

Chapter 9

Ayurvedic Approach to Cardiovascular Diseases: Delineating the Literary and Clinical Evidences

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9.1 Introduction

Ayurveda is a comprehensive, traditional health care wisdom rooting from Indian subcontinent and witnessing a global reach in the contemporary world. This global reach of traditional health care wisdom in general is consequential to the submission of inefficiency observed by and large of conventional health care models in finding efficient cures to various age and lifestyle-related disorders and also to various idiopathic illnesses where the causes and subsequently the cures are not truly straightforward. Conventional health care model, as a result, is compelled to go for a restructuring to its own dictums of disease interventions for inclusion of more naive, comprehensive, docile, dependable, ecofriendly, sustainable, human, and real-life solutions within its own ambit of disease understanding and management. Standing close to its literal meaning (*ayu* = life, *veda* = discipline of study or knowledge, a more appropriate English translation of Ayurveda could be *vivo*-logy), Ayurveda, through a conglomeration of various nature-driven preventive and curative approaches referring to human health comes as a natural ally to join conventional medical science for providing a more comprehensive care to humanity. Eventually, this comprehensive approach not only cares for physical health but also equally cares to mental, social, and spiritual components of health which are integral to total quality of life (TQL) determination in toto [1].

A quest of being healthy and subsequently to look for the causes and cures of diseases is as old as the origin of human. Initiated subsequent to this natural quest,

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a process of information accumulation through continuous experimentation and observation of natural processes was observed throughout the ages. In early Vedic periods (*Atharvaveda* circa 1500 BC), this knowledge accumulation took the shape of a more defined discipline of study which was further refined and enriched in early historic period marked by the exponential growth of various philosophical schools throughout the globe [2, 3]. Passing through a history of over 3,500 years, Ayurveda, besides few other indigenously derived medicines, still caters to the need of over 80% of domestic population in India [4] and also comprises a major traditional health care approach among many Asian countries [5].

9.2 Fundamentals of Health and Disease: The Ayurvedic Perspectives

Contrary to many other medical systems, talking exclusively about diseases and their management as a mean to restore health, Ayurveda has its own approach of considering preservation of health as its primary motive. Subsequently, it has paid a considerable attention to understand what the health is and how this can be preserved by observing some simple protocols. While talking about human health, Ayurveda simultaneously has a purely individualistic approach by linking the subtle details of human prakriti (constitution) to disease propensity and prognosis besides having a composite approach of linking microcosm with macrocosm through its unity of individual and cosmos principle (*loka-purusha samya* theory) [6]. Ayurvedic health care fundamentals can principally be grouped as (1) those defining the dynamic interaction between macrocosm and microcosm and (2) those defining the vital activities of an individual body.

9.2.1 *Conceptualizing a Reciprocal Relation Between Macrocosm with Microcosm: Theory of Loka-Purusha Samya*

A conceptualization of *lok* (universe), *purush* (individual), and *samya* (resemblance) is an Ayurvedic dictum which seeks multiple applications to living systems besides its application to health and disease. Man is considered as a miniature replica of cosmos with all its essential constituents and functions. The constituent elements of the universe and those of the smaller universe within the human body are identical, and their responses to varied stimuli are also identical. Ayurvedic theory of origin of life, which largely is a derivative of *Sankhya* school of thought, considers the life as a culmination of *A-vyakta* (invisible) building material into more *vyakta* (visible) forms through a directed process of condensation and combination of various primary elements called as *mahabhuta*. Owing to the limitation

of human perception, these *mahabhuta* are counted to be five and are perceived through their special attributes by special senses. This idea of origin of life has become the basis of theory of *panchamahabhuta* which established every living or nonliving constituted of the same primary elements where a proportional difference among these elements in different objects defining differentiating physical or physiological features. It is this identity of composition which underlies the central dogma of Ayurvedic therapeutics that mandates a selective choice of food and drugs for a desired effect of health maintenance to diseases cure [7]. It was believed that this principle could hardly operate in the absence of perceived similarity between the substances in the external and internal to man. The man and the cosmos here look to be in an energy-based dynamic relation where the flow is directed from higher to lower levels [2].

9.2.2 *Prakriti: The Basis for Being in Health or Disease*

Expanding its dictum of origin of life, Ayurveda proposes every individual to be composed of a specific set and subset of *panch bhautic* components. Every set specific to an individual is thought to be determined genetically (as per the *panch bhautic* predominance in sperm and ova) with partial influences of maternal nutrition, age of mother, and environmental factors. Individual vital attributes and subsequently its socioeconomic gains are proposed largely to be determined by the primary set of *panch mahabhut* of an individual called as *prakriti*. This is further proposed that to be in health, this is important to maintain the primary set of five elements balanced, and therefore, a regimen of diet and routine is important to be observed. Any imbalance incriminated deliberately or casually leads to imbalance and subsequently to disease. A principle of treatment in this respect is as simple as the eruption of the disease is. This is to observe the means which can help reestablish the lost balance. Ayurveda has laid huge importance upon diet and routine for the proposed pathogenesis of a disease or as a requisite for being in health. Fundamentally, it is owing to their five elemental propositions, but can we make some further scientific inferences through these abstract principles? A differential expression of genes is known to influence human health and behavior. How a differential five elemental composition may find a place through expression of differential vital characteristics of an individual is interesting to be explored in light of theory of differential gene expression. We also know about epigenetic principles explaining for environmental and dietary influences upon differential gene expression. This would be interesting to see further if the Ayurvedic idea of preserving ones *prakriti* to remain in health has any relation with differential expression or suppression of genes through various dietary and environmental means. Evidences are accumulating to find *prakriti* association to some specific genetically determined metabolic regulators which finally determine the fate of ingested food and, subsequently, their effects upon body [6, 8].

Table 9.1 Correlating functional attributes to *mahabhuta* and *tridosha*

Functional attributes	<i>Mahabhuta</i>	<i>Dosha</i>
Transport	<i>Akash, vayu</i>	<i>Vata</i>
Disintegration	<i>Agni</i>	<i>Pitta</i>
Synthesis	<i>Jala, prithvi</i>	<i>Kapha</i>

9.2.3 *Intervening in a Disease: Identifying the Pathology and Determining the Tools of Intervention*

As vital manifestations are said to be the mandates of *prakriti* and, in turn, to be of *panchamahabhuta*, a *prakriti* or eventually a compositional imbalance could possibly be identified by observing the anomalies of vital functions and by contrasting them to the functions of the same individual in health. Principal functions of a living unit, i.e., transport, disintegration, and synthesis, are proposed to be the attributes of different *mahabhuta* (Table 9.1). As per their functional specificity, these are further called as *tridosha* (*vata*, *pitta*, and *kapha*), determining a specific set of function ruled by a specific set of *mahabhuta*. By identifying the subtle changes in functional attributes, an abnormal status of *mahabhuta* could be known. This is how a diagnosis is proposed to be made in Ayurveda. An anomaly of *mahabhuta* can either be in the form of excess or deficit; therefore, the restoration is inclined toward making a rebalance through countering or supplementing the incriminated one. As an offshoot to the *panchabhautic* theory, establishing an identical composition to every substance, every substance was further identified as a potential medicine. This is subsequent to the identification of an elemental imbalance as cause of disease and elemental predominance among various substances of cosmos including herbs, minerals, metals, and animal derivatives.

Within the huge repertory of nature, which substance for which disease? This was yet to be determined before an intervention could truly be made. An elemental predominance of herbs or nonliving substances is not possible to be identified through their vital functions. Therefore, it required an attribute which may truly be representative to the elemental composition of the object at one hand with a clear perceptibility through conventional senses on the other. Intercepting beautifully at this stage, Ayurveda proposes a novel idea of identifying elemental composition and thereby the pharmacological properties of a substance by its taste (Table 9.2). *Rasa* (taste) as the principal attribute from a substance, further supplemented with *guna* (quality), *virya* (potency), *vipaka* (aftertaste), and *prabhava*, determines the pharmacological properties of a substance. Eventually, a drug choice in Ayurveda is made as per the elemental imbalances leading to symptoms and choosing the substance supposed to make the elemental rebalance to restore health. An elemental basis to taste and subsequently to its pharmacology has remained a subject of debate in modern pharmacology. Brunton (1985) proposed an atomic weight basis to the taste by observing that similar tastes are produced by combinations which contain elements such as lithium, sodium, and potassium, showing a periodic recurrence of

Table 9.2 *Rasa* and its elemental composition

<i>Rasa</i>	Elemental composition
<i>Madhura</i>	<i>Jala, prithvi</i>
<i>Amla</i>	<i>Prithvi, agni</i>
<i>Lavana</i>	<i>Jala, agni</i>
<i>Katu</i>	<i>Vayu, agni</i>
<i>Tikta</i>	<i>Vayu, akasha</i>
<i>Kashaya</i>	<i>Vayu, prithvi</i>

ordinary physical properties. Among the carbon compounds, those which produce similar tastes are found to contain a common “group” of elements. Thus, organic acids contain the group COOH, the sweet substances $\text{CH}_2\cdot\text{OH}$ [9]. A proposal of Ayurveda for an identical composition behind an identical taste therefore cannot easily be overruled. Further convincing evidences regarding the relation of taste and its pharmacology were proposed by observation of similar pharmacological properties to similar tasting substances [10, 11].

9.3 Cardiovascular Diseases: Ayurvedic Viewpoint

Ayurvedic classics present an elaborate description of cardiovascular system and the diseases originating through it. Interestingly, while talking about possible etiologies to cardiovascular diseases, a substantial stress has been laid upon stress-inducing factors, and therefore its avoidance through observation of a righteous conduct is promoted as an important intervention to cardiac diseases.

9.3.1 Cardiovascular System: Anatomic-Physiological Correlates in Ayurveda

Hridaya, the Ayurvedic synonym for heart (derived from the Sanskrit word *hrit*, having an epistemological resemblance to heart), is defined as an organ which has a capacity to receive and to disburse [12]. Enumerated as an organ, it is further said to be a place of vitality and consciousness by its consideration among ten vital places of body (*das pranayatanani*). Describing its gross anatomy, *Sushruta* resembles it with inverted lotus having a property of expansion and shrinkage during work and rest similar to the changing diurnal dimension of lotus flower and also projecting arch of aorta from apex similar to the peduncle of lotus flower [13] (Fig. 9.1).

Extending further within the description of system, a heart is said to be an organ where ten composite openings either in the form of arteries (*mahamula*) or veins (*mahaphala*) exist. A circulation in human body is said to exist at three stages

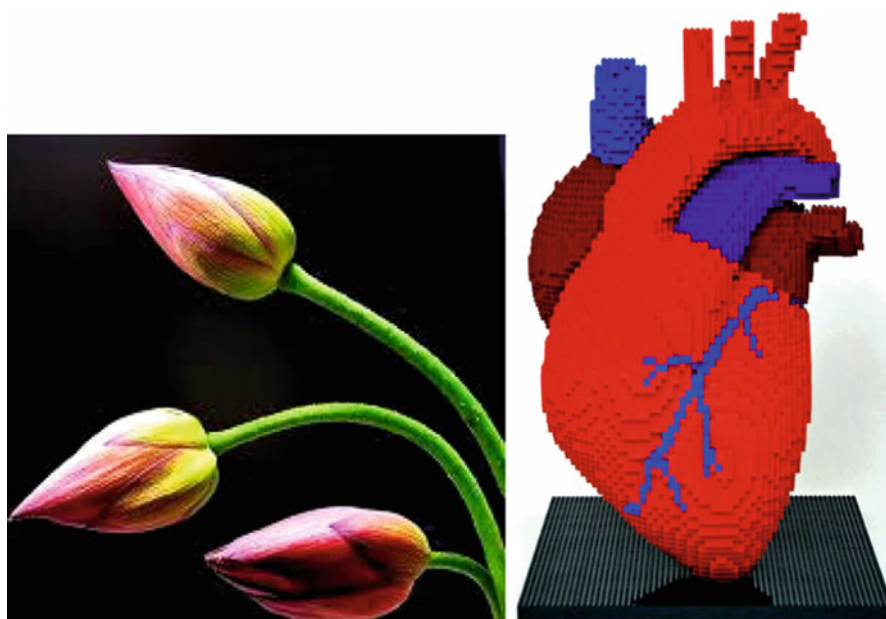


Fig. 9.1 Inverted lotus and its resemblance to anatomical features of heart as described in Ayurveda (With permission from Nathan Sawaya, The art of the brick, downloaded from <http://www.brick-artist.com/contact.html> downloaded on 18 Aug 2010)

Table 9.3 Three primary vessels, their functions and resemblance to conventional vascular structures

Primary vessel	Function	Resembling conventional vascular structure
<i>Dhamani</i>	Circulation through active pumping	Artery
<i>Srotas</i>	Percolation of blood through secretion	Capillary
<i>Sira</i>	Passive circulation of blood	Vein

through three distinct vessels, namely, *dhamani* (the one which pumps to make the flow of blood), *srotas* (the one which percolates blood), and *sira* (the one which slips the blood). This directional flow of blood as described in Ayurveda has a good resemblance to that of modern artery-capillary-vein circulation (Table 9.3).

Heart is said to be the place of *oja* (vital essence) which is perceived as nutrients flowing in blood. As heart pumps the blood throughout the body, it is also pumping *oja*, and hence, the vessels coming out from this are also called as *ojovaha* (*vaha*=permitting to flow). Heart is further said to be the seat of activities of whole body, brain, sense organs, and their perceptions for essentiality of a good circulation to ensure these all (*Charaka Samhita Sutra Sthana* 30/5).¹

¹Shadangama angamvigyanam indriyadyartha panchakam/Atma cha sagunashchetashchintyaam cha hridi sanshritam//charaka samhita sutra sthana 30/5.

Considering this importance, heart in Ayurveda is considered as a *marma* (vital seat) where a trauma, either blunt or invading, can result in syncope or even death (Ch.Su.30/6).²

The pumping action of heart is performed by *vyan vayu* which results in blood circulation to nourish the tissues (*dhatu*s). The heart and the arteries along with the *buddhi*, *indriya*, and *mana* are under the control of *prana vayu* (A.S.Su20).

9.3.2 Diseases of Heart

This is important to appreciate in the beginning only that a disease classification in Ayurveda carries a syndromic approach where in case of obscurity of the pathogenesis, the symptoms and signs form the basis of a disease nomenclature. In Ayurveda, it is the generalization and not the obscurity of the pathogenesis which forms the basis of this approach. A disease name in Ayurveda therefore, in no way, stands parallel to what is understood in modern medicine in terms of pathogenesis to a similar name. This distinct style of Ayurvedic disease description warrants for two important inferences. The first is that a disease as described in Ayurveda may not be taken granted for a disease in conventional understanding merely on the basis of their nomenclature resemblance. The other and clinically more important inference is that a disease entity description in Ayurveda, if it is seen from conventional perspectives, is not limited to the specified disease chapter of ancient Ayurvedic text books but is available in a scattered form to many other places.

As Ayurvedic disease nomenclature is primarily focused on presenting symptom or the site of symptoms, a disease from modern perspective because of multiplicity of symptoms may find its description in multiple chapters in Ayurveda focusing upon specific symptoms. Referring this to heart disease, we find that a description of heart disease from modern perspective is not limited to the chapter of *Hrida Roga* in Ayurveda, but instead, it is widely scattered through the description of *shvasa*, *hicca*, *shotha*, and *pandu* also besides its primary description available within the cognizance of *hrida roga*.

9.3.2.1 General Causes of *Hrida Roga*

Among various causes identified to precipitate a heart disease, most appreciable ones as per Ayurveda are *vyayama* (excessive exercise), *tikshna ahara* (pungent diet), excessive use of *virechana* (purging), *vasti* (medicated enema), or *vamana* (emesis). Some primary diseases leading to emaciation, excessive worry, stress, fear, and a direct trauma to heart may also lead to a heart disease. By observing the

²Tasyopaghatanmurchayam bhedan marana mricchati/yadwi tata sparshavigyanam dhari tattatra samshritam//charaka samhita, Sutra sthana 30/6.

enumerated causes of heart diseases as are appreciated in Ayurveda, this is easy to infer that Ayurveda considers the etiological factors in reference to practical manifestation of a disease. A pathological understanding follows only to this primary observation. For causes described here as a reason to heart disease, most are concerned with water and nutrition depletion from the body either through an excessive loss (*vaman*, *virechana*, *vasti*, excessive exercise, trauma) or a reduced intake (emaciation, stress, fear, worry). All these causes ultimately lead to a depletive state where the functions of the heart (Sect. 8.3.1) are not adequately met, hence mimicking a heart disease. This is difficult to find that if among these many causes, anyone can essentially and finally qualify to terminate into a real cardiac pathology. This is also important to observe that contrary to contemporary understanding of risk factors to cardiac diseases, besides psychological factors, Ayurveda does not mention any other factor in its vivid list of etiology to heart diseases. Of most important among all is the nonobservance of obesity and dietary excess from the list of risk factor to heart disease among descriptions of Ayurveda. This important observation raises a question against the linking of fundamental understanding of heart disease in both the streams of medicine. This puts further emphasis to our previous connotation of Ayurvedic descriptions for being more functional compared to the modern understanding which is primarily pathological. This fundamental difference to the understanding of etiopathogenesis of heart disease in both the streams of medicine forms the basis to their differential approach which is often contrasting to each other. Contrary to the modern approach of treating heart disease which is marked by a salt, oil, and fat reduction, Ayurvedic medicaments used in this condition are predominantly marked by an excess of salt, oil, and fat.

9.3.2.2 Type of *Hrida Roga* in Ayurveda

Ayurveda identifies five distinct kinds of heart diseases as per their clinical description. This disease classification is essentially the etiological classification where the symptoms originating as result of some specific cause are grouped under the head of disease. As per the *doshic* distinction of causes, the heart diseases of Ayurveda can either be grouped as that caused by independent causations (*vata*, *pitta*, and *kapha*) or a combination (*tridoshaja*) or else as a complication (*krimija*). Heart disease description as is given in Ayurveda has a thorough resemblance to many typical presentations available to conventional cardiac diseases. Therefore, this would be of worth to explore the Ayurvedic presentation of cardiac diseases with their possible correlates in modern science. Among all, *vataja* and *krimija hrida roga* have special resemblance to modern understanding of angina and infarction, respectively.

Vataja Hrida Roga

A *vataja hrida roga* is proposed to be precipitated by grief, fasting, exercise, and dry, less, and zero-oil foods. Presenting symptoms are trembling or tightening

around heart, loss of consciousness, lack of responsiveness, or rigidity. The pain perceived is of greater intensity (*Charaka Samhita Sutra Sthana* 17/30–31).³ A *vataja hrida roga* presentation as is given in Ayurveda has a typical resemblance to the unstable or stable angina presentations which may be precipitated through a variety of mechanisms including factors promoting catecholamine secretions and consequently increasing myocardial oxygen demand [14]. Various etiological factors described in *vataja hrida roga* satisfy to this proposition of mechanism for precipitation of angina pain.

Krimija Hrida Roga

Charaka has given a very elaborate description of pathogenesis in *krimija hrida roga*, its possible clinical presentation and prognosis. A heart disease when composed of all three possible *doshas* (*tridoshaja*) and a person having such a disease (the one who has angina), if indulges ignorantly in repeated consumption of *til* (sesame), milk and its products (*kshira*), and *guda* (raw sugar) or like substances, develops some outgrowths (*granthi*) within arteries of the heart. These outgrowths gradually, while being in touch with nutritional part of blood (*rasa*), liquify. This liquified portion of outgrowth gives rise to the growth of various worms which eat up the heart (*Charaka Samhita, Sutra Sthana*. 17/37–40). This description of Ayurveda regarding pathogenesis of *krimij hrida roga* has a striking resemblance to the pathogenesis of evolution of atheroma, development of a lipid-rich necrotic center of atheromatous lesion, and plaque rupture to develop microthrombi or large occlusive or nonocclusive mural thrombi [15]. In case of occlusion of thrombi to an arterial lumen, it leads to the development of infarction. Symptoms caused by *krimija hrida roga* are said to be of acute onset, difficult to manage, and characterized by severe pain often of piercing or cutting nature and requiring urgent management. These features are further having a resemblance to acute myocardial infarction presentations as it is understood to modern science.

9.3.2.3 Preventing Heart Diseases: Ayurvedic Wisdom

Considering its importance as a vital organ which governs the systemic circulation, Ayurveda pays a special attention to save the heart from trauma directly or indirectly and also from various factors which may in turn become a precipitation factor for various heart diseases. Surprisingly, while advising for care to heart, *Charaka* further says to save cardiac arteries too through observation of certain do's and don'ts. It is said to avoid various stress-causing factors and to effortfully promote

³Shokopavasavyayamarukshashushkaalpa bhojanai/vayuravishya hridayam janayatuttama rujam// Vepathu veshtanam stambha pramoha shunyata dara/hradi vatature rupam jeeerne cha atyarthave-dana//Charaka samhita Sutra Sthana 17/30–31.

the consumption of substances which are cardiopromotive and thereby helping in the maintenance of normal integration of cardiac vessels. An *amla* (sour) taste in general is considered as cardioprotective. Endorsing it further, *Charaka* has identified a group of ten natural substances which are predominantly sour in taste under *hridya* (cardioprotective) division. Without making a convincing remark, this is interesting to find ASA (acetyl salicylic acid) as a cardioprotective primarily because of its antiplatelet aggregation substance. Incidentally, ASA happens to be a weak acid having a clear sour taste. While talking about pathogenesis in *krimija hrida roga*, *Charaka* has stressed the people who, despite of having a *hrida roga*, still indulge in consuming substances like sesame, milk, and sugar-rich substances as more prone for *krimija hrida roga*. This description is much similar to the current-day dietary instructions which are required to prevent a heart disease.

At this point, *Charak's* wisdom for prevention of cardiovascular diseases is worth mentioning, "One who wishes to protect his heart (*mahat*), arteries (*mahamoolas*) and vitality (*ojas*) should avoid the causes which produce grieved mood and perform intentionally with the diets and doings which are *hridhya* (cardio protective), *ojasya* (vitality raising) and *srotas prasadanam* (pleasing to channels). They should follow a calm (*prasham*) and self investigating (*gyanam*) life style" (C.Su.30/13–14).

9.3.2.4 Treating Heart Diseases: Ayurvedic Principles

Besides advocating for various measures to prevent heart diseases through careful observance of certain cardio supportive acts, Ayurveda further describes a few pharmacological interventions to deal with *vataja* and *krimija hrida roga*. This is evident through a literary review that rock salt (*saindhava lavana*), sour substances, *shunthi* (zingiber), and *pushkara mula* (inula root) are fairly taken up as a dependable component of heart disease management in Ayurveda. Besides this, a use of sesame oil or *ghrit* (purified butter) processed with herbs is also often recommended as a respite. A carefully designed and customized *shodhana* (biopurification) is also recommended for heart disease. Fasting and use of digestives following a *shodhana* are advocated in *krimija hrida roga*.

9.4 Contemporary Evidences for Ayurvedic Therapy to Various Cardiological Conditions

9.4.1 Evidences Through Classical Researches

Despite of its contemporary importance, an Ayurvedic description of cardiac disease has rarely been subjected to a critical analysis. In the absence of a clear correlation with heart diseases from conventional point of view and with that of

Ayurveda, it is difficult to apply convincingly the medicine described in one text to the notion it is perceived by another. In a broader sense, Ayurvedic description of heart diseases seems not limited to the diseases of heart but, instead, encompasses a broad range of conditions in and around heart and also the pathologies directly or indirectly affecting the function of heart. It is for this reason, many conditions where primary pathology is a circulatory deficit are also considered as *hrida roga* in Ayurveda.

Many attempts have been made to correlate various Ayurvedic *hrida roga* conditions to their modern parallels. Because of inadequacy to their research models, none however could reach to a conclusive submission.

Researches in cardiac diseases in reference to the exploration of efficacy of individual compounds and comparative effectiveness research to multidrug therapy had been attempted primarily at various postgraduate research institutes of Ayurveda in India. These researches are by and large exploratory throughout the country and are limited to find clinical effect of certain compounds in certain cardiac conditions. In spite of their genuine focus upon exploratory analysis of various Ayurvedic compounds for their possible clinical utility, in lack of good research protocols, it could not contribute to growth of *hrida roga* understanding in Ayurveda. The other part of the research at the same time was done by biomedical scientists who worked with one or few isolated herbal isolates for their possible effects upon established cardiac pathologies.

Conditions commonly approached by Ayurvedic research institute in India for their research in cardiology were hypertension, congestive heart failure, hyperlipidemia, and ischemic heart disease. These conditions were tried to be treated with various classical Ayurvedic compounds either as a pilot, a control, and a combination treatment protocol.

Unavailability of these researches conducted at various research institutes of Ayurveda in India is another problem which interferes with making of a systematic review based upon researches conducted at various places in India. Most of these works are in the form of doctoral or postdoctoral research works and are available only through a physical search. Following are the glimpses of works done at State Ayurvedic College, Lucknow, India, where the postgraduate researches in Ayurveda are conducted for over 35 years.

In initial studies, congestive heart failure was tried with *hridaya chintamani rasa*, *satavarjunadi yoga*, and *arjunadi kashaya*. In few controlled studies, the results were found comparable to and not better than control, which was the standard regimen of digoxin in most studies [16–18].

In a study on hyperlipidemia with *arogyavardhini*, an Ayurvedic herbometallic compound, a comparison was made to *arogyavardhini* where metallic components were removed. The study reported a substantial reduction to serum cholesterol level among patients treated, however no significant difference among both variety of *arogyavardhini* either with or without metal [19].

Studies upon hypertension were largely conducted in the pilot form. Trials conducted with *sarpagandhadi yoga* are marked with inconsistent reports of inconclusive findings [20] to a significant fall in blood pressure [21]. Further reports upon

hypertension with *jatamansi yoga* and alcoholic extract of *Coleus forskohlii* Briq root observed significant blood pressure reduction in trial [22–24]; however, in some studies, a contrary results have also been observed [25]. A further work upon ischemic heart disease in 1988 through *pushkar brahmi guggul* as the trial drug could not find any noticeable results [26].

9.4.2 Evidences Through Biomedical Researches

There are no clinical trials listed at NIH in reference to Ayurvedic treatment proposal to any cardiological condition [27]. Similarly, till date, there are no Cochrane reviews enlisted in the Cochrane Library in reference to Ayurvedic therapy in cardiac disease [28]. A Pubmed search for “Ayurveda and cardiovascular disease” as search words identified ten entries. Among them, however, none qualified to be identified as evidence to Ayurvedic interventions in cardiovascular disease [29]. This observation found cardiology as a naive subject of research in Ayurveda from contemporary point of view.

An advent of reserpine in India as an active component from *sarpagandha* (*Rauwolfia serpentina*), and its successful use in reducing the blood pressure, initially tried to bring Ayurveda from folklore to biomedical laboratories. As early as in 1931, Bose and Sen reported antihypertensive effects of *sarpagandha*, a herb known to Ayurveda since centuries for its traditional use in mania and psychosis [30]. Its therapeutic effect to mania was later presumed to be an attribution to its blood pressure–reducing capacity. A further interest to reserpine however lost to the observations of intractable depression following its regular use until it is renewed recently, when observation of more clear mechanism of its action is made.

Terminalia arjuna has been another herb from Ayurveda which attracted sufficient attention of biomedical scientist for its possible favorable actions upon various cardiac pathologies. Bharani (1995) in a double-blind, placebo-controlled crossover study upon effect of Terminalia bark extract upon patients of refractory congestive heart failure shown the stable improvement in symptoms and signs of heart failure along with improvement in left ventricular ejection-phase indices with definite improvement in quality of life [31]. *Terminalia arjuna* has also been favorably investigated for its antioxidant and hypocholesterolemic effects in a randomized placebo-controlled trial. This study found antioxidant effects of *arjuna* equivalent to vit. E [32]. Arjuna bark has also been investigated for its possible role in chronic stable angina in another double-blind, placebo-controlled crossover study [33]. An antiplatelet action to arjuna bark has also been reported recently [34].

Commiphora wightii (*guggulu*) is another commonly used Ayurvedic herb resin which has been extensively researched for its antihyperlipidemic actions. A monograph of all the major citations of its use has been published [35]. Satyavati, Dwarakanath, Sukhdev, and Nityanand have extensively studied the hypolipidemic

effect of *C. wightii*. The product has also been marketed and widely used [36, 37]. The side effects of the plant have also been documented. The mechanism of its toxicity, however, is yet to be ascertained.

9.5 Future of Research in Ayurvedic Cardiology

What is the evidence basis to use of Ayurvedic drugs in various cardiac and related conditions? When we ask this question to ourselves, we are sure to find a million of questions unanswered, a thousand of them unattempted, and only a handful approaches moving in the direction of real evidence-based practice. Ayurvedic practice of medicine is largely based upon certain key principles of identifying a pathogenesis and corresponding offers toward its management. Ayurveda elaborates beautifully to the concepts of health and disease by their exposition through theory of *panchamahabhuta* and *tridosha*. It further identifies an intricate interrelationship between microcosm and macrocosm and explores their possible interaction toward health and disease. Ayurveda further elaborates admirably the clinical sign and symptoms to most clinical entities as are known today. On the contrary, a pathogenesis (*samprapti*), in reference to specific clinical entities, is rather poorly understood to a critical mind and so is its treatment approach.

A therapy in Ayurveda is proposed to occur in two principal ways:

1. *Dosha pratyaneek*: A treatment based upon logics of pathogenesis and its management through identification of the drugs which logically act against the actual pathogenesis
2. *Vyadhi pratyaneek*: A treatment based upon direct action of a drug upon certain clinical entity without taking a note for the pathogenesis of the disease and pharmacological properties of the drug from Ayurvedic perspective

A rationality of the former application can be drawn in clinical practice if the pathogenesis and the pharmacological action of a drug are previously known. This forms the evidence base to the selection of a drug in a particular condition as per Ayurvedic principles. It is in this context, must also be noted, that any approach which utilizes the former principle of choosing a drug in a particular condition should also require to take an account of any variability of drug actions in reference to their contemporary availability. Needless to say, any deviation to pathology status from the one that is classically drawn should also be taken into account.

The other approach of a disease management in Ayurveda requires more rigorous evidences to prove its worth. Various medicines in Ayurveda are described to work through their *prabhava* (special action). In these drugs, an Ayurvedic pharmacological rationale to their usage cannot be established. This is easy to find that in the absence of pharmacological rationales, establishment of their clinical efficacy is the single largest prerequisite justifying their uses. We can easily find that this can

be done only through rigorous clinical trial of the drugs commonly used in Ayurveda on the basis of their *prabhava*.

Talking specific to cardiovascular diseases, Ayurveda needs to work at many fronts simultaneously. It requires to find what is the actual relationship between *hrida roga* and contemporary understanding of cardiac diseases. It also has to identify what is the rationale of identifying various etiological factors crucial to the birth of a *hrida roga*. Similarly, it has to find the rationale of advocating various oil-, fat-, and salt-rich preparations in context to heart diseases especially when the same are considered as the risk factors to the same clinical conditions by contemporary medical science.

Through the clinical experiences, various other herbs, like *karaveer* and *punar-nava*, and minerals or metals, like *mandura*, have also been observed for their good effects upon cardiovascular system. These experiences are required to be enriched by proper documentations arriving through rigorous clinical trials to bring forth the undaunted evidences.

Besides active drug intervention, lifestyle modifications, stress reduction, and avoidance of precipitating factors have also been recognized globally for their potential to impede and even revert a cardiac pathogenesis. Interestingly, Ayurveda identifies lifestyle codes as one among its founding principles to assure a healthy life. *Charaka* has beautiful elaborations of the idea in the form of *achara rasayana* and through elaborations of qualifying conditions if someone wishes to remain healthy. These principles though in general are the rules of good living, at the same time they also have a potential for a disease reversal. It is particularly true in reference to cardiac diseases.

It at the same time should also be understood that a few Ayurvedic herbs have also been noted for their toxicological potential upon heart. Most notable herb among them is aconite (*vatsanabha*), a frequently used herb in Ayurvedic preparations having digestive and antipyretic properties. We have come across many case reports where a morbid cardiac arrhythmia is reported after consumption of aconite-containing Ayurvedic preparations [38, 39]. Without getting further into these reports to see who is guilty, the manufacturer, the prescriber, or the patient, we simply need to understand that there are potentially toxic drugs in Ayurveda in reference to their effect upon cardiovascular system, and thereby, a caution is required to be observed while prescribing them. This observation becomes more relevant when we see an ever-increasing use of CAM in conjunction with conventional medicine without getting them searched for potential herb-drug interactions. Cardiovascular diseases, for their increasing prevalence and also for their stable nature, offer more caution to be exercised in this regard [40, 41].

Cardiovascular morbidities are going to become the largest cause of morbidities to human population in near future [42]. This is supposed to amount second only to cancer. In light of currently observed epidemiological shift of diseases in a global perspective, where lifestyle, degenerative, and mutagenic pathologies are outreaching infective pathologies, conventional practices of medicine are largely found inadequate, and need of a pragmatic, human, natural, and close to real-life situation

approach of medicine is directly felt [43]. Ayurveda having a potential to comply for this emerging void in practice of medicine, needs to be tested rigorously for its thoughtful, rationale, potential, and evidence-based use to serve what is most deserved at the time. Accumulating evidences about optimal medical therapy (OMT) including lifestyle modifications in cases of stable coronary diseases for their comparable effectiveness to invasive procedures like percutaneous coronary intervention (PCI) [44] are strong enough to persuade for thinking more seriously toward the lifestyle and natural alternatives to cardiovascular disease management. In one landmark trial, Manchanda et al. [45] found that Yoga lifestyle is a feasible and cost-effective intervention in patients with advanced coronary artery disease. Yogendra et al. [46] revealed that Yoga-based lifestyle modifications helped in regression of coronary lesions and in improving myocardial perfusion. Srivastava [47] noted a reduction of SBP, DBP, heart rate, and body fat%, total cholesterol, triglycerides, and LDL after regular yogic practices.

In light of accumulating evidences, both primary and secondary, Ayurveda, inclusive of yoga and naturopathy for its comprehensive and inclusive approach, seems to be a promising complement to the existing knowledge about cardiovascular diseases [48].

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