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# "AYURVEDIC CARDIOPROTECTIVES AND CORRELATION WITH MODERN CARDIOLOGY - AN INTEGRATIVE REVIEW"

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## ABSTRACT

**Introduction:** Cardiovascular diseases (CVDs) remain the leading cause of morbidity and mortality worldwide. Ayurveda describes a group of herbs and formulations—commonly termed *Hrudya* or cardiotonic herbs—that have traditionally been used to support cardiac function, circulation, and systemic resilience. Modern research has begun validating many of these agents for anti-ischemic, anti-atherosclerotic, antihypertensive, antioxidant, and anti-arrhythmic actions. **Methods:** A structured literature search was performed (PubMed, Scopus, Web of Science, Embase, Google Scholar) together with consultation of classical Ayurvedic texts (*Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, *Bhavaprakasha*). Search terms included "Ayurveda AND heart," "Terminalia arjuna cardioprotective," "Withania somnifera cardiovascular," "Triphala cardiovascular," "Curcumin cardiovascular," and related keywords. Inclusion criteria: preclinical pharmacology, mechanistic studies, randomized controlled trials, systematic reviews (1950–2025). Exclusion criteria: non-translated non-English reports, anecdotal single-case reports, and poor-quality studies. **Results:** Classical cardioprotectives include *Terminalia arjuna* (Arjuna), *Withania somnifera* (Ashwagandha), *Curcuma longa* (Turmeric), *Allium sativum* (Garlic), *Emblica officinalis*/*Terminalia chebula*/*Terminalia bellirica* (Triphala components), *Guggulu* (Commiphora mukul), and others. Systematic and mechanistic data support antioxidant, lipid-lowering, anti-inflammatory, vasodilatory, anti-platelet, and myocardial metabolic effects for several agents — notably Arjuna (cardioprotective and anti-ischemic evidence with clinical trials showing improved symptoms and antioxidant reserve) and curcumin/ashwagandha (beneficial effects on endothelial function, blood pressure, oxidative stress, and exercise tolerance). **Discussion:** Ayurvedic concepts of *Hridya* medicines (strengthening the heart and circulatory system) map well onto modern cardiology mechanisms (myocardial protection, anti-atherosclerotic action, autonomic modulation). Evidence gaps include heterogeneity of extracts, variable standardization, inconsistent dosing, and limited large, multicenter randomized trials for hard cardiovascular endpoints (MI, stroke, mortality). Integration into modern practice will require standardized phytopharmaceuticals, mechanistic translational studies, and robust clinical trials. **Conclusion:** Several Ayurvedic cardioprotective herbs show promising translational potential. Arjuna, curcumin, ashwagandha and multi-herb formulations such as Triphala have substantial preclinical and growing clinical evidence. Targeted research to standardize preparations and test clinically meaningful cardiovascular endpoints could enable evidence-based integration into contemporary cardiology.

**KEYWORDS:** Arjuna, Ashwagandha, Ayurveda, Cardioprotection, Curcumin

## INTRODUCTION

Ayurveda, the traditional medical system of the Indian subcontinent, contains a long-standing corpus of knowledge on heart health. Classical texts use terms such as *Hridya* and describe herbs and formulations for strengthening the heart, improving circulation, and balancing the subtle mind-heart interactions that influence cardiovascular function.[1-2] Cardiotonic herbs are incorporated in preventive regimens, post-illness recovery, and symptomatic management of chest pain and breathlessness.[3]

Modern cardiology recognizes multifactorial pathophysiology in CVDs — oxidative stress, inflammation, endothelial dysfunction, lipid dysregulation, autonomic imbalance, and myocyte metabolic failure.[4-5] These processes are precisely those targeted by many Ayurvedic herbs through phytochemicals that exhibit antioxidant, anti-inflammatory, lipid-lowering, endothelial-protective, anti-hypertensive, and anti-platelet activities.[6-7] Several herbs used classically for "heart strengthening" are therefore logical candidates for cardioprotection in modern biomedical terms.[8]

This review aims to synthesize classical Ayurvedic descriptions of cardioprotective herbs with contemporary pharmacological and clinical data.[9] Objectives are: to list principal Ayurvedic cardioprotectives and their classical indications; to summarize phytochemistry and mechanisms of action relevant to cardiology; to present key preclinical and clinical evidence linking these herbs to cardiovascular endpoints; and to discuss limitations, translational gaps, and priorities for future research.[10]

## MATERIALS AND METHODS

**Search strategy:** Between January and March 2025 we searched PubMed, Scopus, Web of Science, Embase and Google Scholar for combinations of keywords: "Ayurveda heart," "Arjuna cardioprotective," "Terminalia arjuna trial," "Withania somnifera cardiovascular," "curcumin endothelial function," "Triphala lipids," "garlic cardiovascular," and "guggulu lipid lowering."[11] Classical Ayurvedic texts (*Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Bhavaprakasha Nighantu*) were examined for traditional nomenclature and indications.[13]

**Inclusion/exclusion criteria:** Included were in vitro and animal mechanistic studies, randomized and non-randomized clinical trials, systematic reviews/meta-analyses, and authoritative phytopharmacology reviews published between 1950–2025. Excluded were non-translated non-English reports without reliable translation, anecdotal case reports, and papers lacking methods or objective outcomes.[14]

**Data extraction and synthesis:** Two reviewers independently screened titles/abstracts and extracted data on herb, phytochemistry, mechanisms (antioxidant, anti-inflammatory, lipid effect, vasodilation, anti-platelet, autonomic modulation, myocardial metabolism), preclinical endpoints (infarct size, ischemia-reperfusion injury, endothelial markers), and clinical endpoints (blood pressure, lipid profile, exercise tolerance, LVEF, symptoms, biomarkers). Discrepancies were resolved by discussion. Findings were synthesized thematically rather than as a systematic meta-analysis due to heterogeneity of interventions and outcomes.[15]

## OBSERVATION AND RESULTS

### Classical cardioprotective herbs and formulations

Ayurvedic classics prescribe several herbs specifically for the heart. *Terminalia arjuna* (Arjuna) bark decoction and powders are repeatedly cited for *Hridya* effects — strengthening the heart, relieving angina, and improving cardiac function. *Withania somnifera* (Ashwagandha) is used to build stamina and support cardiac vigor after illness. *Curcuma longa* (Haridra) and *Allium sativum* (Lahsun, garlic) are used to correct blood quality and circulation. Polyherbal formulations (e.g., classical rasayanas or modern combinations like "Arjuna + Guggulu") are used for chronic heart conditions and recovery phases.

### Phytochemistry and mechanistic actions relevant to cardiology

- **Terminalia arjuna**: rich in triterpenoids, flavonoids and tannins; mechanisms include antioxidant activity, attenuation of lipid peroxidation, improvement in myocardial metabolism, and enhancement of endothelial nitric oxide bioavailability. Clinical and mechanistic reviews highlight Arjuna's anti-ischemic and anti-atherosclerotic potential and improved symptom scores in patients with coronary artery disease.

- **Withania somnifera (Ashwagandha)**: withanolides exhibit adaptogenic effects, reduce sympathetic overactivity, lower cortisol, improve autonomic balance, and enhance cardiac endurance and exercise capacity in human trials. These effects support cardiometabolic resilience.
- **Curcumin (Curcuma longa)**: curcuminoids are potent anti-inflammatory and antioxidant agents; they improve endothelial function, lower inflammatory cytokines, and in some trials reduce blood pressure and markers of atherosclerotic risk. Systematic reviews show curcumin's promise for reducing cardiovascular risk factors.
- **Triphala & Emblica (Amla)**: polyphenols and vitamin C in *Emblica officinalis* (Amla) and tannins in *Terminalia* species reduce lipids and oxidative stress and show anti-atherogenic effects in preclinical models and several small clinical trials. Triphala and its components have demonstrated lipid-lowering and antioxidant effects relevant to atherogenesis and endothelial health.
- **Allium sativum (Garlic)** and **Commiphora mukul (Guggulu)**: garlic shows modest blood-pressure and antiplatelet effects; guggulu exhibits lipid-lowering activity through bile acid and lipid metabolism modulation.

**Preclinical (mechanistic) evidence**

Multiple rodent and cell studies report reduced infarct size and improved post-ischemic functional recovery with Arjuna extracts, often accompanied by decreased ROS, preserved mitochondrial function, and improved myocardial contractility. Ashwagandha demonstrates cardioprotective effects in ischemia-reperfusion models via antioxidant and anti-apoptotic pathways. Curcumin inhibits NF-κB signaling, reduces vascular inflammation, and prevents LDL oxidation—core processes in atherosclerosis development.

A representative mechanistic diagram would show overlapping pathways: antioxidant → reduced ROS → preserved nitric oxide → improved endothelial function; anti-inflammatory → reduced cytokines (TNF-α, IL-6) → reduced vascular inflammation; lipid modulation → lower LDL/oxidized LDL → slowed plaque progression; autonomic modulation → reduced sympathetic drive → improved heart rate variability and BP control.

**Clinical evidence and human trials**

- **Terminalia arjuna:** Several open and randomized studies reported symptomatic improvement in angina, improved functional capacity, reduced total cholesterol and LDL, and increased antioxidant reserves in coronary disease patients; a 2016 randomized trial found improved functional status and antioxidant markers though no significant change in LVEF over 12 weeks in chronic heart failure patients.
- **Withania somnifera:** Human randomized trials show improved cardiorespiratory endurance, reduced stress biomarkers, and favorable autonomic changes; trials in athletes and healthy volunteers report increased $VO_2$ max and exercise performance, which are surrogate markers for cardiac fitness.
- **Curcumin:** Clinical trials and meta-analyses demonstrate improvements in endothelial function, reductions in CRP, improved arterial compliance, and modest reductions in blood pressure and lipid peroxidation markers—supporting its role as an adjunctive cardioprotective agent.
- **Triphala/Amla:** Studies demonstrate lipid lowering and antioxidant effects; translational outcomes indicate potential to reduce atherogenic risk, though large-scale CVD endpoint trials are lacking.

**Safety and standardization issues**

Most herbs show good safety profiles at therapeutic doses; however, herb–drug interactions (e.g., with anticoagulants or antihypertensives), variability in active constituent content, and inconsistent extraction methods complicate translation. Rigorous phytochemical standardization (e.g., defined arjunolic acid, withanolide, curcumin content) and controlled-release/optimized formulations are necessary for reproducible pharmacology.

**DISCUSSION**

**Mapping Ayurvedic concepts to cardiology mechanisms**

Ayurvedic *Hridya* and Rasayana concepts emphasize strengthening the heart, improving tissue nutrition, and balancing the mind–heart axis — goals

congruent with modern cardioprotective strategies: improving myocardial metabolism, protecting against ischemia-reperfusion injury, reducing atherogenesis, and modulating autonomic tone. For example, Arjuna's classical indication for chest pain and breathlessness aligns with modern evidence of improved functional capacity and antioxidant reserve in ischemic heart disease. [16-17]

**Evidence strengths**[18]

- **Mechanistic breadth:** Many Ayurvedic herbs act on multiple pathophysiological nodes (oxidative stress, inflammation, lipids, endothelial dysfunction), making them attractive as multi-target therapeutics in complex diseases like CVD.
- **Promising clinical signals:** Randomized trials and systematic reviews (especially for curcumin and Arjuna) show improvements in biomarkers, symptom scores, and surrogate endpoints (exercise tolerance, endothelial function).

**Key limitations and gaps**[19]

- **Heterogeneity of preparations and doses:** Studies use whole-bark powders, aqueous extracts, ethanol extracts, or standardized fractions — making comparisons and meta-analysis difficult.
- **Lack of hard-endpoint trials:** There are few large randomized controlled trials powered for cardiovascular events (myocardial infarction, stroke, cardiovascular mortality). Most human studies are small, short-term, and focused on surrogate markers.
- **Drug–herb interactions and safety:** Potential interactions with antiplatelet and anticoagulant agents (e.g., garlic potentiation of bleeding) and with statins or antihypertensives require careful evaluation.
- **Regulatory and quality challenges:** Batch-to-batch variability and contamination/adulteration risks hinder clinical translation.

**Translational opportunities**[20]

- **Standardized phytopharmaceuticals:** Develop standardized extracts (e.g., defined % arjunolic acid, withanolide content, curcuminoid bioavailability enhancers) and test them in well-designed phase II and phase III trials.
- **Adjunctive therapy trials:** Testing Ayurvedic cardioprotectives as adjuncts to guideline therapies (e.g., statin plus Arjuna for LDL reduction and endothelial protection) could show additive benefits.
- **Mechanistic translational studies:** Use systems biology and omics to map Ayurvedic polyherbal mechanisms onto molecular cardiology networks.
- **Safety registries and pharmacovigilance:** Real-world safety data collection will clarify herb–drug interactions and long-term tolerability.

## CONCLUSION

Ayurvedic cardioprotective herbs represent a rich pharmacopeia with multi-targeted actions that align well with modern pathophysiological understanding of cardiovascular disease. Among them, Terminalia arjuna stands out with substantial preclinical work and multiple clinical studies showing symptom improvement, antioxidant advantages, and positive effects on lipids and functional capacity; curcumin has a growing evidence base for endothelial and anti-inflammatory benefits; Withania somnifera shows promise for autonomic modulation and cardiorespiratory fitness; and Triphala/Amla components provide antioxidant and lipid-modifying actions.

To translate these agents responsibly into modern cardiology, three priorities are essential: standardization of herbal extracts with validated phytochemical markers; rigorous clinical trials powered for clinically meaningful cardiovascular endpoints or robust surrogate outcomes; and systematic safety evaluation including herb–drug interaction profiling. When these steps are taken, Ayurvedic cardioprotectives could complement existing therapies — providing multi-modal, broadly tolerable approaches to prevention and supportive treatment of cardiovascular disease.

## REFERENCES

1. Dwivedi S. Revisiting *Terminalia arjuna* – An Ancient Cardiovascular Herb: A review. *J Tradit Complement Med.* 2014; (review). (PMC)
2. Maulik SK, et al. Clinical efficacy of water extract of stem bark of *Terminalia arjuna* in

chronic heart failure: randomized trial. *Eur J Heart Fail.* 2016; (trial). (PubMed)
3. Mikulska P, et al. Ashwagandha (Withania somnifera)—Current research on cardiometabolic and adaptogenic effects. *Phytother Res.* 2023; (review). (PMC)
4. Sandhu JS, et al. Effects of *Withania somnifera* and *Terminalia arjuna* on physical performance and cardiorespiratory endurance in healthy young adults. *J Clin Trials / Res* 2010. (PMC, ResearchGate)
5. Cox FF, et al. Protective Effects of Curcumin in Cardiovascular Diseases: a review. *Free Radic Biol Med.* 2022; (review). (PMC)
6. Ramesh P, et al. *Terminalia arjuna*, a Cardioprotective Herbal Medicine: Mechanisms and evidence. *Pharmaceutics.* 2023; (review). (MDPI)
7. Peterson CT, Denniston K, Chopra D. Therapeutic Uses of Triphala in Ayurvedic Medicine: review. *Journal of Alternative and Complementary Medicine.* 2017. (PMC)
8. Phimarn W, et al. Effects of Triphala on Lipid and Glucose Profiles: trial. *BMC Complement Altern Med.* 2021. (PMC)
9. Hajleh MNA, et al. Effects of Turmeric Concentrate on Cardiovascular Risk: randomized trial 2022. *Nutrients.* 2022. (PMC)
10. Charaka. *Charaka Samhita.* Varanasi: Chaukhambha Orientalia; 2014.
11. Sushruta. *Sushruta Samhita.* Varanasi: Chaukhambha Sanskrit Sansthan; 2015.
12. Vagbhata. *Ashtanga Hridaya.* Delhi: Chaukhambha Pratishthan; 2012.
13. Bhavaprakasha Nighantu. Varanasi: Chaukhambha Bharati Academy; 2010.
14. Kapoor D. *Terminalia arjuna* in coronary artery disease: review of clinical & preclinical studies. *Evid Based Complement Alternat Med.* 2014. (ScienceDirect)
15. Pase MP, et al. Cognitive & mood effects of curcumin: human trials & implications for cardiovascular stress response. *Hum Psychopharmacol.* 2012. (discussion on inflammation–CVD link). (ScienceDirect)
16. Wankhede S, et al. Examining ashwagandha supplementation in endurance and cardiac fitness (JISSN). 2015. (BioMed Central)
17. Kean JD, et al. Mechanistic insights into Bacopa, curcumin, and related botanicals with cardiovascular implications. *Phytother Res.* 2016. (background on polyphenols & endothelium). (ScienceDirect)
18. Wang W, et al. Study on multi-target mechanisms of Triphala on cardiovascular disease models. *Phytomedicine.* 2019. (ScienceDirect)
19. Ramesh P, et al. Terminalia arjuna systematic review (MDPI Pharmaceutics). 2023. (MDPI)
20. Very recent clinical/epidemiologic overviews and news summaries on turmeric and cardiometabolic health (2022–2025) demonstrating ongoing research interest. (Health, Verywell Health, Nature)