



Therapeutic Potentials of *Hridaya Dashakaya* (Cardio Friendly Drugs) in Cardio Vascular Diseases - A Review

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Authors' contributions

This work was carried out in collaboration between all authors. Both authors read and approved the final manuscript.

Article Information

Editor(s):

(1) Dr. Hugo R. Ramos, Hospital de Urgencias, Argentina.

Reviewers:

(1) Pravin Jawanjal, Gujarat Ayurved University, India.

(2) Vivekaradhya M, Rajiv Gandhi University of Health Sciences, India.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/73236>

Review Article

Received 22 June 2021
Accepted 01 September 2021
Published 07 September 2021

ABSTRACT

Introduction: Cardiovascular diseases are the leading cause of death among non-communicable diseases. Ischemic heart disease is responsible for 16% of the world's total deaths in 2019. Stroke is the second leading cause of death is responsible for 11%. The main risk factors of cardiovascular diseases are Hypertension, Dyslipidemia, and Diabetics Mellitus. Worldwide 1.13 billion adults had suffered from hypertension and 1.6 million people worldwide killing with diabetes. Dyslipidemia is at roughly twice the risk of developing cardiovascular diseases.

Aim: To find out the therapeutic potentials and utility of the *Hridaya Dashakaya* (Cardio Friendly Drugs) in cardiovascular diseases.

Study Design: This is a review study to find out the therapeutic potentials, pharmacodynamic properties, and utility of the *Hridaya Dashakaya* (Cardio Friendly Drugs) in cardiovascular diseases.

Place and Duration of Study: In the Library, Institute of Indigenous Medicine, the University of Colombo from January to March 2021.

Methodology: *Hridaya dashaka* is mentioned in the Ayurveda authentic text of *Charaka Samhitha Suthrasthana's* fourth chapter in *Dwithiya Maha Kashaya*. Data of the *Hridaya Dashakaya* were collected from authentic Ayurveda text of *Charaka Samhitha* and published research articles,

scientific journals, and other web sources about the pharmacodynamic activities and chemical constituents of each plant, and the data were analyzed by using SPSS software.

Results: According to the findings *Hridaya Dashakaya* (Cardio Friendly Drugs) has been identified as rich in Flavanoids, Vitamin C and has potent in anti-hypertensive, anti-atherosclerosis, anti-diabetic, anti-oxidant properties. *Amla* rasa was identified as predominant among the six *rasas*. *Amla* rasa has increases the *Pitta*, *Kapha* and decrease *Vata* in the body and act as a tonic by stimulating tissue enzyme in the heart.

Conclusion: *Hridaya Dashaka* is a better solution for decrease the risk factors and prevents CVD.

Keywords: Cardiovascular diseases, therapeutic potentials, pharmacodynamic properties.

1. INTRODUCTION

The Heart is known as the *Hridaya* in Ayurveda texts. It is derived from two words. 'Hri' means to bring back forcibly and 'Da' means to denote. According to the Ayurveda, *Hridaya* is the seat of the *Vyana Vata*, *Sadhaka Pitta*, and *Avalambhaka Kapha*. Consider as one of the three *marmas* and the better place of the *Ojas*. In *Charaka Samhitha* explained as *Hridaya* get the *Sparsha Vignana* and the place of the *Chethanayathana*. In the *Srotas* concept, *Hridaya* is the root of the *Pranavaha Srotas* and *Rasavaha Srotas*. In Ayurveda, authentic texts mentioned various risk factors directly acting on the heart; Dietetic factors, psychological factors, Activity and rest, Suppression of natural urges, and trauma to the heart. *Hrid Roga* Pathological process described as, excessive consumption of etiological factors vitiates *Vata*, *Pitta*, and *Kapha*. It causes for vitiating *Rasa* and *Rakta* then enters to the heart and manifest the heart diseases. According to the etiological factors and clinical manifestations heart diseases are classified into five types; *Vataja hridroga*, *Pittaja hridroga*, *Kaphaja hridroga*, *Thridoshaja hridroga*, and *Krimija hridroga* [1].

According to Allopathic Medicine, The major cardiovascular diseases conditions are Ischemic heart disease (IHD), Cerebrovascular disease (stroke), Congenital heart disease (CHD), and Rheumatic heart disease (RHD) [2].

Adequate nutritional requirements and a balanced diet can prevent heart diseases. According to the Ayurveda Authentic texts, Excessive consumption of the Starchy foods, Oily foods, sweet foods, milk, coconut milk, coconut oil, egg yolk, salt, meat, butter is not suitable food for a healthy life, especially for the heart [3]. Vegetables and fruits must be taken every day to regulate the equilibrium of the body constitution [3]. Pomegranate, mango, lemon mango, pineapples, oranges, papaya are the best fruits for the heart. Sesame oil, one-year-old

bee honey, and Garlic mixed with bee honey are the best remedy for cardiovascular diseases [3].

Hridaya Dashaka (Cardio Friendly Drugs) is mentioned in the Ayurveda authentic text of *Charaka Samhitha Suthrasthana* four in *Dwithiya Maha Kashayz* [4]. It contains ten ingredients; *Mangifera indica* Linn., *Spondias pinnata*, *Atrocarpus lakoocha* Roxb, *Carissa carandas* Linn., *Tamarindus indica* Linn., *Rheum emodi* Wall, *Zizyphus jujube* Lam., *Zizyphus sativa* Gaertn *Punica granatum* and *Citrus decumana*. As per the scientific researches, some ingredients in *Hridaya Dashaka* have been identified as plants with therapeutic effects such as antidiabetic, antioxidant, antihyperlipidemic, antihypertensive and cardioprotective, etc.

A Review of those findings through the basic principles of Ayurveda may further confirm the suitability of *Hridaya Dashaka* in the prevention of cardiovascular diseases. Therefore, this type of study was undertaken.

1.1 Objectives

1.1.1 General objective

To find out the therapeutic potentials of *Hridaya Dashakaya* in Cardiovascular diseases.

1.1.2 Specific objective

To find out the pharmacodynamic properties of *Hridaya Dashakaya*.

To find out the utility of *Hridaya Dashakaya* in Cardiovascular diseases.

2. MATERIALS AND METHODS

2.1 Data Collection

Data of the *Hridaya Dashakaya* were collected from authentic Ayurveda text of *Charaka Samhitha* in the Library, Institute of Indigenous Medicine, the University of Colombo from January to March 2021. The selected text was

written by Prof. P.V.Sharma and published in 2014 by Chaukhambha orientalia.

2.2 Sources of Data

The data were collected from published research articles, Ayurveda texts, and other relevant texts, scientific journals, and other web sources about the pharmacodynamic activities, and chemical constituents of each plant.

2.3 Data Analysis

The collected data were analyzed by using SPSS software, version 16

3. RESULTS

3.1 General Properties of *Hridaya Dashaka*

According to the pharmacodynamics of Ayurveda, depend on its *Rasa* (taste), *Guna* (qualities), *Virya* (general potency), *Vipaka* (transformed state after digestion), and *Prabhava* (specific potency).

All the ingredients mentioned in *Hridaya Dashaka* have *Amla Rasa* (100%). Also *Guru guna* 50% and *Laghu guna* 50% in the ingredients of *Hridaya Dashaka*. Prominent *veerya* and *vipaka* were respectively *Ushna veerya* (70%) and *Amla vipaka* (50%), *Madhura vipaka* (50%).

3.1.1 Pharmacodynamic properties and Chemical constituents that have been identified through scientific experiments

According to scientific researches, *Hridaya dashakaya* were found mostly in Flavonoids, Vitamin C. All the plants of *Hridaya Dashaka* had beneficial effects on the heart like anti-atherosclerotic, antidiabetic, hypocholesterolemic, cardiotoxic, cardioprotective, and hyperlipidemic.

Pharmacodynamic activities and Chemical constituents of *Hridaya Dashaka* that have been identified in plants are tabulated below Table 2.

4. DISCUSSION

Hridaya dashakaya were predominant in *Amla* (sour) in taste. The *Amla rasa* (sour) food items have increased the *Pitta* and *Kapha* in the body. Also, tend to decrease *Vata* in the body. *Amla rasa* act as a tonic by stimulating tissue enzyme in the heart and help to utilize the calories.

According to modern science, Pharmacodynamic activities have been experimentally researched in each plant so that the medical use of it is highlighted.

4.1 Cardio Protective Effect

The effects of Mangiferin on the isoproterenol-induced myocardial infarction in rats were investigated by a previous study, Mangiferin was found to enhance the effect of isoproterenol-induced pathological changes, decrease the lipid peroxide formation. Those results show the cardioprotective effect of mangiferin [6]. Unstable angina or myocardial infarction with One hundred patients were randomly assigned to the test and the control groups ($n = 50$, each) and the results of test patients had significantly lower levels of serum troponin and malondialdehyde by Pomegranate juice [76]. Isoproterenol hydrochloride was used to induce myocardial infarction in Wistar rats and *Punica granatum*-treated animals showed a lesser degree of cellular infiltration in histopathological studies.[64].

4.2 Anti-Diabetic Effect

The anti-diabetic effects of alcoholic extract of the leaves of *Mangifera indica* at doses of 50, 100,150, and 200 mg/kg body weight in rabbits [9]. The leaves of *Mangifera indica* used for anti-diabetic properties were found by scholars [10-13]. The previous study discovered that the body produces a potent and strong hypoglycemic effect with the Single oral administration of a dose of 250 mg/ kg body weight in Type-2 diabetes on rabbits [14].

The aqueous extract from mango leaves showed a clear hypoglycemic effect in diabetic rats. And other scientists found anti-diabetic activities of *Mangifera indica* stem bark [18-19]. The bark and roots extracts of mango significantly lowered the blood sugar level of hyperglycemic rats [20]. The blood glucose level of all the 36 experimental rats was the result shows that the blood glucose level was lower in the *Spondias pinnata* extract groups compared to the diabetic control group. On the 21st- day blood glucose level in group V was 24.83 ± 0.83 mmol/L whereas that in group III was 20 ± 4.38 mmol/L. The Blood glucose level in groups I, II, III, and IV were lower compared to group V but the glucose level is still much higher than the normal level. This indicates that the plant may have a mild anti-diabetic effect. [29].

Table 1. General properties of *Hridaya Dashaka*[5]

Sanskrit name	Latin name	Rasa	Guna	Veerya	Vipaka
Amra	<i>Mangifera indica</i> Linn.	Kashaya Amla	Laghu Ruksha	Shita	Katu
Amratak	<i>Spondias pinnata</i>	Amla Kashaya	Guru	Ushna	Madhura
Lakoocha	<i>Atrocarpus lakoocha</i> Roxb	Madhura Kashaya Amla	Guru Ruksha	Ushna	Amla
Karamarda	<i>Carissa carandas</i> Linn.	Amla Tikta	Guru Ushna	Ushna	Amla
Vrikshamla	<i>Tamarindus indica</i> Linn.	Madhura Amla	Laghu Ruksha	Ushna	Amla
Amlavetasa	<i>Rheum emodi</i> Wall	Amla	Laghu Ruksha Thikshna	Ushna	Amla
Kuvala	<i>Zizyphus jujube</i> Lam.	Madhura Amla	Guru	Shita	Madhura
Badara	<i>Zizyphus sativa</i> Gaertn	Madhura Amla	Guru	Ushna	Madhura
Dadima	<i>Punica granatum</i>	Madhura Kashaya Amla	Laghu Snigdha	Anushna	Madhura
Mathulunga	<i>Citrus decumana</i>	Madhura Amla	Laghu Snigdha	Ushna	Madhura Amla

Table 2. Pharmacodynamic activities and Chemical constituents of *Hridaya Dashaka*

Plant name	Pharmacodynamic activities	Chemical constituents
<i>Mangifera indica</i> Linn.	Cardio protective [6-8] Anti-diabetic [7,-21] Hypolipidemic [7,22,23] Anti-oxidant [7,19,24,25,26]	carotenoids, polyphenols, omega-3, -6 polyunsaturated fatty acids quercetin, kaempferol, gallic acid, caffeic acid, catechins, tannins, xanthonoid, Mangiferin, Mangiferolic acid, indicenol [8,23]
<i>Spondias pinnata</i>	Anti-diabetic [27,28,29] Hypoglycemic [30,31] Anti-oxidant [27,32,33] Thrombolytic activity [32,31] Anti – hyperlipidemic [28,29]	betaamyryn, oleanolic acid and amino acids- glycine, cystine, serine, alanine leucine, tannin , polysaccharides, flavanoids [32,31]
<i>Atrocarpus lakoocha</i> Roxb <i>Carissa carandas</i> Linn.	Anti –platelet [34] Cardiotonic [35] Hypotensive [35]	Alkaloids, flavonoids , phenols, tannins, lignins, glycosides [34] Flavonoid , steroids, carbohydrates, alkaloids [35]
<i>Tamarindus indica</i> Linn.	Hypocholesterolaemic [36,37] Anti- diabetic [38,39] Antioxidative [36,38,40,41,37] Cardio protective [37] Anti-hyperlipidemic [38,39,42,37]	Phenolic, flavonoid , potassium -Hexacosane, eicosanoic acid, b- sitosterol, octacosanyl ferulate, 21- oxobehenic acid, pinitol [38,43]
<i>Rheum emodi</i> Wall	Anti- diabetic [44] Antioxidant [44,45,46] Anti dyslipidemic [45]	Physson, emodin, piceatannol, daucosteroll, chrysophanol rhein, aloe- emodin, glycosides and stilbene, picetannol[44,45]

Plant name	Pharmacodynamic activities	Chemical constituents
<i>Zizyphus jujube Lam.</i>	Anti – platelet [47] Anti –coagulant [47] Antioxidant [48,49,50] Hypotensive [51] Hypoglycemic [52,53,54] Anti-hyperlipidemic [52,55,54] Anti-diabetic [50]	Flavonoids, vitamins C , tannins, saponins cyclopeptide alkaloids, polysaccharides [49,50]
<i>Zizyphus sativa Gaertn</i>	Antioxidant [56] Anti-diabetic [56,57]	Vitamin C , alkaloids, glycosides, flavonoids , phenolics, polysaccharides [56,57]
<i>Punica granatum</i>	Anti-oxidant [58,59,60,61-74] Cardiotonic [75,76,77,78] Thrombolytic [79] Anti-hypertensive [80,81,82,83,84,85] Anti – diabetic [86,87,62,88,89,90,63,91] Anti-hyperlipidemic [62,63,92,93,94,95]	Vitamin C, flavonoids Punicalgin, tannins, punicalin, ellagitannins [59,75,64,96-102]
<i>Citrus decumana</i>	Anti-oxidant [103,104]	Alkaloids, coumarins [76]

4.3 Anti- Hypertensive Effect

In the previous study discovered the different doses of the Aqueous: Ethanol extract (50:50) of *Carissa carandas* leaves were tested and were found to have a dose-dependent hypotensive effect on mean arterial blood pressure of Normotensive rats [35]. Administration of *Punica granatum* juice extract (PJ- 100 mg/kg and 300 mg/kg; p.o.) for 4 weeks in angiotensin-II treated rats significantly ($P<0.05$) reduced the mean arterial blood pressure and vascular reactivity changes to various catecholamines. *Punica granatum* juice extract could prevent the development of high blood pressure induced by angiotensin-II probably by combating the oxidative stress and antagonizing the physiological actions of Ang II [81].

4.4 Anti-Lipidemic Effect

Aqueous extract of *Mangifera indica* leaves sequent reduced total serum cholesterol, triglycerides, low-density lipoprotein, very low-density lipoprotein, and increased high-density lipoproteins in rats [22]. The result of *Spondias pinnata* showed that lipid parameters such as Serum Triglycerides, Total Cholesterol, LDL, and VLDL were increased and HDL was decreased significantly in the diabetic control group compared to normal rats [29]. In the previous study, *Tamarindus indica* fruits were showed hypocholesterolemic effects [39]. *Z. Jujuba* leaves can be used in diabetics for glucose and lipid reduction with inducing diabetes in rats [54].

4.5 Antioxidant Effect

The previous study was discovered that the extract of *Rheum emodi* exhibits antioxidant activity through correction of oxidative stress and validates the traditional use of *R.emodi* in diabetic animals [44]. In- vivo study using *Punica granatum* in experimental rats reported that the fruit extract conferred good antioxidant protection against the oxidative stress that was found to be peaked during the thrombus formation. A previous study using *Punica granatum* in experimental rats reported that the antioxidant effects [58]. The fruit *Punica granatum* has an augmentative effect on thrombolysis by rendering good oxidative protection with its numerous antioxidants [75]. The peel extract of *Citrus decumana* in different solvents was evaluated for their in vitro anti-oxidant activity and it was useful as a natural anti-oxidant. [62].

When considering these facts, all the plants of *Hridaya Dashaka* have contained Cardioprotective, Anti-diabetic, Hypolipidemic, Anti-oxidant, Hypocholesterolemic, and Hypotensive effects. *Hridaya Dashaka* has contained Flavanoids, Vitamin C, and Amla rasa then it is a good solution for decrease the risk factors and prevents CVD.

5. CONCLUSION

The therapeutic potentials of *Hridaya Dashakaya* may helpful in the management of heart diseases. Most of the drugs in the list are used as components of the diet. (*Ahara Dravya*) and the plants possessing sour taste fruits are quoted. These drugs can be included to the diet in the day today as spices and Fruits. According to Ayurvedic concept excessive *Kapha dosha* is responsible to increases body weight. *Ushna veerya* helps to reduce the *Kapha dosha* and it will reduce the risk factors of Cardio-Vascular diseases. The chronological order mentioned in *Ayurveda*, *Amla rasa* makes the channels potent to carry on the nutrients to subsequent *Dhatu*s. It helps the organic metabolism and improves the structural & functional form of *tissues Hridaya maha dashakaya* is predominant *amla rasa*, *Ushana veerya*, and *Amla vipaka* which help reduce the risk factors of Cardio-Vascular diseases., and it play a major role in maintaining healthy heart. It may use in the prevention of heart diseases to be subjected to further researches.

NOTE

The study highlights the efficacy of "Ayurveda" which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

DISCLAIMER

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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