



ISSN 2456-3110

Vol 7 · Issue 3

April 2022

Journal of
**Ayurveda and Integrated
Medical Sciences**

www.jaims.in

JAIMS

An International Journal for Researches in Ayurveda and Allied Sciences



Maharshi Charaka
Ayurveda

Indexed

A review on *Pushkarmula* - The effective Anti-Ischemic Drug

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ABSTRACT

Hridroga is a disease of *Marma* (vital organ) which is the seat of many vital activities. In *Ayurveda* all the painful heart disease comes under the broad classification of *Hridroga*. In modern science myocardial ischemia is one of the worst painful conditions among the heart diseases Myocardial ischemic develops when Coronary blood supply to the myocardium is reduced, either in terms of absolute flow rate. (Low-flow or no flow ischemia) or relative to increased tissue demand. *Inula racemosa* Hook, F (Asteraceae) Commonly known as *Pushkarmula* is one of the herbs mentioned in all Ayurvedic scriptures. The great Sage *Charaka* has categorized it as *Hikkanigrahana* - stops hiccup a *Svasahara* - alleviates the breathlessness in asthma. It has also anti-inflammatory, Cardiovascular hypoglycemic, antianginal, analgesic and antibacterial Properties. This article is an attempt to collect and review all the data concerning systemic scientific study of ethnopharmacology of *Inula racemosa* and its cardio protective functions.

Key words: *Hridroga*, *Pushkarmula*, *Ayurveda*, *anti-ischemic*, *Hikkanigrahana*.

INTRODUCTION

Hridaya which is considered to be heart in this context definition of heart disease, aetiology, pathogenesis and management has been described in *Charak Samhita*. According to the *Sushruta* any condition which produces disturbances in the heart is called as *Hridroga*.^[1] *Sushruta* has devoted a separate chapter to deal with the disease *Acharya Jejjat* interprets the word *Badha* as different characteristic of pain

lenavidha Peeda. In Ayurvedic classic 5 types of *Hridrogas* are mentioned *Vataja*, *Pittaja*, *Kaphaja*, *Sannipataja* and *Krmija*.^[2]

Inula racemosa is known to be used in traditional medicine throughout the world. Especially East Asia and Europe. Apart from being used for other ailments, the plant extract and its isolated active constituent show promising activity against abdominal pain. Acute enteritis bacillary dysentery expectorant and tonic. *Inula racemosa* is also used in combination with other plant extract and used for various conditions including hyperlipidemia. angina and patients with ischemic heart disease.^[3] Various active constituent have been isolated from the plant, most important being sesquiterpene lactones - Alantolactone (ATT), and isolantolactone (IALD)) That show anti inflammatory and decreased proteolytic activity.^[4] This review is therefore aimed to comprehensively collect all the literature regarding Anti inflammatory activity of plant property *Inula racemosa* and its cardioprotective property.

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Submission Date: 19/02/2022 Accepted Date: 25/03/2022

Access this article online

Quick Response Code



Website: www.jaims.in

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METHODOLOGY

Ischemic heart disease

IHD is characterized by myocardial impairment due to imbalance between coronary blood flow and myocardial requirement. The commonest cause at IHD is atherosclerotic coronary artery disease. Nonatherosclerotic causes of myocardial ischemia are rare and include coronary artery embolism, coronary arteritis.

Risk factors for Clinical Atherosclerosis

| Non modifiable | Modifiable |
|-----------------------|-------------------|
| Age | Dyslipidemia |
| Male gender | Hypertension |
| Family history of CHD | Diabetes |
| Presence of CHD | Abdominal Obesity |
| Menopause | Smoking |
| Physical inactivity | Diet |

Pushkar Mula

Latin Name : *Inula racemosa* Hook F (Asteraceae)

Family : Iridaceae

English Name : Orris Root

Synonym : *Kasari, Sulahara, Sughandhika, Hemvati, Vruksharuha, Kushtabheta.*

Gana : *Hikkanigrahana, Svasahara*

Virya : *Ushna*

Vipak : *Katu*

Rasa : *Tikta, Katu*

Drug doses

Churna : 1-3 gms

Kalpa : *Pushkarmuladi Churna, Pushkaradi Churna, Pushkarmulasava.*

Phytochemical Constituents

Sesquiterpene lactones, Alantolactone (ALT) and isoalato lactone (IALT), Dihydroalantolactone,

dihydroisoalantolactone, isnunolide, inunalantodiene isoalantodiene.^[4]

Anti- Ischemic Activity of Pushkarmula

Sage *Charaka* Says medicated oil prepared by cooking with the paste of *Haritaki, Nagara, Pushkara Mula* (Juice of) *Vayastha (Guduci)*, (juice of) *Kayastha (Amalaki)* and Salt, and *Hingu* is immensely effective for curing *Gulma* (phantom tumor), heart disease and pain in the chest caused by the aggravated Vayu.^[6]

The decoction of *Pushkarmula, Matulunga Palasa, Bhutika, Sati* and *Devadaru* should be added (*Praksepa*) with the powder of *Nagara, Ajaji, Vaca, Yavani, Yavakshara* and salt. This potion should be given in luke warm form to the patient suffering from *Vatika* type heart disease.^[7]

In Kaphaja type of heart disease

The powder of *Krsna (Pippali), Sati, Pushkarmula, Rasnavaca, Abhaya* and *Nagara* is useful for this ailment^[8]

According to Sage Bhavaprakash

Churna of *Haritaki, Vacha, Rasna, Pippali, Nagar, Shati, Pushkarmula* helps in the treatment of *Hridroga*.^[9]

According to Sage Chakradatta

Churna of *Pushkarmula* when taken along with honey helps in the treatment of chest pain due to heart disease, cough, dysnea, hiccups.^[10]

Sauvarchal salt and *Pushkarmula Churna* along with *Kanji* of the *Yawa* when taken help in relieving chest pain due to heart disease.^[11]

Fine *Churna* of *Shatipushkarmula, Titindikdadim* and roots of *Matulunga* along with lukewarm water or *Madhya*, helps in treatment of *Arsha, Gulma* and *Hridyaroaga*.^[12]

Vangasena Samhita

Pushkaradikalka

Pushkarmula, Bijjora lemon roots, *Shunthi, Kachur* and *Harad* when grinded together and paste is formed and taken along with *Yavakshar, Kanji* ghee or *Saindhav*

Lavana beneficial for the treatment of *Vataja* type of *Hridayaroga*.^[13]

Padhal (kumbhi), Kachur, Shati, Bala, Rasna, Shunthi, Haritaki, Pushkarmul all are grinded together to form a *Churna* or *Kwatha* made by the above medicine when taken along with *Gomutra* beneficial in treatment of *Kaphaja hridayaroga*.^[14]

Licking *Pushkarmula Churna* along with honey helps in relieving chest pain due to heart disease, dysnea, cough, hiccups.^[15]

Churna of *Haritaki, Vacha, Rasnashati, Shunthi, Pushkarmula* are useful in treatment of chest pain due to heart disease.^[16]

Review according to modern science

Inula racemosa has been indicated for its use in cardiac disorders. Hence, petroleum extract of the roots and alantolactone, which has been isolated from the roots of *Inula racemosa*, were subjected for evaluation of their cardio protective activity in myocardial ischemia (100 mg/kg body weight). Myocardial ischemia was induced in the rats by isoproterenol administration (20 mg/100 g subcutaneously twice at an interval of 24 hrs.). Lipid peroxides and glutathione contents were estimated. It was found that the alantolactone effectively reduced the lipid peroxide levels in the ischemic rats and brought down the glutathione content to near normal level as compared to the petroleum ether extract (Chabukswar *et al.*, 2010).^[17]

Prathyush *et al.*, 2013, investigated the cardioprotective potential of *Inula racemosa* root hydro alcoholic extract against isoproterenol induced myocardial infarction in rats. The rats treated with isoproterenol (85 mg/kg s.c.) exhibited myocardial infarction, as evident by significant ($P < 0.05$) decrease in mean arterial pressure, heart rate, contractility, relaxation along with increased left ventricular end diastolic pressure, as well as decreased endogenous myocardial enzymatic and non-enzymatic antioxidants. Isoproterenol also significantly ($P < 0.05$) induced lipid peroxidation and increased leakage of myocyte injury marker enzymes. Pretreatment with *Inula racemosa* extract (50, 100, 200 mg/kg per day, p.o.) for 21

consecutive days, followed by isoproterenol injections on days 19th and 20th significantly ($P < 0.05$) improved cardiac function by increasing the heart rate, mean arterial pressure, contractility and relaxation along with decreasing left ventricular end diastolic pressure. Pretreatment with *Inula racemosa* also significantly ($P < 0.05$) restored the reduced form of glutathione and endogenous antioxidant enzymes superoxide dismutase, catalase, glutathione superoxidi from the heart, which were depleted after isoproterenol administration. In addition to the restoration of antioxidants, *Inula racemosa* significantly ($P < 0.05$) inhibited lipid peroxidation and prevented the leakage of myocytes specific marker enzymes creatine phosphokinase-MB and lactate dehydrogenase from the heart. Thus, it was concluded that *Inula racemosa* protects heart from isoproterenol-induced myocardial injury by reducing oxidative stress and modulating hemodynamic and ventricular functions of the heart. Present study findings demonstrate the cardioprotective effect of *Inula racemosa* and support the pharmacological relevance of its use and cardioprotective mechanism is ischemic heart disease as well as substantial its traditional claim (Prathyush *et al.*, 2013).^[17]

In another experiment it has been found that ethanol roots extract of *I. racemosa* possess cardioprotective activity against isoproterenol induced myocardial infarction treated wistar rats by restoring electrocardiographic, histopathological and biochemical changes. Myocardial infarction was induced in the wistar rats by isoproterenol administration (200 mg/kg-1 subcutaneously twice at an interval of 24 h). Ethanol roots extract of *I. racemosa* markedly restrained isoproterenol-induced electrocardiographic changes indicative of its cell membrane protecting effects. At a dose of 400, 600 and 800 mg/kg-1 daily for a period of 10 days, improved cardiac function, decreased oxidative stress, cardiac injury, maintained cell membrane integrity and lipid peroxidation process in a dose dependent manner. In addition, it has normalized histopathological changes caused by isoproterenol administration (Shirole *et al.*, 2013).^[17]

In another experiment myocardial ischemia was induced in rats by isoproterenol administration (20 mg/100 g subcutaneously twice at an interval of 24 h). The petroleum ether extract of roots of the plant *I. racemosa* and alantolactone, which have been isolated from the roots of the plant were subjected for evaluation of their cardioprotective activity in myocardial ischemia. Lipid peroxides and glutathione contents were anticipated. It has been found that the alantolactone as well as petroleum ether extract effectively reduces the lipid peroxide levels in the ischemic rats and brings the glutathione content to near normal level (Chabukswar et al.,2010).^[17]

A combination of the plant *C. mukul* and *I. racemosa* in 1:1 ratio was studied in 200 patients suffered with ischemic heart disease. The major symptoms included chest pain, with ST-segment and T-wave changes on the electrocardiogram (ECG), suggested myocardial ischemia in about 80 percent of the patients. Pretreatment with combination of the plant *C. mukul* and *I. racemosa* in 1:1 ratio to the patients caused improvement in precordial pain and dyspnea, restoration of normal ECG patterns, and significant reductions in cholesterol, triglycerides and total lipid levels (Batliwala et al.,1993). The isolated compound from *I. racemosa* was evaluated for the cardioprotective activity on isolated frog heart at a dose 40 µg mL⁻¹ showed that alantolactone decreased heart rate and force of contraction. The study indicated that the alantolactone produces a negative inotropic and negative chronotropic effect on frog's heart (Lokhande et al.,2006).^[17]

Cardioprotective activity of ethanol root extract of *I. racemosa* was evaluated in wistar male albino rats having myocardial ischemic reperfusion injury. The extract at a dose of 100 mg kg⁻¹ for 30 days appreciably restored the myocardial antioxidant status evidence by increased superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), reduced glutathione (GSH) and prevented leakage of cardiomyocytes specific enzymes, creatine phosphokinase isoenzyme and lactate dehydrogenase (LDH). The result suggested cardioprotective effect of *I. racemosa* likely resulted to improve antioxidant status, haemodynamic and left

ventricular contractile function subsequent to suppression of oxidative stress (Ojha et al., 2010). Pushkar Guggal (2 g), a mixture of Commiphora and *Inula*, was administered three times daily for 4 months in angina pectoris and in the management of ischemic heart diseases. By this treatment periodical pain, discomfort and dysphonia were controlled. It decreased mean serum cholesterol (Sharma and Gupta, 1983, Tripathi et al. 1984b, Sharma et al. 1986a, Singh et al. 1991, 1993). Dwivedi et al. tried a polyherbal preparation containing *Pushkarmul*, *Saussurea lappa* and *Terminalia arjuna* for heart diseases. It enhanced the aortic prostaglandin E2 (Dwivedi et al. 1987). Sati and Sharma (1990) tried it for congestive cardiac failure. Arora et al. evaluated the cardioprotective activity of the drug in coronary artery diseases, hypertension and diabetes mellitus (Arora et al.,1995)^[17]

CONCLUSION

Today world is facing many severe health problems cardio vascular disease CVD has become one of the in one of them. CVD has become one of most common Causes of mortality now a day. It is necessary to find effective medicine on CVD *Ayurvedic* system of medicine can be the great help in controlling the heart disease, as the system. Is a votary al plant based approach. *Inula racemosa* Hook F is a medicinal plant which play a very important role in heart disease. The phyto constituent of the Plant possess high cardio protective activity *I racemosa* has been proving a promising medicine. For treating heart related diseases in natural way with less or no side effects unlike allopathic treatment, all the result in the studies proved to have significant in the management of myocardial ischemia by the *I. racemosa*

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How to cite this article: Sapana S. Dakhole, Brijesh R. Mishra, Harish J. Purohit. A review on Pushkarmula - The effective Anti-Ischemic Drug. J Ayurveda Integr Med Sci 2022;3:127-131.

Source of Support: Nil, **Conflict of Interest:** None declared.
