An intriguing discovery was noted in the examination of heart rate variations. Although both groups saw a decline in heart rate, the decrease was more significant in the Cilnidipine-Telmisartan group, showing a statistically highly significant difference ($p = 0.00$). This finding is consistent with earlier research indicating that Cilnidipine, through its simultaneous blocking of L-type and N-type calcium channels, not only manages blood pressure but also diminishes sympathetic nerve activity, leading to a reduction in heart rate [13,14]. Conversely, Amlodipine, a selective L-type calcium channel blocker, is linked to reflex tachycardia in

certain instances, which could account for the slight variation in heart rate in Group A [15].

The average pulse rate and BMI measurements were similar in both groups, with no significant disparities noted. Although the pulse rate stayed consistent, the marginally elevated BMI in Group A seemed to have no effect on treatment results. The results of this research indicate that both Amlodipine-Telmisartan and Cilnidipine-Telmisartan combinations are successful in controlling hypertension. Cilnidipine-Telmisartan could provide an extra benefit for patients where regulating heart rate is a treatment objective, particularly in individuals with increased sympathetic activity or existing tachycardia. The findings of this research align with earlier comparative studies. For example, research by Adake P et al. (2015) and Hasan MH et al. (2024) found that Amlodipine and Cilnidipine were both effective at reducing blood pressure, yet Cilnidipine demonstrated a better profile regarding heart rate regulation and decreased sympathetic activation. From a clinical perspective, the results endorse the utilization of either combination for efficient blood pressure regulation [16, 17]

In patients susceptible to elevated heart rate or with comorbidities such as ischemic heart disease, Cilnidipine-Telmisartan might be more suitable because of its sympatholytic properties. This blend may aid in lowering cardiovascular strain and enhance long-term results.

Conclusion: The findings of this study indicate that the combinations of Amlodipine-Telmisartan and Cilnidipine-Telmisartan are effective in substantially lowering both systolic and diastolic blood pressure in patients with hypertension. Cilnidipine-Telmisartan, however, showed a statistically meaningful decrease in heart rate, presumably because of its dual action as an L- and N-type calcium channel blocker, which dampens sympathetic activity. This renders it a better choice for patients needing extra heart rate management. Although both combinations have clinical utility, Cilnidipine-Telmisartan could provide extra cardiovascular advantages. Additional



extensive, prolonged studies are suggested to confirm these results and steer ideal treatment options in the control of hypertension.

Limitations: This study has several constraints, such as the brief follow-up duration, small sample size, and absence of assessment for long-term cardiovascular incidents or renal results. Furthermore, biochemical indicators and patient-reported results (like quality of life or adherence to medication) were not evaluated.

Conflict of Interest: The Authors have not disclosed any conflicts of interest.

References:

1. Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. *Nat Rev Nephrol.* 2020 Apr;16(4):223-237. doi: 10.1038/s41581-019-0244-2.
2. Kibone W, Bongomin F, Okot J, Nansubuga AL, Tentena LA, Nuwamanya EB, Winyi T, Balirwa W, Sarah Kiguli, Baluku JB, Makhoba A, Kaddumukasa M. High blood pressure prevalence, awareness, treatment, and blood pressure control among Ugandans with rheumatic and musculoskeletal disorders. *PLoS One.* 2023 Aug 7;18(8):e0289546. doi: 10.1371/journal.pone.0289546.
3. Patel P, Launico MV. Angiotensin II Receptor Blockers (ARB) [Updated 2025 May 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK537027/>
4. McKeever RG, Patel P, Hamilton RJ. Calcium Channel Blockers. [Updated 2024 Feb 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK482473/>
5. Khadka S, Joshi R, Shrestha DB, Shah D, Bhandari N, Maharjan M, Sthapit S. Amlodipine-Induced Pedal Edema and Its Relation to Other Variables in Patients at a Tertiary Level Hospital of Kathmandu, Nepal. *J Pharm Technol.* 2019 Apr;35(2):51-55. doi: 10.1177/8755122518809005.
6. Chandra KS, Ramesh G. The fourth-generation Calcium channel blocker: cilnidipine. *Indian Heart J.* 2013 Dec;65(6):691-5. doi: 10.1016/j.ihj.2013.11.001.
7. Kumari K, Sinha R, Toppo MS, Mishra P, Alam S, Majhee L. Blood Pressure Reducing Potential and Renoprotective Action of Cilnidipine Among Hypertensive Patients Suffering From Chronic Kidney Disease: A Meta-Analysis. *Cureus.* 2023 Apr 18;15(4):e37774. doi: 10.7759/cureus.37774.
8. Chopra HK, Wander GS, Ponde CK, Nanda NC, Khullar D, Venugopal K, et al., The Promise of Cilnidipine in Hypertension with Comorbidities: National Consensus Statement: National Consensus Group Comprises Cardiologists, Nephrologists, and Diabetologists from India in a National Meet at New Delhi held on 22nd May 2022. *J Assoc Physicians India.* 2024 Jan;72(1):88-95. doi: 10.59556/japi.71.0400.
9. Bromfield S, Muntner P. High blood pressure: the leading global burden of disease risk factor and the need for worldwide prevention programs. *Curr Hypertens Rep.* 2013 Jun;15(3):134-6. doi: 10.1007/s11906-013-0340-9.
10. Vasani AP, Beiser A, Seshadri S, Larson MG, Kannel WB, D'Agostino RB, Levy D. Residual lifetime risk for developing hypertension in middle-aged women and men: the Framingham Heart Study. *JAMA.* 2002;287:1003-1010.
11. Bekki H, Yamamoto K, Sone M, Homma T, Nakata M, Nohara M, Fukami K, Okuda S, Yamagishi S. Efficacy of combination therapy with telmisartan plus amlodipine in patients with poorly controlled hypertension. *Oxid Med Cell Longev.* 2010 Sep-Oct;3(5):342-6. doi: 10.4161/oxim.3.5.13199.



12. Shete M, Saxena A, Nakrani A, Shah C, Bhojwani H, Jiwane D. Assessing cilnidipine and its combination usage in Indian settings: a knowledge, attitude, and practice survey. *Int J Adv Med* 2024;11:559-65.
13. Adake P, Somashekar HS, Mohammed Rafeeq PK, Umar D, Basheer B, Baroudi K. Comparison of amlodipine with cilnidipine on antihypertensive efficacy and incidence of pedal edema in mild to moderate hypertensive individuals: A prospective study. *J Adv Pharm Technol Res.* 2015 Apr-Jun;6(2):81-5. doi: 10.4103/2231-4040.154543.
14. Manjula S, Kumar MK. Expert perspectives and practices on the clinical use of cilnidipine + telmisartan in the management of hypertension with comorbid diabetes in Indian settings. *International Journal of Cardiology Sciences.* 2024;6(1):74-80.
15. Bulsara KG, Patel P, Cassagnol M. Amlodipine. [Updated 2024 Apr 21]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK519508/>
16. Adake P, Somashekar HS, Mohammed Rafeeq PK, Umar D, Basheer B, Baroudi K. Comparison of amlodipine with cilnidipine on antihypertensive efficacy and incidence of pedal edema in mild to moderate hypertensive individuals: A prospective study. *J Adv Pharm Technol Res.* 2015 Apr-Jun;6(2):81-5. doi: 10.4103/2231-4040.154543.
17. Hasan MH. Comparison Between the Efficacies of Amlodipine and Cilnidipine in Treating Hypertensive Patients. *Cardiology and Cardiovascular Medicine.* 8 (2024): 1-6.