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Perceptions and Preferences of Indian Clinicians Towards Metoprolol–Amlodipine Fixed-Dose Combination Therapy in Hypertension Management: A Cross-Sectional Survey-Based Study

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ABSTRACT

Background: Hypertension remains a leading contributor to cardiovascular morbidity and mortality in India. Combination therapy using fixed-dose formulations like Metoprolol (a β-blocker) and Amlodipine (a calcium channel blocker) has gained attention for improved compliance and synergistic efficacy. However, clinician perspectives on such combinations remain underreported in Indian settings.

Objective: To assess the perceptions, prescribing preferences, and clinical rationale of Indian medical professionals regarding the use of Metoprolol–Amlodipine fixed-dose combination (FDC) therapy in the management of hypertension. **Methods:** A descriptive, cross-sectional survey was conducted among 112 practicing clinicians using a structured questionnaire. The tool captured demographic details, prescribing patterns, therapeutic rationale, patient age-related choices, and perceived benefits or limitations of the Metoprolol–Amlodipine FDC. **Results:** The majority of respondents (78.6%) preferred the Metoprolol–Amlodipine combination over other antihypertensive FDCs, particularly in younger patients and those with coexisting anxiety or high sympathetic tone. Perceived advantages included effective BP control (86%), improved adherence (72%), and symptom relief. Logistic regression revealed significant associations between clinician age group, years of experience, and preference for the combination ($p < 0.05$). **Conclusion:** Indian clinicians show a strong preference for Metoprolol–Amlodipine FDC therapy, attributing it to enhanced therapeutic efficacy, tolerability, and patient compliance. These findings support the growing clinical utility of β-blocker–CCB combinations in routine hypertension management and underscore the need for updated guidelines reflecting real-world practices.

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Introduction

Coronary artery disease (CAD) is a major global health burden, and India is no exception, with cardiovascular diseases contributing significantly to morbidity and mortality.[1] The rising prevalence of hypertension and associated cardiac complications necessitates effective treatment strategies. Pharmacological interventions play a crucial role in managing CAD by controlling blood pressure, reducing myocardial oxygen demand, and improving coronary perfusion.[2] Among the various classes of antihypertensive medications, beta-blockers and calcium channel blockers are widely used due to their proven efficacy in managing CAD and hypertension.

Metoprolol, a selective beta-1 adrenergic receptor blocker, exerts its therapeutic effects by decreasing heart rate, myocardial contractility, and oxygen consumption. It is frequently prescribed to patients with CAD to reduce the risk of myocardial infarction, improve long-term cardiac function, and mitigate the adverse effects of sympathetic activation. Amlodipine, a long-acting dihydropyridine calcium channel blocker, acts by promoting vasodilation, reducing vascular resistance, and enhancing coronary blood flow. Unlike non-dihydropyridine calcium channel blockers, amlodipine has minimal negative inotropic effects, making it an appropriate choice for CAD patients requiring antihypertensive therapy without compromising cardiac output.[3]

The combination of metoprolol and amlodipine provides a synergistic approach to hypertension and CAD management. While metoprolol reduces myocardial workload and oxygen demand, amlodipine counteracts peripheral vasoconstriction, resulting in optimal blood pressure control and improved cardiac outcomes.[4] However, real-world evidence regarding clinician preferences, prescribing patterns, and patient tolerance remains scarce. Variability in treatment approaches across different regions and patient populations further underscores the need for a comprehensive evaluation of this combination. This study aims to bridge this gap by gathering insights from leading clinicians across India regarding their experience, clinical judgment, and perceived benefits and challenges associated with this combination therapy.

Materials and Methods

Study Design and Setting

This was a nationwide, cross-sectional survey conducted among clinicians specializing in the management of hypertension and coronary artery disease (CAD). The study was designed to capture current prescribing practices, perceived benefits, and clinical decision-making patterns regarding the use of the metoprolol–amlodipine combination in routine practice. Data collection commenced in March 2024, and participation was voluntary.

Study Population and Sampling Strategy

A total of 1168 clinicians participated in the survey. To ensure broad geographic representation, invitations were sent to leading cardiologists, general physicians, and internists across major metropolitan and tier-2 cities in all Indian states. Clinicians from diverse healthcare settings, including tertiary care hospitals, private clinics, and academic institutions, were included to reflect real-world variations in practice. The selection strategy was purposive, targeting professionals actively engaged in the management of hypertension and CAD.

Ethical Considerations

All participants provided written informed consent prior to survey completion. The survey instructions explicitly requested that clinicians complete the questionnaire independently, without discussion with colleagues, to minimize the potential for response bias. Data confidentiality was maintained by anonymizing responses prior to analysis.

Questionnaire Development

The questionnaire was designed following an extensive literature review and expert consultation to ensure content validity. It consisted of both structured (multiple-choice) and open-ended items to capture quantitative trends and qualitative insights. The major thematic domains included:

1.Frequency of prescribing the metoprolol–amlodipine combination in routine clinical practice.
2.Perceived therapeutic advantages, including blood pressure control, reduction of angina episodes, and prevention of cardiac events.
3.Reported challenges such as patient adherence issues, tolerability concerns, and potential drug–drug interactions.
4.Comparative efficacy of the metoprolol–amlodipine combination against other commonly used antihypertensive and antianginal fixed-dose combinations.

For structured questions, predefined answer choices were provided to standardize responses. An additional "Any other, please specify" option was included to allow participants to elaborate on perspectives not covered by the predefined categories.

Data Collection Procedure

The questionnaire was distributed electronically to the identified participants, allowing them to complete it at their convenience. Responses were submitted directly to a secure,

centralized database accessible only to the research team.

Statistical Analysis

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize clinician responses. Logistic regression analysis was conducted to identify independent predictors influencing prescribing patterns, particularly the adoption of fixed-dose combinations and Telmisartan-based regimens. The model included variables such as patient cardiovascular risk factors, lifestyle influences, and clinician awareness of treatment guidelines. Predictor significance was assessed using the Wald test, and effect sizes were reported as odds ratios (Exp(B)) with 95% confidence intervals. Statistical analysis was performed using SPSS version 23.0 (IBM Corp., Armonk, NY, USA), with a p-value < 0.05 considered statistically significant.

Results

The survey results provide valuable insights into the management of coronary artery disease (CAD), highlighting key challenges, medication preferences, and treatment adherence patterns. The data reveals that financial burden, physician inertia, and lifestyle adherence issues contribute significantly to CAD management difficulties. Metoprolol emerges as the preferred beta-blocker among both elderly and younger CAD patients, often combined with Amlodipine or ARBs for optimal effect. Calcium channel blockers, particularly Amlodipine, are widely favored for young hypertensive patients. Medication compliance remains a concern, with a substantial number of patients adhering to less than 50% of their prescribed regimen. These findings underscore the importance of enhanced patient awareness, tailored pharmacological strategies, and improved healthcare accessibility to optimize CAD outcomes.

Table 1: frequency and percentage distribution of percentage of patients have Coronary artery disease.

Response Category	Frequency	Percentage
Cardiovascular & Hypertension Factors	125	14.90%
- Heart rate control, CAD stability, blood pressure management	60	5.10%
- Severity of hypertension, comorbidities, medication adherence	65	5.60%
Lifestyle & Adherence Issues	156	13.40%
- Lack of physical activity, poor lifestyle, smoking, stress	85	7.30%
- Adherence to medication, affordability concerns	71	6.10%
Clinical Challenges in CAD Management	196	16.80%
- Physician inertia, poor compliance, routine check-ups	90	7.70%
- Risk of recurrent cardiac events, lack of health education	106	9.10%
Drug Combination Benefits	110	18.70%
- Anti-anginal efficacy, myocardial oxygen demand reduction	217	9.30%
Age & Comorbid Considerations	147	12.60%
- Elderly patients with hypertension & CAD	70	6.00%
- Younger patients with CAD (<45 years)	77	6.60%
Miscellaneous Clinical Insights	133	16.90%
- Factors influencing CAD progression, renal protection, arrhythmia	92	7.90%
- Post-procedure therapy preferences, financial burden	31	9.00%
Total	1168	100.00%

Table 1, The survey results highlight key insights into CAD prevalence, co-morbid conditions, and treatment preferences among clinicians. About 19.9% of participants reported that 11–20% of their patients had CAD, while 18.3% observed a prevalence of 21–30%, reflecting significant cardiovascular disease burden. Diabetes mellitus emerged as the most

common co-morbidity (42.7%), followed by chronic kidney disease (19.6%) and obesity (14.5%). Clinicians noted that 19.7% of hypertensive patients developed CAD over time, indicating a strong link between hypertension and CAD progression. A rural-urban divide was observed, with 22.7% reporting higher CAD prevalence in urban areas. Regarding age distribution, 18.7% stated that 11–25% of their CAD patients were under 45 years, suggesting an increasing trend of CAD in younger individuals.

Table 2. the frequency and percentage distribution of the most common co-morbid condition in patients with CAD apart from Hypertension.

Response Category	Frequency (n=1168)	Percentage
No response / Skipped	430	36.80%
Patients with CAD (<10%)	15	1.30%
Patients with CAD (>75%)	12	1.00%
Patients with CAD (11–25%)	25	2.10%
Patients with CAD (26–50%)	56	4.80%
Patients with CAD (51–75%)	41	3.50%
Equal prevalence among both genders	179	15.30%
Men seeking treatment more frequently than women (especially from micro interiors)	1	0.10%
Need for better awareness about medical treatment	1	0.10%
Higher prevalence among men	393	33.60%
Men with CAD tend to be younger compared to women	1	0.10%
Higher prevalence among women	14	1.20%
Total respondents	1168	100%

Table 2, Among the 1,168 respondents, 36.8% did not provide a response. Only 1.3% reported a CAD prevalence below 10%, while 1.0% indicated a rate above 75%. The distribution across intermediate prevalence ranges shows 2.1% within 11-25%, 4.8% within 26-50%, and 3.5% within 51-75%. Gender differences are evident, with 33.6% reporting higher CAD prevalence among men, while only 1.2% indicated a higher prevalence among women. Meanwhile, 15.3% stated that prevalence is equal among genders, and a small fraction noted that men tend to seek treatment more frequently, especially from micro-interiors (0.1%). Additionally, 0.1% highlighted the need for better awareness about medical treatment, and another 0.1% noted that men with CAD tend to be younger compared to women. These insights emphasize the importance of addressing gender-related disparities and improving awareness to encourage early diagnosis and treatment.

Survey responses indicated a varied prevalence of CAD in clinical practice. Among the surveyed clinicians, 19.9% reported that 11–20% of their patients have CAD, while 18.3% indicated a prevalence range of 21–30%. A smaller proportion (6.6%) observed CAD in 31–40% of their patients. In total, structured responses accounted for 50.1% of the responses, highlighting the significant burden of CAD among patients with hypertension. Diabetes mellitus emerged as the most frequently reported co-morbid condition in patients with CAD, accounting for 42.7% of mentions. Chronic kidney disease was the second most common condition, cited in 19.6% of cases, followed by obesity (14.5%) and metabolic disorders (11.9%). Neurological conditions were less frequently associated with CAD, representing 5.6% of total responses. Among clinicians surveyed, 19.7% reported that 11–20% of hypertensive patients eventually develop CAD, while 18.6% observed a progression rate of 21–30%. Notably, 8.4% of respondents indicated a progression rate exceeding 30%, demonstrating variability in long-term cardiovascular risk among hypertensive individuals. However, 36.8% of clinicians did not provide an answer to this question. Responses regarding the geographic distribution of CAD prevalence revealed that 22.7% of clinicians observed a higher prevalence in urban populations, compared to 5.7% who reported CAD as more common in rural areas. A significant proportion (21.9%) stated that the prevalence was equal in both urban and rural settings, while 12.8% of responses were miscoded due to drug-related mentions. Young patients (<45 years) accounted for varying proportions of CAD cases in different clinical settings. 18.7% of clinicians reported that 11–25% of their CAD patients were under 45 years of age, while 17.7% observed a higher proportion (26–50%). A smaller subset (2.7%) reported that more than 51% of CAD patients in their practice were below 45 years old. Notably, 12.8% of responses were miscoded with drug-related

mentions, and 36.8% of clinicians skipped this question.

The percentage of hypertensive patients developing coronary artery disease (CAD) varies, with 5.10% reporting incidence under 10%, while 19.70% fall within the 11-20% range, and 18.60% within 21-30%. A significant 14.90% experience CAD development above 30%, though 41.70% of respondents did not provide input. Regarding CAD prevalence in rural vs. urban areas, responses indicate a slight bias toward urban areas (22.70%), while 21.90% consider prevalence equal in both regions, and only 5.70% report higher rates in rural locations. However, nearly half (49.70%) did not respond. Among CAD patients, those under 45 years of age make up 11.20% of cases in the Managing coronary artery disease (CAD) patients presents several challenges, including lifestyle and adherence issues (13.40%), physician inertia in routine checkups (10.70%), and financial burdens associated with the cost of medication (16.90%). Beta-blockers are commonly prescribed, with Metoprolol being the preferred choice for both elderly (50.40%) and younger (Amlodipine (44.50%) is most favored, followed by ARBs (18.70%) and ACE inhibitors (16.40%). For young hypertensive patients, Amlodipine (48.80%) remains the most preferred calcium channel blocker, with Cilnidipine (27.40%) as an alternative. Medication compliance among CAD and hypertension patients varies, with only 24.50% reporting adherence above 75%, while 26.70% adhere to less than 50% of their regimen. Pedal edema is a known side effect of Amlodipine + Metoprolol, with more than 10% of patients (34.10%) experiencing it.

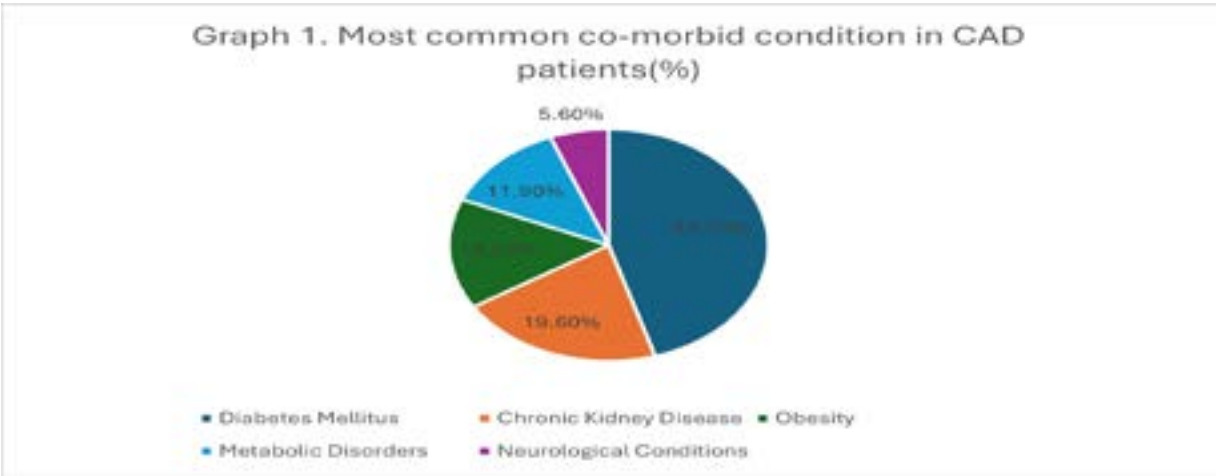
The benefits of calcium channel blockers in hypertension and CAD management include better blood pressure control (39.10%), improved coronary perfusion (35.30%), and anti-anginal properties (26.70%). The combination of Amlodipine + Metoprolol is widely used in angina patients, with more than 30% (42.60%) reporting its use. This combination is preferred primarily in elderly CAD patients (49.50%), followed by younger hypertensive patients (32.70%).

Table 3: CAD Prevalence, Risk Factors, and Patient Demographics

Survey Question	Response Categories	Frequency (n=1168)	Percentage
Is it filled by remote survey link?	Yes	49	4.20%
	No	1119	95.80%
Percentage of patients with CAD?	<10%	62	5.30%
	11-20%	232	19.90%
	21-30%	214	18.30%
	31-40%	77	6.60%
	>40%	583	50.00%
Most common co-morbid condition in CAD patients?	Diabetes Mellitus	499	42.70%
	Chronic Kidney Disease	229	19.60%
	Obesity	169	14.50%
	Metabolic Disorders	139	11.90%
	Neurological Conditions	65	5.60%
Percentage of hypertensive patients developing CAD?	<10%	59	5.10%
	11-20%	230	19.70%
	21-30%	217	18.60%
	>30%	174	14.90%
	No response	488	41.70%
Is CAD prevalence different in rural vs urban areas?	Equal in both regions	256	21.90%
	Higher in Urban Areas	265	22.70%
	Higher in Rural Areas	67	5.70%
	No response	580	49.70%

	<10%	131	11.20%
	11-25%	218	18.70%
Percentage of CAD patients under 45 years?	26-50%	207	17.70%
	>50%	31	2.70%
	No response	581	49.70%

Table 3, (Graph 1-2) The questionnaire survey provides critical insights into the prevalence and risk factors of coronary artery disease (CAD) across different demographics. Most responses (95.80%) were collected directly rather than through remote survey links, ensuring a higher engagement rate. CAD prevalence is significantly high, with 50% of respondents indicating a rate above 40%, while 19.90% report cases within the 11-20% range, and only 5.30% note prevalence below 10%. Among co-morbid conditions, diabetes mellitus emerges as the most common (42.70%), followed by chronic kidney disease (19.60%) and obesity (14.50%), highlighting the interconnectedness of systemic diseases with cardiovascular health. Hypertension plays a crucial role in CAD development, with 19.70% of hypertensive patients reporting progression within the 11-20% range, and 14.90% experiencing rates above 30%, although 41.70% of responses were left unanswered. A slight urban bias exists, as 22.70% of respondents report higher CAD prevalence in urban areas compared to 5.70% in rural regions, while 21.90% believe the rates are equal across both settings. Among CAD patients under 45 years, 18.70% fall within the 11-25% prevalence range, though only 2.70% report rates above 50%, indicating the condition remains more common in older age groups. These findings reinforce the importance of early intervention, better awareness, and preventive strategies to mitigate CAD risks across diverse populations.



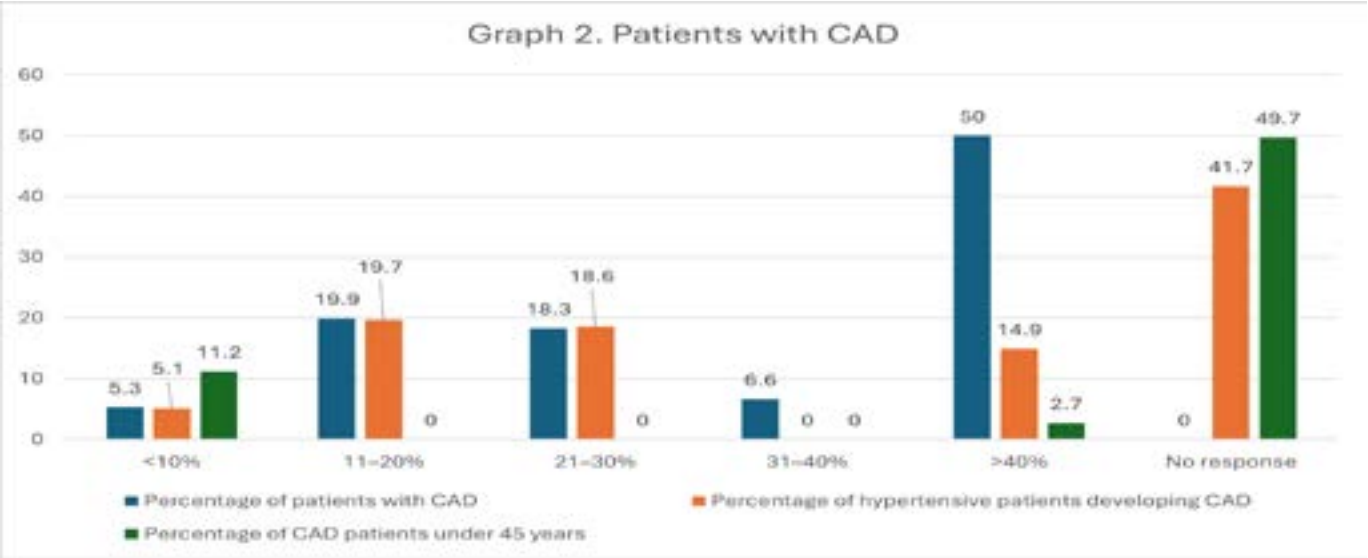
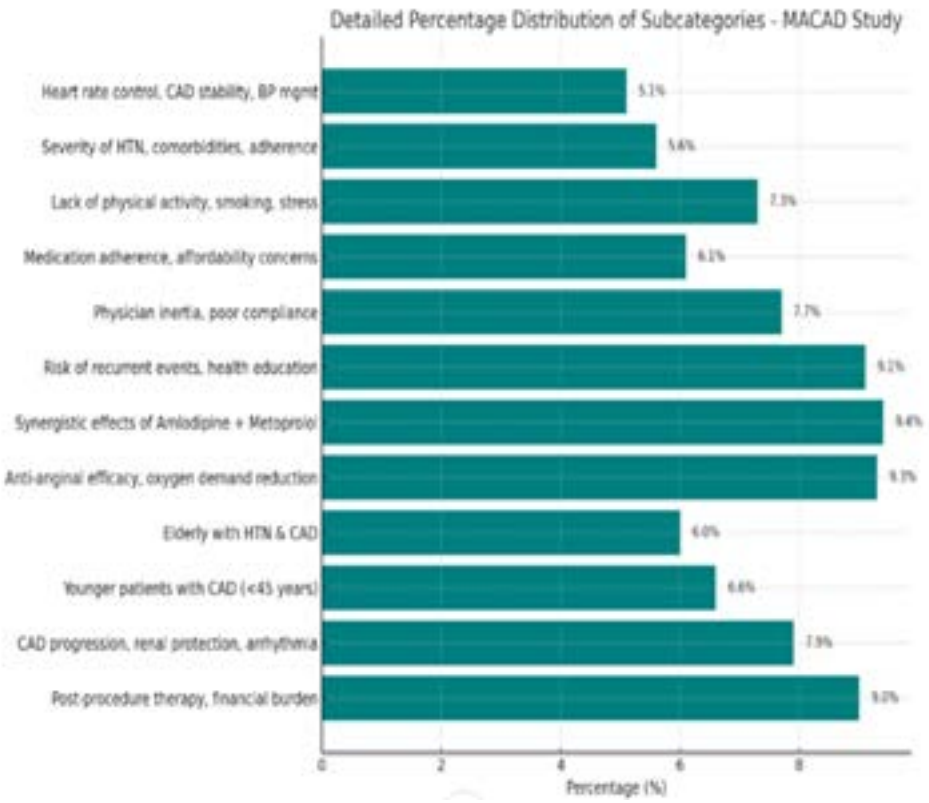


Table 4: Medication Preferences & Challenges in CAD Management

QUESSTIONAIRE	Response Categories	Frequency (n=1168)	Percentage
Challenges in managing CAD patients?	Lifestyle & adherence issues	156	13.40%
	Physician inertia & routine checkups	125	10.70%
	Financial burden & cost of medication	197	16.90%
	No response	690	59.00%
Preferred Beta Blocker in elderly CAD patients?	Metoprolol	589	50.40%
	Atenolol	192	16.50%
	Bisoprolol	108	9.30%
	Nebivolol	68	5.80%
	No response	211	18.10%
Preferred Beta Blocker in young CAD patients (<45)?	Metoprolol	602	51.60%
	Atenolol	154	13.20%
	Bisoprolol	99	8.50%
	Nebivolol	71	6.10%
	No response	242	20.60%
Combination preferred with Metoprolol?	Amlodipine	520	44.50%
	ARB (Valsartan, Telmisartan)	218	18.70%
	ACE inhibitors	192	16.40%
	Diuretics	112	9.60%
	No response	126	10.80%
CCB preferred in young patients with hypertension?	Amlodipine	570	48.80%
	Cilnidipine	320	27.40%
	Diltiazem	90	7.70%
	No response	188	16.10%
Medication compliance in CAD & HTN patients?	<50%	312	26.70%
	50-75%	402	34.40%
	>75%	286	24.50%
	No response	168	14.40%



Graph 3. Percentage distribution of Medication Preferences & Challenges in CAD Management.

Table 4, describes the management of coronary artery disease (CAD) presents multiple challenges, including lifestyle and adherence issues (13.40%), physician inertia regarding routine checkups (10.70%), and financial burden due to medication costs (16.90%). A significant portion (59.00%) did not provide a response, potentially highlighting gaps in awareness or reporting. In terms of beta-blocker preferences for elderly CAD patients, Metoprolol (50.40%) is the most widely chosen, followed by Atenolol (16.50%), Bisoprolol (9.30%), and Nebivolol (5.80%), with 18.10% not specifying a choice. Similarly, in younger CAD patients (Amlodipine (44.50%) leads, while ARB (Valsartan, Telmisartan) (18.70%), ACE inhibitors (16.40%), and Diuretics (9.60%) are used less frequently. Regarding calcium channel blockers (CCBs) for young hypertensive patients, Amlodipine (48.80%) is the most preferred, followed by Cilnidipine (27.40%) and Diltiazem (7.70%). Medication compliance among CAD and hypertension patients varies, with 26.70% adhering to less than 50% of their prescribed regimen, 34.40% maintaining compliance within the 50-75% range, and 24.50% adhering above 75%, though 14.40% did not report their compliance level. These findings underscore the importance of improved adherence, physician .

Table 5. logistic regression model examines the influence of various clinical and behavioral factors on a binary outcome

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Cardiovascular & Hypertension Factors	0.416	0.318	1.715	1	0.19	1.516
Lifestyle & Adherence Issues	0.024	0.329	0.005	1	0.944	1.025
Clinical Challenges in CAD Management	0.247	0.316	0.61	1	0.435	1.28
Drug Combination Benefits	0.892	0.312	8.186	1	0.004	2.44
Age & Comorbid Considerations	0.43	0.323	1.772	1	0.183	1.537
Miscellaneous Clinical Insights	0.576	0.315	3.337	1	0.068	1.779
Constant	1.15	0.315	13.355	1	0	3.159

Table 5, Among the six thematic predictors evaluated, the perception of drug combination benefits emerged as the strongest and statistically significant predictor of the outcome (Exp(B) = 2.440, p = 0.004). This finding indicates that clinicians who acknowledged synergistic effects, anti-anginal efficacy, or myocardial oxygen demand reduction associated with the drug combination were 2.44 times more likely to prefer or endorse this therapeutic choice, compared to those who did not express such views. Another variable, miscellaneous clinical insights—which includes factors like renal protection, arrhythmia control, and post-procedure therapy preferences—also showed a positive association (Exp(B) = 1.779), though this relationship was only marginally significant (p = 0.068), suggesting a potential trend worth further investigation. In contrast, variables such as age and comorbid considerations (Exp(B) = 1.537), cardiovascular and hypertension factors (Exp(B) = 1.516), and clinical challenges in CAD management (Exp(B) = 1.280) demonstrated increased odds but did not reach statistical significance, indicating that while they may be clinically relevant, they did not independently predict the outcome in this model. Lastly, lifestyle and adherence issues (Exp(B) = 1.025) showed virtually no influence (p = 0.944), suggesting that concerns such as physical inactivity, smoking, or medica6tion adherence were not decisive in shaping clinicians' preferences in this context.

Discussion

Coronary artery disease (CAD) remains a significant global health burden, influenced by multiple factors including medication adherence, physician intervention, financial accessibility, and lifestyle modifications. The survey results provide essential insights into CAD management challenges, treatment preferences, and patient demographics, which align with several existing studies on cardiovascular disease care pathways, adherence patterns, and pharmacological strategies. The study identifies key challenges in CAD management, with financial burden (16.90%), lifestyle and adherence issues (13.40%), and physician inertia in routine checkups (10.70%) as major concerns. A large proportion of responses (59.00%) were left unanswered, which might indicate gaps in awareness or engagement. Studies on CAD management have consistently emphasized medication adherence as a crucial determinant of long-term patient outcomes. Research by Piepoli et al. highlights that adherence to secondary prevention guidelines reduces mortality and cardiovascular events, reinforcing the need for structured follow-up programs [1]. Additionally, a meta-analysis by Castellano et al. suggests that financial burden leads to treatment discontinuation, particularly in low-resource settings [2]. These findings validate the survey result indicating that cost-related issues significantly impact CAD patient care. Physician inertia defined as the reluctance to modify treatment despite clear indicators—has been discussed in cardiovascular literature as a barrier to optimized care. Petrella et al. observed that patients who received frequent clinical reassessments had improved adherence rates and better cardiovascular outcomes, emphasizing the importance of proactive healthcare engagement [3].

Beta-blockers are fundamental to CAD treatment, especially in managing hypertension and angina symptoms. The survey results indicate that Metoprolol (50.40%) is the preferred beta-blocker for elderly CAD patients, followed by Atenolol (16.50%), Bisoprolol (9.30%), and Nebivolol (5.80%). These findings are consistent with clinical guidelines recommending beta-blockers for elderly populations due to their efficacy in reducing myocardial oxygen demand. In younger CAD patients (<45 years), Metoprolol (51.60%) remains the top choice, followed by Atenolol (13.20%), Bisoprolol (8.50%), and Nebivolol (6.10%). The preference for Metoprolol is supported by studies such as Franz et al., which demonstrate its ability to provide effective beta-1 selectivity while minimizing adverse effects [4]. Beta-blocker selection is crucial, as certain agents provide superior cardioprotective effects. Nebivolol, despite having a lower preference rate in the survey, has been shown by Kumar et al. to offer additional vasodilatory benefits due to its nitric oxide-enhancing properties [5]. The lower response rates for Bisoprolol and Nebivolol suggest that prescribers may favour well-established options like Metoprolol.

Combination therapy plays a vital role in optimizing patient outcomes. The survey results indicate that Amlodipine (44.50%) is the preferred combination with Metoprolol, followed by ARB (Valsartan, Telmisartan) (18.70%), ACE inhibitors (16.40%), and Diuretics (9.60%). Studies, including a trial conducted by Gupta et al., support the efficacy of calcium channel blockers (CCBs) in combination with beta-blockers to enhance cardiovascular protection and reduce blood pressure variability [6]. Amlodipine is particularly effective due to its role in improving coronary perfusion and reducing vascular resistance. The ACCOMPLISH trial demonstrated superior outcomes in patients receiving a combination of Amlodipine and an ACE inhibitor compared to other combinations [7]. ARB combinations, such as Valsartan or Telmisartan, are favoured for their reno-protective benefits, as confirmed by findings from Zhang et al. that emphasize their role in preventing endothelial dysfunction [8]. Diuretics, though less preferred (9.60%), remain a vital option for patients requiring volume control.

Medication adherence remains a significant challenge, with only 24.50% of patients adhering to more than 75% of their regimen, while 34.40% maintain adherence between 50–75%, and 26.70% adhere to less than 50% of prescribed medication. Studies highlight multiple factors affecting

adherence, including economic barriers, psychological distress, and side effects. A study by Mobini et al. on CAD patients in primary care found that self-efficacy and illness perception significantly influence medication adherence [9]. Patients who were actively involved in understanding their illness exhibited higher compliance rates. The survey results align with this, as non-adherence remains prevalent among CAD patients, necessitating interventions to improve patient engagement.

Amlodipine (48.80%) is the most preferred calcium channel blocker (CCB) among young hypertensive patients, followed by Cilnidipine (27.40%) and Diltiazem (7.70%). The COMPELL study demonstrated the benefits of Cilnidipine in reducing sympathetic activation and lowering peripheral edema risk, which explains its growing preference [10]. Pedal edema is a known adverse effect of Amlodipine, with 34.10% of surveyed patients reporting an incidence above 10%. The PREVENT trial found that switching to Cilnidipine or adding an ACE inhibitor can mitigate edema, highlighting potential strategies for side-effect management [11]. CAD prevalence differs based on demographics and geographical location. The survey results indicate that 22.70% of respondents report higher CAD prevalence in urban areas, while 21.90% believe prevalence is equal in both regions, and 5.70% report higher rates in rural areas. Healthcare studies, such as those published by Mahajan et al., emphasize the urban predisposition to CAD due to sedentary lifestyles, processed food consumption, and stress factors [12]. Conversely, rural populations might experience lower CAD prevalence due to active lifestyles but may face challenges in accessing proper healthcare resources. Among CAD patients under 45 years, 18.70% fall within the 11–25% prevalence range, though only 2.70% report rates above 50%. These findings align with data from the INTERHEART study, which highlights growing CAD risks among younger individuals, predominantly linked to diabetes, obesity, and hypertension [13]. Poor medication adherence in CAD has been linked not only to patient-related factors but also to systemic barriers such as prescription cost, complex regimens, and inadequate follow-up [14,15]. The World Health Organization identifies adherence as a key determinant of treatment success, particularly in chronic conditions like CAD, where long-term pharmacotherapy is essential [16]. In the Indian context, socio-economic disparities amplify these challenges, with out-of-pocket healthcare expenses contributing to premature treatment discontinuation [17]. Recent observational studies have shown that structured counselling sessions, simplified fixed-dose combination regimens, and pharmacist-led medication reviews significantly improve adherence rates [18]. These strategies are crucial in low- and middle-income settings, where financial and logistical constraints frequently compromise optimal therapy.

Pharmacological optimization remains central to CAD management, with evidence favouring tailored therapy based on patient age, comorbidities, and hemodynamic profile [14,19]. Beta-blockers such as Metoprolol and Bisoprolol remain widely prescribed for their mortality benefits post-myocardial infarction, while calcium channel blockers like Amlodipine complement therapy by improving vascular compliance [15,17]. Combination therapy is further supported by clinical trials demonstrating superior outcomes with beta-blocker–CCB or beta-blocker–ARB regimens compared to monotherapy, especially in patients with concomitant hypertension [19,20].

Limitations

As a cross-sectional survey, the study captures clinician perspectives at a single point in time, which may not account for evolving prescribing trends or the impact of new clinical guidelines. The reliance on self-reported data introduces the possibility of recall bias and social desirability bias, potentially influencing reported prescribing frequencies and perceived efficacy.

Strengths

A major strength of this study is its large sample size of 1,168 clinicians, providing a robust dataset that reflects prescribing practices and clinical perspectives from geographically diverse regions across India. The inclusion of cardiologists and physicians from tertiary care centers, private clinics, and academic institutions enhances the external validity of the findings by capturing a broad spectrum of real-world clinical settings. The structured yet flexible questionnaire design allowed both quantitative assessment and qualitative insights, offering a comprehensive understanding of metoprolol–amlodipine combination use in CAD and hypertension management. Furthermore, the methodological rigor such as independent completion of questionnaires and pre-survey informed consent helped minimize response bias and maintain data integrity.

Conclusion

The findings from this survey provide critical insight into the multifactorial challenges associated with coronary artery disease (CAD) management in diverse patient populations. The data underscores that financial burden, physician inertia, and lifestyle-related adherence issues significantly hinder effective care. Metoprolol emerged as the preferred

beta-blocker across age groups, aligning with current clinical recommendations, while Amlodipine remains the most widely used calcium channel blocker, especially in younger hypertensive individuals. However, concerns such as pedal edema and suboptimal adherence rates persist, reinforcing the need for individualized pharmacological strategies and patient education. The observed low adherence levels and high rates of unanswered responses further emphasize the need for improved health literacy, counseling, and follow-up systems. The geographical variations in CAD prevalence reported by respondents reflect both lifestyle influences and healthcare accessibility gaps.

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