



MEDICINAL PLANTS WITH CARDIOPROTECTIVE ACTIVITY: A REVIEW

Priya K Davison¹, Sandhya S¹, K. Krishnakumar¹, Kavitha MP^{2*}

¹Department of Pharmaceutical Analysis, St. James College of Pharmaceutical Sciences, Chalakudy, Kerala, India.

²St. James hospital trust Pharmaceutical Research Center (DSIR certified), Chalakudy, Kerala, India.

ABSTRACT

Herbal medicines are an important part of healthcare throughout the world. Herbal medicines have been widely utilized as effective remedies for the treatment and prevention of multiple health conditions. Cardiovascular disease is a major cause of death worldwide. According to WHO, coronary heart disease is ranked as the primary contributor of morbidity. Therefore there arises a need to identify plants that have potent cardioprotectant and cardiostimulant activity, as well as the phytochemicals responsible for these activities. This review highlights some of the important plants that possess potent cardioprotective activity.

Key words: Cardiovascular disease, Cardioprotectant, Cardiostimulant.

INTRODUCTION

Cardiovascular disease (CVD) is the number one cause of death globally and are the leading cause of death in India also. Cardiovascular disease is an established chronic disease for the population of developed and developing countries. Chronic diseases are illnesses that are prolonged, do not resolve spontaneously and are rarely cured completely (Thanmay N and Arnab G, 2013; Shankar Murthy K and Kiran BR, 2012). Cardiovascular disease includes a number of conditions affecting the structure and function of heart. They can include: Coronary artery disease (narrowing of the arteries), myocardial infarction, arrhythmias, heart failure, heart valve disease, congenital heart disease, cardiomyopathy and pericardial disease. Coronary heart disease:

Coronary heart disease (CHD): occurs when the flow of oxygen-rich blood to your heart is blocked or reduced by a build-up of fatty material.

Myocardial infarction: The term Myocardial Infarction

should be used when there is evidence of myocardial necrosis in a clinical setting consistent with myocardial ischemia (Gary T, 2016).

Arrhythmia: The heart beat provides the mechanical force for the pumping of oxygenated blood to, and deoxygenated blood away from, the peripheral tissues. This depends critically on the orderly activation recovery of electrical excitation through the myocardium. Disruptions of this can lead to arrhythmias (Coronel R and Groot JJ, 2001).

Heart Failure: A clinical syndrome caused by the heart to supply blood to the tissues commensurate to the metabolic needs of that tissue (Jeffrey SB and Abhishek S, 2015).

Heart Valve Disease: Heart valve disease is one of the most prevalent causes of heart failure and sudden cardiac death. It mainly involves intrinsic abnormalities of valve or functional dysfunction (Julien IH and Samuel K, 2002). Congenital heart disease: *Congenital heart disease*, is defined as a gross structural abnormality of the heart or intra-thoracic great vessels that is actually or potentially of functional significance (Charles MC et al., 2012).

Corresponding Author

Kavitha MP

Email: stjamespharmacyproject@gmail.com

Cardiomyopathy: Cardiomyopathy is broad spectrum diseases that affect the muscle or myocardium of the heart. This results in a failure of the heart to provide adequate oxygenated blood to the body and remove carbon dioxide and other waste products (Abdulhannan P *et al.*, 2012). Peripheral heart disease (PAD): It is a common vascular condition that affects both quality of life and life expectancy with an increased risk of cardiovascular events. PAD is a term used to describe the impairment of blood flow to the extremities usually as a result of atherosclerotic occlusive disease (Nick HM *et al.*, 1998).

MEDICINAL PLANTS USED IN CARDIAC DISEASES

Digitalis purpurea* or *lanata

A number of herbs contain potent cardioactive glycosides, which have positive inotropic actions on the heart. The drugs digitoxin, derived from either *D purpurea* (foxglove) or *Digitalis lanata*, and digoxin, derived from *D lanata* alone, have been used in the treatment of congestive heart failure for many decades. Cardiac glycosides have a low therapeutic index, and the dose must be adjusted to the needs of each patient. The only way to control dosage is to use standardized powdered digitalis, digitoxin, or digoxin. When 12 different strains of *D lanata* plants were cultured and examined, their total cardenolide yield ranged from 30 to almost 1000 nmol/1g (Stuhlemmer U *et al.*, 1993).

Cynara scolymus

Medicinal artichoke products consist of the dried radical leaves of *Cynara scolymus* L.(Asteraceae).The plant and its preparations are commonly used to treat atherosclerosis. Two randomized controlled clinical trials assessed the effects of an artichoke extract on cholesterol levels in 187 patients (Gail BM, 1998).

Allium sativum

Garlic (*Allium sativum*, Liliaceae), also known as “the spice of life”, was one of the earliest documented examples of a food plant also used for the prevention and treatment of diseases. Garlic is known to lower blood pressure, boost immune system, fight infections, and prevent cancer. Garlic contains a number of disulphide and trisulphide organo sulfur compounds that appear to be the active constituents. Clinical trials reveal that garlic (bulb) has antihypercholesteremic, antihypertensive. Garlic is known to lower blood pressure, boost immune system, fight infections, and prevent cancer. Garlic lowers the overall cholesterol counts and helps to combat bacterial infection, ulcer, and cancer (Singh RH, 2006).

Commiphora mukul

Is a lipophilic extract prepared from the resin of trunk and branches of *Commiphora mukul* (Jacq.) Engler (Burseraceae), commonly referred to as the mukulmyrrh tree. The medicinal use of guggul dates back to 6000 BC, when it was employed for the treatment of obesity, atherosclerosis, and various inflammatory conditions. Preparations of resin have also been used in traditional medicine as mouthwashes, astringents, for treatment of ulcers of mouth and pharynx, for foul and indolent ulcers, or wound healing in veterinary practice (Sandhya S *et al.*, 2000).

Ginkgo biloba

(Ginkgoaceae family) is an important herb used in traditional Chinese medicine and is the only surviving species of Ginkgo, the oldest living tree species (Vandana S *et al.*, 2009; Huh H and Staba EJ, 1992) Extracts of *Ginkgo biloba* leaves have been found to possess cardioprotective, antiasthmatic, antidiabetic, hepatoprotective, and potent central nervous system activities (Naik SR *et al.*, 2006; Panda VS and Naik SR, 2008). Chemically, the active constituents of *G. biloba* leaf are glycosides of the flavonoids kaempferol, quercetin, and isorhamnetin; diterpene lactones namely ginkgolides A, B, C, M, J, and bilobalide; and the bioflavones ginkgetin, isoginkgetin, and bilobetin (Kleijnen J *et al.*, 1992). The constituents of *G. biloba* are scavengers of free radicals. By scavenging free radicals, *G. biloba* inhibits lipid peroxidation and augments levels of endogenous antioxidants (Gupta SK *et al.*, 1997).

***Ocimum sanctum* (tulsi)**

Is an Indian medicinal plant is used against wide variety of conditions (Treas and Evans, 1997). It also possesses hypoglycemic, hypolipidemic, immune modulatory and cardioprotective activity (Mediratta PK *et al.*, 1997). *Ocimum sanctum* possess good cardioprotective activity due its antioxidant activity (Arya DS *et al.*, 2006). Its constituents are orientin and vicenin (flavonoids), phenolic compounds (eugenol, cirsilinoleol, apigenin) and anthocyanins are known to augment reduced glutathione (GSH) and antioxidant enzyme levels and scavenge lipid peroxides (Bharani A *et al.*, 2002).

Terminalia arjuna

Bark possesses cardio-protective activity. Clinical randomized trials reveal that *Terminalia arjuna* is associated with improvement in signs and symptoms of heart failure (AmritPal S, 1998). Arjuna is a cardiac tonic used in Ayurveda for a variety of heart conditions (Sumitra M *et al.*, 2001). Often it is combined with *ashwagandha*, *brahmi* and *guggul* in heart formulas. *Arjuna* is a coronary vasodilator, protects the heart, strengthens circulation, and helps to maintain the

tone and health of the heart muscle (Picrorhizha K, 20016).

Picrorhiza kuroa

Is one of the oldest medicinal plants found in the Himalayas. Since time immemorial, this perennial herb has been used in Ayurveda due to its antibacterial, anti-cholestatic, anti-allergic effect. The roots and rhizomes of *picrorhiza* possess medicinal properties. Clinical trials performed in 14 congestive heart failure patients revealed that it can be used in ischemic heart disease, and cardiomyopathy (Pintu KD *et al.*, 2014).

Mangifera indica

Also known as mango, aam, it has been an important herb in the Ayurvedic and indigenous medical systems for over 4000 years. Mangoes belong to genus *Mangifera* which consists of about 30 species of tropical fruiting trees in the flowering plant family Anacardiaceae. Mango is one of the most popular of all tropical fruits. Mangiferin, being a polyphenolic antioxidant and a glucosyl xanthone, it has strong antioxidant, anti-lipid peroxidation, immunomodulation, cardiotoxic (Awari D *et al.*, 2009).

Punica granatum

Is a fruit-bearing deciduous shrub. Various parts of this plant is used in the treatment of dyspepsia, bronchitis, hypotensive, throat inflammation, worm etc. Pomegranate juice consumption inhibits serum angiotensin converting enzyme activity and reduces systolic blood pressure. Studies using fresh fruitjuiceon

hypodynamic frog heart reveals that *Punica granatum* has rapid onset of action compared to Digoxin (Shigematsu N *et al.*, 2001).

Gymnema sylvestre

Obesity plays a central role in the insulin resistance syndrome, which is associated with hyperinsulinemia, hypertension, hyperlipidemia, type 2 diabetes mellitus, and an increased risk of atherosclerotic cardiovascular disease. An extract of leaves given to rats for three weeks influenced lipid metabolism, improving serum cholesterol and triglyceride levels.³⁷The present study was done to assess the effect of *Gymnema sylvestre* extract (GSE) in the high fat diet (HFD)-induced cellular obesity and cardiac damage in Wistar rats. Adult male Wistar rats (150–200 g body weight) were used in this study. HFD was used to induce obesity. Furthermore, treatment with standardized ethanolic GSE (200 m/kg/p.o.) for a period of 28 days resulted in significant decrease in total cholesterol, triglycerides, LDL, apoprotein-b, blood pressure. This reveals that *Gymnema sylvestre* has potent cardioprotective activities (Kumar V *et al.*, 2012).

Garcinia pedunculata

Studies reveal that fruits of *Garcinia pedunculata* have cardioprotective activity. The study was done on wistar albino rats. The aqueous fruit extract pre-treated group significantly reduced the activity of serum biomarkers such as CK-MB, SGPT and ALP and caused mild to moderate reduction of SGOT (Kannan R *et al.*, 2012).

Fig 1. Flowers of Digitilisanata



Fig 2. Leaves and flower of Cyanara Scolymus



Fig 3. Bulb of garlic



Fig 4. Branches of Commiphora mukul



Fig 5. Leaves of ginkgo biloba



Fig 6. Leaves of Tulsi



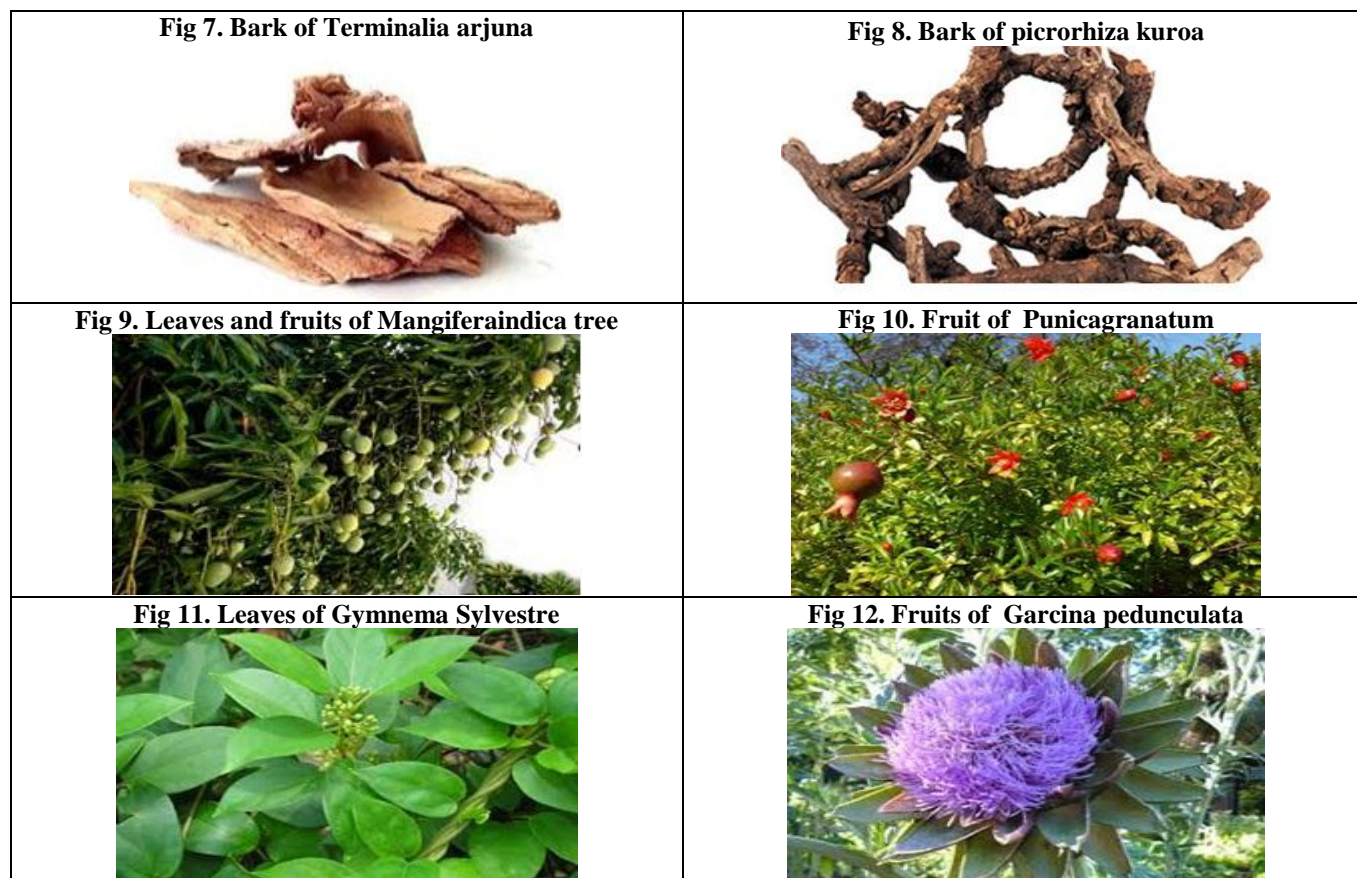


Table 1. Other Medicinal Plants Used In Cardiac Diseases

S. no	Botanical name		
1	<i>Gmelina asiatica</i>	10	<i>Adonis vernalis</i>
2	<i>Carissa carandas,</i>	11	<i>Apocyanum cannabinum</i>
3	<i>Garcina indica</i>	12	<i>Asclepius friticosa</i>
4.	<i>Ziziphus jujuba</i>	13	<i>Plumeria rubra</i>
5.	<i>Citrus medica</i> Linn.	14	<i>Cerebra manghas</i>
6	<i>Cryptostegia grandiflora</i>	15	<i>Calotropis piscera</i>
7	<i>Urgenia maritime</i>	16	<i>Mucuna prutia</i>
8	<i>Withania somnifera</i>	17	<i>Cinnamum zeylanicum</i>
9	<i>Centella asiatica</i>	18	<i>Azadiracta indica</i> (Kaksha JP et al., 2015; Nur KA et al., 2015; Ipseeta M et al., 2004; Emmanuel B. T et al., 1978; Kamela M S et al., 2001; Shakir J S et al., 2007)

CONCLUSION

Diet and lifestyle play an important role in preventing and reversing heart disease. From this article it is clear that certain herbs and supplements can help lower the risk of heart disease and treat heart conditions. This review reveals the importance of few medicinal plants that have potent cardio-protective activity.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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