

Siddha Medicine in Cardiovascular Care: Clinical Evidence and Pharmacological Perspectives for Integrative Management-An Integrative Review

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ABSTRACT

Cardiovascular Diseases (CVDs) are leading causes of mortality globally and in India, contributing substantially to the burden of noncommunicable diseases. The Siddha system of medicine recommends several internal formulations for cardiovascular care; however, the consolidation of scientific evidence supporting these therapies is necessary to strengthen their role in integrative healthcare. The objective was to compile and analyze available preclinical, toxicity, and clinical evidence on Siddha internal medicines recommended for the management of cardiovascular diseases. This descriptive evidence-based review included preclinical studies, acute and chronic toxicity studies, clinical trials (case reports, case series, pilot studies, and randomized controlled trials), and postgraduate and doctoral theses related to Siddha formulations indicated for CVD treatment. Molecular docking studies and literature reviews of individual ingredients were excluded. A comprehensive search was conducted in PubMed, Embase, Web of Science, Science Direct, the Cochrane Library, and Google Scholar via relevant keywords with Boolean operators. The data were compiled and analyzed systematically. Thirty-four Siddha internal formulations recommended for cardiovascular diseases were identified. Among these compounds, 17 demonstrated antioxidant activity, 8 exhibited anti-inflammatory effects, 2 exhibited cardioprotective properties, 2 exhibited antihypertensive activity, 4 exhibited hypolipidemic effects, and 1 exhibited antiatherogenic action. Several formulations have also shown antidiabetic, Hepatoprotective, and immunomodulatory activities relevant to CVD comorbidities. Toxicity studies conducted on selected formulations indicated acceptable safety profiles under experimental conditions. Limited clinical evidence suggests improvements in lipid parameters and cardiovascular health indicators. Siddha internal medicines exhibit pharmacological activities relevant to cardiovascular disease management. While preclinical evidence is substantial, robust, large-scale clinical trials are warranted to validate efficacy and ensure safe integration into evidence-based cardiovascular care.

Keywords: Antioxidant, Cardiovascular diseases, Cardioprotective, Integrative medicine, Siddha medicine.

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Received: 06-03-2026;

Revised: 13-05-2026;

Accepted: 14-07-2026.

INTRODUCTION

Noncommunicable Diseases (NCDs) pose considerable challenges to global health. These diseases significantly impact public health systems and require effective strategies for prevention and management (Sharma *et al.*, 2024). NCDs, commonly referred to as chronic diseases, are characterized by a prolonged duration and result in a complex interplay of genetic,

physiological, environmental, and behavioral factors. The primary categories of NCDs include cardiovascular diseases-such as heart attacks and strokes-various forms of cancer, chronic respiratory diseases (including chronic obstructive pulmonary disease and asthma), and diabetes. Notably, NCDs have a disproportionately severe impact on populations in low- and middle-income countries, where approximately three-quarters of global NCD-related fatalities, totaling 32 million, occur (Non communicable diseases, 2025). In 2023, NCDs continue to pose a significant global health challenge, accounting for 74% of total deaths and 86% of premature deaths from NCDs in Low- and Middle-Income Countries (LMICs) (Varghese *et al.*, 2025).

In India, NCDs are responsible for approximately 6 million deaths each year, accounting for approximately 63% of all annual fatalities



DOI: 10.5530/pres.20260030

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(Krishnan *et al.*, 2025). Between 1990 and 2023, the proportion of deaths attributable to NCDs in India substantially increased, increasing from 37.9% to 66%. In many developed nations, NCDs typically manifest in individuals aged 55 years or older; however, in India, the onset of these diseases tends to occur approximately a decade earlier. The growing prevalence of NCDs in India is further aggravated by the increasing incidence of multimorbidity, particularly among adults residing in urban areas. Given the chronic nature of these illnesses, individuals frequently endure disabilities or diminished quality of life for prolonged periods, resulting in continuous emotional and financial strain (Hemram *et al.*, 2025).

In response to the increasing incidence of NCDs, India established the National Programme for the Prevention and Control of Cancer, Diabetes, Cardiovascular Disease, and Stroke (NPCDCS) in 2010. This program positioned India as the inaugural country to implement the global NCD monitoring framework and to set national objectives aimed at reducing premature mortality associated with these diseases (MoHFW, 2017). Despite significant advancements in public health, including lower mortality rates and longer life expectancies, India still faces considerable challenges in addressing NCDs (Chaurasia, 2017; Singh *et al.*, 2017).

Ayush systems possess considerable potential to significantly contribute to the prevention and management of NCDs such as diabetes, cardiovascular disease, cancer, and stroke. The 12th Five-Year Plan for health in India advocates the integration of Ayush systems, particularly in their areas of expertise, which encompass preventive and promotive health care, as well as the treatment of health conditions affecting women, children, elderly individuals, NCDs, mental health disorders, palliative care, and rehabilitation. The National Programme for Prevention and Control of Cancers, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS), established by the Indian Government, has incorporated Ayush interventions to address the escalating burden of NCDs and associated risk factors at designated pilot sites. This initiative serves as a commendable model for further integration efforts. The implementation of early screening, accurate identification, and timely referrals within these integrated programs, coupled with the promotion and adoption of Ayush-based lifestyle practices, can significantly increase efforts to prevent and manage NCDs (Kumar *et al.*, 2023).

As the incidence of morbidity and mortality related to NCDs continues to escalate annually, it is imperative to adopt a preventive strategy grounded in the Siddha system of medicine. This ancient and holistic approach underscores the importance of maintaining a balanced lifestyle and adhering to established health guidelines. By strictly following the lifestyle prescriptions advocated within the Siddha framework—such as nutritional recommendations, physical activity regimens, and mental well-being practices—individuals can substantially decrease their

risk of developing NCDs. These preventive measures can not only effectively manage the onset of these debilitating diseases but also contribute to their prevention, thereby increasing overall health and longevity (Lekha *et al.*, 2015).

In Siddha medicine, various botanical species and their formulations have been demonstrated to offer significant benefits in the management of cardiovascular conditions. The *marudham pattai* (*Terminalia arjuna*) tree and its constituents, particularly arjunolic acid, exhibit a cardioprotective effect in rats, which is attributable to their antioxidant properties (Singh *et al.*, 2024). In the Siddha system of medicine, herbs, minerals, and therapeutic techniques are utilized to treat respiratory diseases, such as wheezing, coughing, and shortness of breath (Panneerselvam *et al.*, 2025). Many medicines are recommended for respiratory diseases, such as *Thalisathi chooranam*, *Adathodai manapagu*, *Thirikadugu chooranam*, and *Thoothuvalai Nei* (Shalini *et al.*, 2025). Many Siddha medicines are recommended for the integrative management of Noncommunicable Diseases (NCDs).

The "Standard Treatment Guidelines on Management of Metabolic Disorders in the Siddha System of Medicine," published by the Ayush Vertical of the Directorate General of Health Services in New Delhi in April 2025 (STG, 2025), along with the Siddha Standard Treatment Guidelines released by the National Institute of Siddha (STG 2019), detail a range of internal and external medications for the four primary NCDs: cardiovascular diseases, cancer, chronic respiratory diseases (including chronic obstructive pulmonary disease and asthma), and diabetes.

A significant number of these medications contain phytoconstituents, and numerous clinical studies have demonstrated their pharmacological efficacy in the management and treatment of Noncommunicable Diseases (NCDs). The scientific validity and safety considerations of Siddha medicines are crucial in the integrated approach to addressing NCDs.

The primary aim of this comprehensive review is to collect and analyze data that support the scientific validity of internal medicines for Cardiovascular Diseases (CVDs), as outlined in the aforementioned guidelines for the integrative treatment of Noncommunicable Diseases (NCDs). Furthermore, the secondary objective of this review is to investigate strategies to enhance the scientific framework associated with the improvement of the aforementioned pharmaceutical interventions.

METHODOLOGY

Study Selection

This descriptive review encompasses preclinical studies, acute and chronic toxicity studies, and clinical trials, including case studies, case reports, case series, pilot studies, Randomized Controlled Trials (RCTs) and doctoral and postgraduate theses. This review specifically excludes molecular docking studies and literature reviews concerning the individual ingredients of the medicines.

Search strategy

The present study involved an extensive search of various search engines and biomedical databases, such as PubMed, Embase, Web of Science, Science Direct, Cochrane Reviews, and Google Scholar, using keywords such as Siddha, traditional medicine, ancient wisdom, NCDs, CVD, pharmacological actions, toxicity, etc., and Boolean operators, such as AND, OR, NOT, AND NOT.

Data collection

To establish a correlation between Siddha disease terminologies and their English counterparts, the World Health Organization's publication on International Standard Terminologies in Siddha Medicine was utilized.

Data compilation, processing, and statistical analyses were conducted systematically, employing basic statistical methods in Microsoft Excel 2010. The information obtained from the comprehensive literature review has been tabulated, analyzed, and reported in this manuscript.

RESULTS

According to the Standard Treatment Guidelines for the Management of Metabolic Disorders within the Siddha System of Medicine, 34 medicinal formulations are listed under the section dedicated to cardiovascular diseases. This compilation includes 6 *Kudineer* (decoction), 10 *Chooranam* (medicinal powders), 2 *Rasayanam* (semi-solid confection), 1 *Ilagam* (electuary), 4 *Mathirai* (pills/tablets), 9 *Parpam* (white calx), and 2 *Chendooram* (red calx). Among these 34 formulations, 17 demonstrate antioxidant activity, 8 possess anti-inflammatory properties, 1 has antiatherogenic effects, 2 are identified as cardioprotective, 2 possess antihypertensive properties, and 4 exhibit hypolipidemic activities. The pharmacological actions of each medicine are outlined in Table 1, and the significant activities related to CVDs in Siddha medicines are shown in Table 2.

DISCUSSION

Cardiovascular Diseases (CVDs) remain a leading cause of morbidity and mortality globally and in India, where they account for a significant proportion of Noncommunicable Disease (NCD)-related deaths (Krishnan *et al.*, 2025). The present review consolidates scientific evidence on the pharmacological efficacy of Siddha internal medicines recommended for CVD management, highlighting their potential role in integrated healthcare approaches.

The 34 Siddha formulations identified for cardiovascular diseases have diverse pharmacological effects, including antioxidant, anti-inflammatory, cardioprotective, antihypertensive, antiatherogenic, and hypolipidemic effects. The antioxidant activity of 17 formulations plays a central role in CVD prevention and management by mitigating oxidative stress, which is

a well-established contributor to endothelial dysfunction, atherosclerosis, and myocardial injury (Vinubharathi *et al.*, 2019; Keerthana *et al.*, 2018; Hazeena Begum *et al.*, 2014). The anti-inflammatory properties of 8 formulations further reduce vascular inflammation, which underlies plaque formation and the progression of coronary artery disease (Ganapathy *et al.*, 2020; Rajalakshmi, *et al.*, 2017; Nikil Niva *et al.*, 2026).

The cardio protective activity of formulations such as *Dhratchathy Chooranam* and *Venthamarai Chooranam* likely arises from the synergistic effects of phytochemicals, including flavonoids, saponins, and polyphenols. These compounds modulate lipid metabolism, reduce oxidative damage, and stabilize myocardial cellular function, as evidenced in preclinical studies (Kumar *et al.*, 2023; Mahalakshmi *et al.*, 2021; Mahalakshmi *et al.*, 2016). The antihypertensive and hypolipidemic properties of certain formulations complement conventional pharmacotherapy by regulating blood pressure and lipid profiles, which are critical risk factors for CVD morbidity and mortality (Tamilselvan *et al.*, 2022; Babu *et al.*, 2014; Indrakumar, 2016; Kumar *et al.*, 2023; Manoharan *et al.*, 2023).

Preclinical studies indicate robust pharmacological actions across multiple Siddha formulations, including antidiabetic, hepatoprotective, immunomodulatory, and antiulcer activities, which are relevant in the context of CVD comorbidities (Vinubharathi *et al.*, 2018; Jain *et al.*, 2018; Rajamohamed *et al.*, 2019; Punitha, 2013; Patra *et al.*, 2014; Sheeba *et al.*, 2025). Toxicity studies performed on several formulations, such as *Amukkara Chooranam*, *Keezhanelli Chooranam*, and *Silasathu Parpam*, have demonstrated safety profiles that support their clinical use (Jain *et al.*, 2018; Patra *et al.*, 2014; Kumar *et al.*, 2023; Vikesh *et al.*, 2018).

Clinical evidence, although limited in scope, supports the efficacy of these formulations in human subjects. Studies on *Amukkara Chooranam*, *Parangi Rasayanam*, and *Maruthampattai Kudineer* have revealed improvements in lipid profiles, glycemic control, and overall cardiovascular health (Vinubharathi *et al.*, 2019; Punitha *et al.*, 2018; Muthukumaran *et al.*, 2020). These findings align with the pharmacological rationale observed in preclinical models, suggesting translational potential for the integrative management of CVDs.

The multifactorial actions of Siddha medicines can be attributed to their polyherbal and mineral compositions, which act through complementary pathways: antioxidant activity neutralizes reactive oxygen species, protecting endothelial and myocardial cells (Baharuddin, 2024). Anti-inflammatory mechanisms inhibit proinflammatory cytokines (e.g., TNF- α and IL-6) and reduce vascular inflammation (Popko *et al.*, 2010). Lipid-lowering and hypolipidemic effects prevent atherogenesis and improve blood lipid profiles (Majdalawieh *et al.*, 2023). Cardioprotective and antihypertensive actions enhance myocardial resilience and

Table 1: Siddha Internal Medicines for Cardiovascular Diseases: Preclinical, Pharmacological, Toxicity, and Clinical Evidence.

Sl. No.	Name of the internal medicine	Preclinical Studies	Pharmacological actions	Toxicity study	Clinical studies related to CVDs
Cardiovascular Diseases (CVDs)					
1.	Venthamarai kudineer	-	-	-	-
2.	Thamaraga kudineer	-	-	-	-
3.	Maruthampattai kudineer	(Vinubharathi <i>et al.</i> , 2019 and Vinubharathi <i>et al.</i> , 2018).	Antioxidant (Vinubharathi <i>et al.</i> , 2019), antidiabetic (Vinubharathi <i>et al.</i> , 2018).	(Vinubharathi <i>et al.</i> , 2019)	-
4.	Nerunjil kudineer	(Praba <i>et al.</i> , 2018 and Akila <i>et al.</i> , 2013 and Alam <i>et al.</i> , 2019).	Antiurrolithiasis (Praba <i>et al.</i> , 2018), anti-inflammatory, antinociceptive (Akila <i>et al.</i> , 2013), Nephroprotective (Alam <i>et al.</i> , 2019).	(Noorul Alam, 2019 and Akila <i>et al.</i> , 2012)	-
5.	Adathodai kudineer	(Perumal <i>et al.</i> , 2020).	Antioxidant, anti-atherogenic (Perumal <i>et al.</i> , 2020).	-	-
6.	Thiratchai kudineer	(Mantela <i>et al.</i> , 2024).	Hepatoprotective, antioxidant (Mantela <i>et al.</i> , 2024).	(Mantela <i>et al.</i> , 2024)	-
7.	Amukkara chooranam	(Jain <i>et al.</i> , 2018 and Rajamohamed <i>et al.</i> , 2019 and Punitha, 2013 and Patra <i>et al.</i> , 2014).	Immunomodulatory, antioxidant (Jain <i>et al.</i> , 2018), antibiofilm (Rajamohamed <i>et al.</i> , 2019), hypolipidemic (Punitha, 2013), antiulcer (Patra <i>et al.</i> , 2014).	(Jain <i>et al.</i> , 2018 and Patra <i>et al.</i> , 2014)	(Punitha <i>et al.</i> , 2018)
8.	Dhratchathy chooranam	(Ganapathy <i>et al.</i> , 2020).	Cardio protective, antioxidant, anti-inflammatory (Ganapathy <i>et al.</i> , 2020).	(Ganapathy <i>et al.</i> , 2020)	-
9.	Elathy chooranam	(Tamilselvan <i>et al.</i> , 2022 and Rajalakshmi <i>et al.</i> , 2017).	Antihypertensive (Tamilselvan <i>et al.</i> , 2022), antioxidant, anti-inflammatory (Rajalakshmi <i>et al.</i> , 2017).	-	-
10.	Venthamarai chooranam	(Babu <i>et al.</i> , 2014; Ravichandran, 2014 and Indrakumar, 2016).	Antihypertensive (Babu <i>et al.</i> , 2014), cardio protective (Ravichandran, 2014), Thrombolytic, Vasodilator, Hypolipidemic, Cardio protective (Indrakumar, 2016)	(Babu <i>et al.</i> , 2014)	-
11.	Seenthil chooranam	(Sheeba <i>et al.</i> , 2025; Sivamanisha <i>et al.</i> , 2022).	Antidiabetic, Hepatoprotective, antimicrobial, antihistamine, antioxidant, anti-obesity, anti-asthmatic (Sheeba <i>et al.</i> , 2025), immunomodulatory (Sivamanisha <i>et al.</i> , 2022).	(Sheeba <i>et al.</i> , 2025)	-
12.	Keezhanelli chooranam	(Kumar <i>et al.</i> , 2023 and Chinraji <i>et al.</i> , 2025 and Nikil Niva <i>et al.</i> , 2025).	Hematinic (Kumar <i>et al.</i> , 2023), Hepatoprotective, hypolipidemic (Chinraji <i>et al.</i> , 2025), antioxidant, anti-inflammatory, antiviral (Nikil Niva <i>et al.</i> , 2025).	(Kumar <i>et al.</i> , 2023)	-
13.	Panchadeepakini chooranam	(Rakshitaa <i>et al.</i> , 2015).	Antioxidant, antimicrobial (Rakshitaa <i>et al.</i> , 2015).	-	-
14.	Maruthampattai chooranam	(Manoharan <i>et al.</i> , 2023).	Hypolipidemic (Manoharan <i>et al.</i> , 2023).	-	-

Sl. No.	Name of the internal medicine	Preclinical Studies	Pharmacological actions	Toxicity study	Clinical studies related to CVDs
15.	Karpoorathi chooranam	-	-	-	-
16.	Asai chooranam	(Keerthana <i>et al.</i> , 2018).	Antioxidant (Keerthana <i>et al.</i> , 2018).	-	-
17.	Inji Rasayanam	(Ashok Kumar <i>et al.</i> , 2014).	Antiuro lithiatic (Ashok Kumar <i>et al.</i> , 2014).	-	-
18.	Parangi Rasayanam	(Mahalakshmi <i>et al.</i> , 2021 and Kaaruniya <i>et al.</i> , 2020 and Kavita Chandra, 2023 and Mahalakshmi <i>et al.</i> , 2024).	Antioxidant (Mahalakshmi <i>et al.</i> , 20210, anticancer (Kaaruniya <i>et al.</i> , 2020), antifungal (Kavita Chandra, 2023), anti- psoriatic (Mahalakshmi <i>et al.</i> , 2024).	(Non Communicable Diseases, 2025; Alam, 2019)	-
19.	Kesari ilagam	-	-	-	-
20.	Kasthuri maathirai	(Vanitha <i>et al.</i> , 2020).	Antioxidant (Vanitha <i>et al.</i> , 2020).	-	-
21.	Korosanai maathirai	(Tamil Muhil <i>et al.</i> , 2018).	Antimicrobial (Tamil Muhil <i>et al.</i> , 2018).	-	-
22.	Vasanthakusumakaramaathirai	(Indhumathi <i>et al.</i> , 2023 and Indhumathi <i>et al.</i> , 2018).	Anti- histamine (Indhumathi <i>et al.</i> , 2023), Bronchodilator (Indhumathi <i>et al.</i> , 2018).	(Indhumathi <i>et al.</i> , 2022)	-
23.	Pooranachandhirodayamaathirai	(Hazeena Begum <i>et al.</i> , 2014 and Muthukumaran Pakkirisamy <i>et al.</i> , 2022 and Vaishnavi <i>et al.</i> , 2024 and Balasubramanian <i>et al.</i> , 2024).	Antioxidant (Hazeena Begum <i>et al.</i> , 2014 and Muthukumaran Pakkirisamy <i>et al.</i> , 2022), anticancer (Vaishnavi <i>et al.</i> , 2024), anti-amnesic (Balasubramanian <i>et al.</i> , 2024).	(Muthukumaran <i>et al.</i> , 2020)	-
24.	Silasathu parpam	(Thirupathi <i>et al.</i> , 2002).	Antiulcer (Thirupathi <i>et al.</i> , 2002), spermatogenic (Balasubramanian <i>et al.</i> , 2014), Antihyperglycemic (Revathy, 2019), Diuretic, Lithotriptic (Nikil Niva <i>et al.</i> , 2024), anti-inflammatory, antinociceptive (Christian CBS <i>et al.</i> , 2024).	(Vikesh <i>et al.</i> , 2018)	-
25.	Sangu parpam	(Thirupathi <i>et al.</i> , 2002).	Antiulcer (Thirupathi <i>et al.</i> , 2002), anti-inflammatory, antioxidant (Nikil Niva <i>et al.</i> , 2026).	(Madhavan <i>et al.</i> , 2021)	-
26.	Muthuchippiparpam	(Ganesan <i>et al.</i> , 2016).	Antioxidant, antimicrobial (Ganesan <i>et al.</i> , 2016), antiulcer, anti-inflammatory, Anti osteoporotic (Senthil Velu Kanthal <i>et al.</i> , 2017).	-	-
27.	Ayanaaga parpam	-	-	-	-
28.	Muthu parpam	(Chitra <i>et al.</i> , 2023).	Antioxidant (Chitra <i>et al.</i> , 2023), anticataract (Chitra <i>et al.</i> , 2024), neuroprotective (Sabari girija <i>et al.</i> , 2020), anti-inflammatory (Shanmugapriya <i>et al.</i> , 2025).	(Jenifer Vimala <i>et al.</i> , 2022)	-

Sl. No.	Name of the internal medicine	Preclinical Studies	Pharmacological actions	Toxicity study	Clinical studies related to CVDs
29.	Sirungi parpam	(Omprakash <i>et al.</i> , 2011).	Antiulcer (Omprakash <i>et al.</i> , 2011).	(Omprakash <i>et al.</i> , 2011)	
30.	Pavala parpam	(Thanuja <i>et al.</i> , 2021).	Hemostatic, Hepatoprotective (Thanuja <i>et al.</i> , 2021), antibacterial (Thanigavelan <i>et al.</i> , 2011).	(Thanuja <i>et al.</i> , 2021)	
31.	Kaariya parpam	-	-	-	-
32.	Uppu parpam	(Kavitha <i>et al.</i> , 2013).	Folliculogenitic (Kavitha <i>et al.</i> , 2013).	-	-
33.	Kalameganarayana chendooram	(Satheesh <i>et al.</i> , 2024).	Anticancer (Satheesh <i>et al.</i> , 2024).	(Ramkumar <i>et al.</i> , 20140	
34.	Ekku chendooram	-	-	-	-

Table 2: Pharmacological Activities of Siddha Formulations Used in Cardiovascular Diseases.

Formulation Type (Total)	Antioxidant	Cardioprotective	Antihypertensive	Hypolipidemic	Anti-atherogenic	Anti-inflammatory
Kudineer (6)	3	1	1	0	0	1
Chooranam (10)	8	1	1	4	1	3
Rasayanam (2)	1	0	0	0	0	1
Ilagam (1)	0	0	0	0	0	0
Mathirai (4)	2	0	0	0	0	0
Parpam (9)	3	0	0	0	0	4
Chendooram (2)	0	0	0	0	0	0

reduce cardiac workload (Nagata *et al.*, 2011). Such multifaceted pharmacodynamics offer advantages over single-target conventional drugs, particularly in managing complex conditions such as CVDs, which involve intertwined metabolic, inflammatory, and oxidative pathways (Kabir *et al.*, 2022).

The integration of Siddha formulations into mainstream cardiovascular care aligns with national health initiatives, including the NPCDCS, and supports preventive strategies. The incorporation of lifestyle modifications, early screening, and Siddha-based therapeutics can help delay disease onset, reduce complications, and enhance quality of life, particularly in populations prone to premature CVD onset, such as urban adults in India (Kumar *et al.*, 2023; Lekha *et al.*, 2015).

LIMITATIONS AND FUTURE DIRECTIONS

While preclinical evidence is extensive, clinical studies on Siddha cardiovascular medicines remain limited in scale, sample size, and methodological rigor. Standardized clinical trials with larger cohorts and long-term follow-up are necessary to validate the efficacy and safety of these methods. Additionally, mechanistic studies at the molecular and genomic levels could further elucidate the pathways modulated by these formulations, enhancing their scientific credibility.

Future research should also explore drug–herb interactions, dose optimization, and pharmacokinetics, ensuring safe integration with conventional therapies. Strengthening pharmacovigilance and quality control measures for Siddha formulations will be crucial for broader clinical adoption.

CONCLUSION

This review demonstrates that Siddha internal medicines exhibit significant pharmacological activities relevant to the management of cardiovascular diseases, including antioxidant, anti-inflammatory, cardioprotective, antihypertensive, and hypolipidemic effects. Preclinical and limited clinical evidence supports their efficacy and safety, highlighting their potential role in integrative strategies for CVD prevention and management. Comprehensive clinical studies and mechanistic research are warranted to consolidate these findings and facilitate evidence-based incorporation of Siddha therapies into mainstream cardiovascular care.

ABBREVIATIONS

CVDs: Cardiovascular Diseases; **NCDs:** Noncommunicable Diseases; **LMICs:** Low- and Middle-Income Countries; **NPCDCS:** National Programme for Prevention and Control

of Cancers, Diabetes, Cardiovascular Diseases, and Stroke; **RCTs**: Randomized Controlled Trials; **TNF- α** : Tumor necrosis factor-alpha; **IL-6**: Interleukin-6; **AT1R**: Angiotensin II type 1 receptor; **eNOS**: Endothelial nitric oxide synthase.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

J: Conceptualization, Methodology, Validation, Formal analysis, Data curation, writing - original draft, writing - review, and editing. **V**: Conceptualization, Methodology, Software, Validation, Formal analysis, writing - original draft, writing - review and editing, Supervision. All authors have read and agreed to the published version of the manuscript.

DECLARATION OF GENERATIVE AI IN SCIENTIFIC WRITING

During the preparation of this work, the author(s) used the Grammarly tool to enhance the manuscript's writing. The ideas, structure, and content of the article are entirely my own. After utilizing this tool, the authors reviewed and edited the content as necessary and take full responsibility for the published article's content.

SUMMARY

This integrative review analyzes the role of Siddha medicine in the management of Cardiovascular Diseases (CVDs), a major global health burden. The authors identified 34 Siddha internal formulations from standard treatment guidelines, including Venthamarai chooranam, Maruthampattai kudineer, and Amukkara chooranam. The review highlights that 17 of these formulations possess antioxidant activity, 8 are anti-inflammatory, and others exhibit cardioprotective, antihypertensive, and hypolipidemic properties. While preclinical studies provide substantial evidence of these pharmacological actions and toxicity studies suggest acceptable safety profiles, clinical evidence remains limited to small-scale studies and case reports. The review concludes that while Siddha medicines offer a promising integrative approach to CVD prevention and management, rigorous large-scale clinical trials are required to validate their efficacy and safety for mainstream adoption.

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Cite this article: Raja NNJ, Veluchamy HND. Siddha Medicine in Cardiovascular Care: Clinical Evidence and Pharmacological Perspectives for Integrative Management-An Integrative Review. *Pharmacog Res*. 2026;18(4):1150-8.