Review Article

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PSYCHOLOGICAL AND BEHAVIOURAL DETERMINANTS OF CARDIOVASCULAR DISEASE: AN INTEGRATIVE AYURVEDIC PERSPECTIVE

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ABSTRACT

Cardiovascular diseases (CVDs) are the leading cause of global morbidity and mortality. Although conventional risk factors are well recognized, psychological and behavioural factors also contribute to cardiovascular dysfunction. Ayurveda describes Hridaya as the seat of Chetana (consciousness), Manas (mind), Prana (vital force), and Ojas, emphasizing the close relationship between mental and cardiovascular health. Classical texts identify Manasika Nidana, including Chinta (worry), Shoka (grief), Bhaya (fear), Krodha (anger), Trasa (terror), and Abhighata (psychological trauma), as etiological factors in Hridroga. This integrative review examines psychological and behavioural determinants of cardiovascular disease and interprets contemporary evidence through Ayurvedic concepts including Hridaya, Manasika Nidana, Dosha Vaishamya, Agni Dushti, Ama, Srotodushti, and Satvavajaya Chikitsa. Literature was reviewed from PubMed/MEDLINE, Scopus, Web of Science, Google Scholar, and classical Ayurvedic texts, with evidence synthesized narratively. Contemporary evidence indicates that psychological stress, depression, anxiety, anger, social isolation, and maladaptive behaviours influence cardiovascular health through neuroendocrine, autonomic, inflammatory, metabolic, and vascular pathways. From an Ayurvedic perspective, these factors may disturb Rajas and Tamas, contributing to Dosha Vaishamya, Agni Dushti, Ama formation, and dysfunction of Rasavaha and Pranavaha Srotas, ultimately contributing to Hridroga. Satvavajaya Chikitsa offers a psychotherapeutic framework emphasizing mental regulation, behavioural modification, and stress management. Ayurveda therefore provides a holistic conceptual framework linking psychological, behavioural, and cardiovascular health. Further interdisciplinary clinical research is required to validate this integrative approach.

Keywords: Cardiovascular disease, Satvavajaya Chikitsa, Hridroga, Ayurveda

INTRODUCTION

Cardiovascular diseases (CVDs) remain the leading cause of global morbidity and mortality, accounting for approximately one-quarter of all deaths worldwide and imposing a substantial socioeconomic burden on healthcare systems.[1] Although conventional risk factors such as hypertension, diabetes mellitus, dyslipidaemia, obesity, smoking, unhealthy diet, and physical inactivity contribute significantly to disease development, they do not fully explain the variability in cardiovascular risk, disease progression, and clinical outcomes. Increasing evidence has identified psychological and behavioural determinants as independent contributors to cardiovascular disease, highlighting the importance of mental health in cardiovascular prevention and management.

Depression, anxiety, chronic psychological stress, anger, hostility, loneliness, and social isolation have consistently been associated with coronary artery disease, myocardial infarction, heart failure, stroke, recurrent cardiovascular events, and cardiovascular mortality.[2] These psychosocial factors also promote unhealthy behaviours, including tobacco use, excessive alcohol consumption, poor dietary habits, physical inactivity, disturbed sleep, and poor adherence to medical therapy, thereby amplifying cardiovascular risk.[3] Contemporary evidence suggests that these determinants influence cardiovascular health through interconnected neuroendocrine, autonomic, inflammatory, metabolic, vascular, and behavioural pathways, supporting the concept that cardiovascular disease is not merely a structural disorder but a complex interaction between biological, psychological, and behavioural factors.[4] Ayurveda has long recognized the inseparable relationship between the mind and the heart. Unlike the predominantly anatomical perspective of contemporary medicine, Ayurveda describes Hridaya as the seat of Chetana (consciousness), Manas (mind), Prana (vital life force), and Ojas (vital essence), emphasizing its central role in maintaining both psychological and physiological homeostasis.[5] Classical Ayurvedic texts identify Manasika Nidana—including Chinta (excessive worry), Shoka (grief), Bhaya (fear), Krodha (anger), Trasa (terror), and Abhighata (psychological trauma)—as important etiological factors in the development of Hridroga.[6] These concepts illustrate that persistent disturbances of mental equilibrium can adversely influence cardiovascular function, providing a holistic framework for understanding psychosomatic disease.

Despite substantial advances in behavioural cardiology, contemporary literature largely explains psychosocial cardiovascular risk through neuroendocrine, inflammatory, metabolic, and vascular mechanisms, whereas Ayurvedic literature discusses the same phenomenon through the concepts of Hridaya, Manasika Nidana, Dosha Vaishamya, and Satvavajaya Chikitsa. However, these two perspectives have seldom been examined within a unified conceptual framework.

Integrating contemporary cardiovascular science with classical Ayurvedic principles may broaden the understanding of mind–heart interactions and support more comprehensive strategies for cardiovascular prevention and rehabilitation.

Therefore, the present integrative review critically examines the psychological and behavioural determinants of cardiovascular disease and interprets contemporary evidence through the Ayurvedic concepts of Hridaya, Manasika Nidana, Hridroga, and Satvavajaya Chikitsa. The review further proposes an integrative conceptual framework that bridges modern psychocardiology with Ayurvedic principles, thereby highlighting the potential role of holistic approaches in cardiovascular prevention, rehabilitation, and future interdisciplinary research.

REVIEW APPROACH

This integrative review was conducted to synthesize contemporary evidence on the psychological and behavioural determinants of cardiovascular disease and interpret these findings through Ayurvedic concepts. A comprehensive literature search was performed using PubMed/MEDLINE, Scopus, Web of Science, Google Scholar. Search terms included cardiovascular disease, psychological stress, depression, anxiety, behavioural factors, psychosocial determinants, Ayurveda, Hridaya, Hridroga, Manasika Nidana, Satvavajaya Chikitsa, and related keywords.

We included peer-reviewed original studies, systematic reviews, meta-analyses, clinical guidelines, and relevant review articles published in English. We reviewed classical Ayurvedic literature, including the Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, and Ashtanga Sangraha, to identify concepts related to Hridaya, Hridroga, Manasika Nidana, Dosha Vaishamya, Agni, Ama, and Srotodushti.

DISCUSSION

The evidence synthesized in this review highlights that psychological and behavioural determinants are integral components of cardiovascular disease rather than secondary modifiers of established illness. Contemporary research demonstrates that chronic psychological stress, depression, anxiety, and maladaptive lifestyle behaviour contribute to cardiovascular dysfunction through interconnected neuroendocrine, autonomic, inflammatory, metabolic, and vascular mechanisms. These findings support the growing recognition that effective cardiovascular prevention requires attention not only to conventional risk factors but also to psychosocial health and behavioural modification.

Ayurveda offers a complementary perspective by interpreting these psychosocial determinants through the concepts of Hridaya, Manasika Nidana, Prajnaparadha, Dosha Vaishamya, Agni Dushti, Ama, and Srotodushti. Unlike the reductionist approach of contemporary medicine, the Ayurvedic framework views cardiovascular disease as the culmination of disturbances in mental, behavioural, metabolic, and physiological homeostasis. This holistic interpretation provides a conceptual basis for integrating psychological well-being with cardiovascular health and highlights the importance of preserving equilibrium of both Manas and Sharira in preventing Hridroga.

The review further emphasizes the relevance of Satvavajaya Chikitsa as a psychotherapeutic approach aimed at strengthening mental resilience, promoting healthy behavioural practices, and facilitating long-term cardiovascular rehabilitation. Although robust clinical evidence evaluating Satvavajaya Chikitsa in cardiovascular disorders remains limited, its principles of mental regulation, behavioural modification, and lifestyle discipline closely align with contemporary concepts of behavioural cardiology, stress management, and cardiac rehabilitation. Future interdisciplinary research integrating biomedical outcomes with validated Ayurvedic parameters is warranted to establish its clinical applicability in evidence-based cardiovascular care.

Psychological and Behavioural Determinants of Cardiovascular Disease; Contemporary Evidence and Biological Basis

Psychological and behavioural determinants are increasingly recognized as independent contributors to the initiation, progression, and prognosis of cardiovascular disease (CVD).[7] In addition to conventional cardiovascular risk factors, depression, anxiety, chronic psychological stress, anger, hostility, social isolation, and adverse life events significantly increase the risk of coronary artery disease, myocardial infarction, heart failure, stroke, recurrent cardiovascular events, and cardiovascular mortality. These psychosocial factors frequently coexist with unhealthy lifestyle behaviours, including tobacco use, excessive alcohol consumption, unhealthy dietary practices, physical inactivity, poor sleep quality, and inadequate adherence to medical therapy, thereby amplifying cardiovascular risk. Consequently, psychological distress and behavioural factors are now regarded as integral components of cardiovascular risk rather than secondary modifiers of established disease.[8]

The pathogenic effects of psychosocial distress are mediated through multiple interconnected biological pathways. Chronic psychological stress activates the hypothalamic–pituitary–adrenal (HPA) axis and sympathetic nervous system, resulting in sustained neuroendocrine and autonomic dysregulation. Persistent activation of these stress-response systems promotes insulin resistance, visceral adiposity, hypertension, dyslipidaemia, increased myocardial oxygen demand, vascular constriction, and reduced heart rate variability, all of which contribute to adverse cardiovascular outcomes.[9] Clinical evidence further suggests that HPA-axis dysregulation is associated with increased cardiovascular mortality, highlighting the important role of chronic stress in disease progression.[10]

Psychological stress also induces a chronic pro-inflammatory state characterized by elevated circulating inflammatory mediators, including interleukin-6 (IL-6), tumour necrosis factor-α (TNF-α), and C-reactive protein (CRP).[11] Persistent inflammation impairs endothelial function by reducing nitric oxide bioavailability, increasing oxidative stress, and promoting leukocyte adhesion and vascular remodelling, thereby accelerating atherosclerotic plaque formation.[12] Simultaneously, psychosocial distress enhances platelet activation and coagulation, creating a prothrombotic state that predisposes individuals to plaque rupture, myocardial infarction, and stroke.[13] These inflammatory, endothelial, and thrombotic responses function synergistically rather than independently, driving the progression of atherosclerotic cardiovascular disease.[14] Collectively, contemporary evidence demonstrates that psychological and behavioural determinants influence cardiovascular health through a coordinated cascade involving neuroendocrine activation, autonomic imbalance, inflammation, endothelial dysfunction, thrombosis, and maladaptive lifestyle behaviours. These interconnected mechanisms provide the biological basis for the strong association between psychosocial distress and cardiovascular disease and establish the foundation for interpreting these processes through the Ayurvedic concepts

of Hridaya, Manasika Nidana, Dosha Vaishamya, Agni Dushti, Ama, and Srotodushti, discussed in the subsequent section.

Table 1: Major Psychosocial and Behavioural Determinants of Cardiovascular Disease

Psychosocial / Behavioural Factor	Evidence in Contemporary Medicine	Major Cardiovascular Consequences
Depression	Independent predictor of CAD, HF, recurrent MI and mortality	Poor prognosis, recurrent events, reduced quality of life
Anxiety	Associated with increased CHD, MI and arrhythmias	Increased cardiovascular events and mortality
Chronic psychological stress	Strong predictor of incident CVD	Accelerated atherosclerosis, hypertension, CAD
Anger and hostility	Associated with sympathetic activation and acute coronary events	MI, hypertension, arrhythmias
Social isolation and loneliness	Associated with increased mortality and poor outcomes	CAD progression, heart failure, mortality
Behavioural factors (smoking, inactivity, unhealthy diet, poor sleep, non-adherence)	Indirectly increase cardiovascular risk	Progression of CVD and poor treatment outcomes

Ayurvedic Interpretation of Psychosocial Cardiovascular Disease

Ayurveda offers a holistic framework for understanding the relationship between psychological disturbances and cardiovascular disease through the concept of Hridaya, regarded as more than a structural organ. Classical texts describe Hridaya as the seat of Chetana (consciousness), Manas (mind), Prana (vital force), and Ojas (vital essence), reflecting its role as the central regulator of both mental and physiological functions. It is also recognized as the Mula Sthana of Rasavaha and Pranavaha Srotas, emphasizing its importance in circulation, respiration, tissue nourishment, and maintenance of vitality.[15] Consequently, disturbances affecting mental homeostasis are considered capable of directly impairing the functional integrity of Hridaya and predisposing an individual to Hridroga.

From an Ayurvedic perspective, psychological disturbances constitute primary etiological factors (Manasika Nidana) in the pathogenesis of Hridroga. Classical texts identify Chinta (excessive worry), Shoka (grief), Bhaya (fear), Krodha (anger), Trasa (terror), and Abhighata (psychological trauma) as major factors that disrupt mental equilibrium. In addition, Prajnaparadha (intellectual error), manifested through unhealthy lifestyle practices, inappropriate diet, disturbed daily routines, and neglect of wholesome conduct, further aggravates disease susceptibility.[16] Together, Manasika Nidana and Prajnaparadha establish a psychosomatic foundation in which emotional and behavioural disturbances initiate pathological changes before the appearance of structural cardiovascular disease.

The progression from psychological disturbance to cardiovascular disease follows a sequential pathophysiological cascade. Persistent emotional stress promotes the predominance of Rajas and Tamas, leading to derangement of Prana Vayu, Vyana Vayu,[17] Sadhaka Pitta, and Avalambaka Kapha, which collectively regulate the normal functioning of Hridaya. Continued Dosha Vaishamya impairs Agni, resulting in the formation of Ama. Ama's circulation through Rasa Dhatu causes Srotodushti (Srotorodha), particularly in the Rasavaha and Pranavaha Srotas, thereby compromising tissue nourishment, circulation, and vital physiological functions. These interconnected events culminate in Hridroga, the clinical expression of prolonged psychological, behavioural, and physiological imbalance.

Although contemporary cardiovascular science explains disease progression through neuroendocrine activation, autonomic imbalance, inflammation, endothelial dysfunction, thrombosis, and metabolic alterations, Ayurveda interprets the same continuum through disturbances of mental equilibrium progressing to Dosha Vaishamya, Agni Dushti, Ama, and Srotodushti. While these explanatory models arise from different medical paradigms and should not be considered direct biological equivalents, both recognize that persistent psychological and behavioural disturbances initiate a progressive cascade culminating in cardiovascular dysfunction. This conceptual convergence provides the basis for an integrative understanding of mind–heart interactions and supports the incorporation of psychological well-being into comprehensive cardiovascular prevention and management.

Table 2: Integrative Interpretation of Contemporary Cardiovascular Pathophysiology and Ayurvedic Concepts

Disease Stage	Contemporary Medicine	Ayurvedic Interpretation
Initiating factors	Depression, anxiety, chronic stress, anger, social isolation	Manasika Nidana (Chinta, Shoka, Bhaya, Krodha, Trasa, Abhighata)
Primary response	HPA axis activation, autonomic dysregulation	Raja–Tama Vaishamya
Functional dysregulation	Neuroendocrine imbalance	Prana Vayu, Vyana Vayu, Sadhaka Pitta Vaishamya
Metabolic changes	Metabolic dysfunction	Agni Dushti → Ama Utpatti
Tissue/vascular changes	Inflammation, endothelial dysfunction, thrombosis	Rasavaha and Pranavaha Srotodushti
Clinical manifestation	Atherosclerosis, CAD, MI, HF	Hridroga

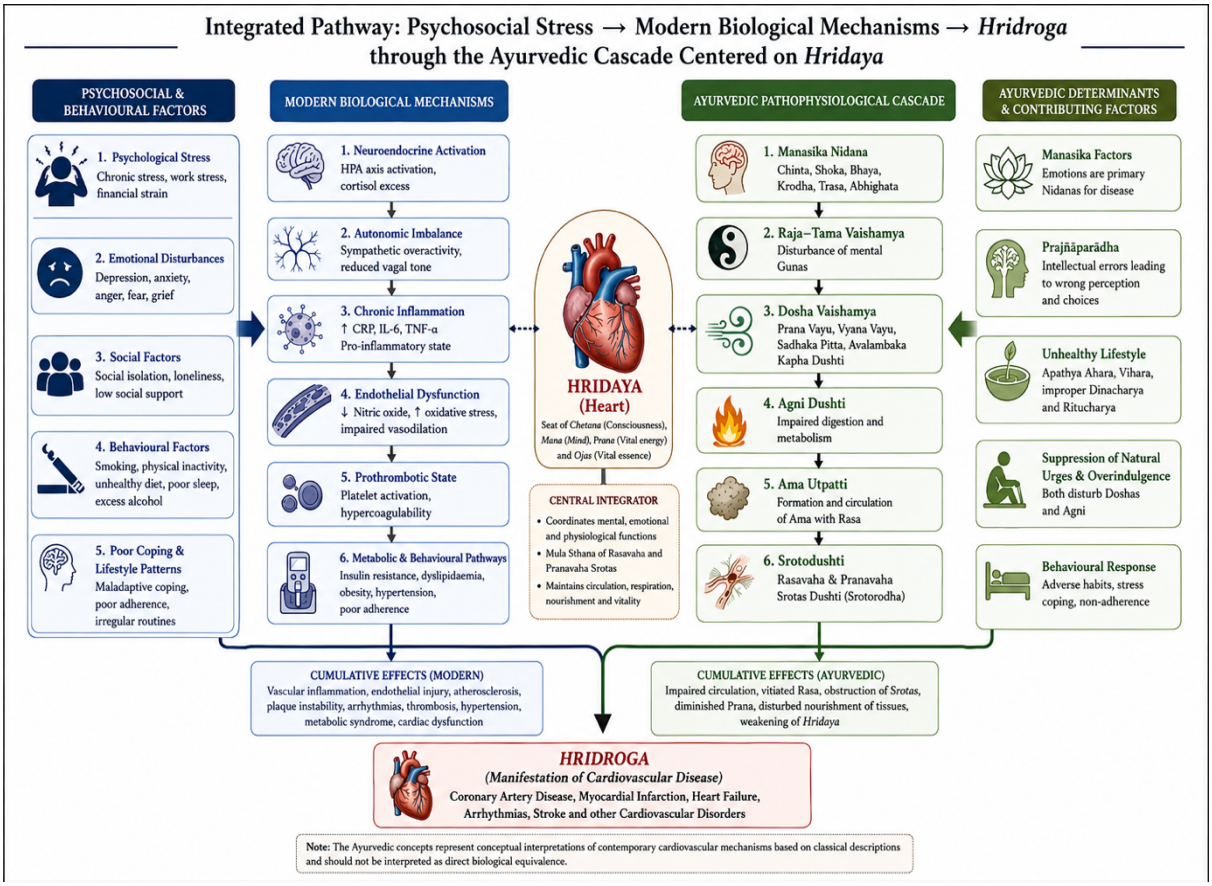

Figure 1: An integrated pathway showing Psychosocial Stress → Modern Biological Mechanisms → Hridroga through the Ayurvedic cascade centered on Hridaya.

(The authors acknowledge the use of ChatGPT OpenAI for the generation/editing of Figure 1. All AI-assisted content was reviewed and validated by the authors, who take full responsibility for its accuracy and appropriateness.)

Satvavajaya Chikitsa in Cardiovascular Prevention and Rehabilitation

Satvavajaya Chikitsa, one of the three principal therapeutic modalities described in Ayurveda, is a psychotherapeutic approach aimed at restoring mental equilibrium through Manonigraha (control of the mind).[18] By strengthening Sattva and minimizing the influence of Rajas and Tamas, it seeks to regulate cognitive, emotional, and behavioural responses that contribute to disease development. Since Manasika Nidana such as Chinta, Shoka, Bhaya, Krodha, Trasa, and Abhighata are recognized as important etiological factors in Hridroga, Satvavajaya Chikitsa has particular relevance in the prevention and long-term management of stress-related cardiovascular disorders. Its primary objective is to interrupt the progression from psychological imbalance to somatic disease by promoting emotional stability, adaptive behaviour, and mental resilience.

The therapeutic framework of Satvavajaya Chikitsa extends beyond symptom relief and emphasizes behavioural modification, self-regulation, and psychological rehabilitation. Classical Ayurvedic texts describe principles such as Trivargasya Anvavekshana (adoption of wholesome conduct), Tadvidya Seva (guidance from knowledgeable physicians), and Atma–Desha–Kala–Bala–Shakti Vijnana (self-awareness of one's physical capacity, environment, and circumstances), which collectively encourage healthy decision-making, stress management, and long-term lifestyle modification.[19] These principles are complemented by Achara Rasayana, which promotes ethical conduct, emotional discipline, and healthy daily practices, thereby preserving both psychological well-being and cardiovascular health.[20]

The practical application of Satvavajaya Chikitsa centres on five complementary components—Jnana, Vijnana, Smruti, Dhairya, and Samadhi—that collectively foster self-awareness, understanding of disease, emotional resilience, positive behavioural change, and mental tranquillity (Table 3). Acharya Vagbhata describes Atmadi Vijnana as the supreme remedy for mental disorders caused by Rajas and Tamas, explaining that the realization of one's true Self through the practice of Yoga and Samadhi helps restore mental balance and eradicate mental afflictions.[21]

Through counselling, cognitive restructuring, meditation, Pranayama, and contemplative practices, these interventions help reduce psychological distress, improve coping abilities, enhance treatment adherence, and support cardiovascular rehabilitation. Although contemporary evidence supporting Satvavajaya Chikitsa in cardiovascular disease remains limited, its holistic emphasis on psychological regulation and lifestyle modification aligns closely with current concepts of behavioural cardiology and cardiac rehabilitation, highlighting its potential as a complementary strategy alongside evidence-based cardiovascular care.

Table 3: Key Components of Satvavajaya Chikitsa in Cardiovascular Rehabilitation

Component	Primary objective	Expected cardiovascular rehabilitation benefit
Jnana	Develop realistic self-awareness and correct negative thinking	Better emotional regulation and disease acceptance
Vijnana	Educate about disease, risk factors, and lifestyle	Improved coping, treatment adherence, and secondary prevention
Smruti	Learn from previous experiences and identify stress triggers	Resolution of emotional conflicts and stress reduction
Dhairya	Strengthen resilience through counselling and reassurance	Reduced anxiety, depression, and dependency
Samadhi	Meditation, Pranayama, and cultivation of positive emotions	Improved mental tranquillity, reduced stress perception, and enhanced quality of life

CONCLUSION

Psychological and behavioural determinants play a pivotal role in the initiation, progression, and prognosis of cardiovascular disease and should be recognized alongside conventional cardiovascular risk factors in comprehensive disease prevention and management. Contemporary evidence demonstrates that these determinants influence cardiovascular health through interconnected neuroendocrine, autonomic, inflammatory, metabolic, and behavioural pathways, underscoring the importance of addressing psychological well-being in routine cardiovascular care.

Ayurveda complements this understanding by providing a holistic, Hridaya-centred perspective in which Manasika Nidana and Prajnaparadha initiate a sequential pathogenic cascade leading to Hridroga. Rather than offering an alternative to contemporary medicine, this framework provides a systems-based interpretation of the complex interactions among mental, behavioural, and physiological processes that underlie cardiovascular disease.

This review proposes an integrative conceptual framework that bridges contemporary psychocardiology with classical Ayurvedic principles, highlighting Hridaya as the functional link between mind and cardiovascular health. Integrating psychosocial assessment, behavioural modification, and Ayurvedic approaches such as Satvavajaya Chikitsa may strengthen preventive cardiology and cardiac rehabilitation by promoting holistic, patient-centred care. Continued interdisciplinary research is essential to translate these concepts into evidence-informed clinical practice.

Future Scope

Future research should validate the proposed integrative framework through multidisciplinary clinical and translational studies. Well-designed prospective cohorts, randomized controlled trials, and mechanistic investigations are needed to evaluate the effectiveness of Satvavajaya Chikitsa, behavioural interventions, and other Ayurvedic strategies as adjuncts to conventional cardiovascular prevention and rehabilitation. The development of standardized outcome measures integrating contemporary biomedical markers with validated Ayurvedic assessment parameters would strengthen the evidence base and facilitate the incorporation of Ayurveda into evidence-informed cardiovascular care.

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