AN EFFECT OF CARDIOPROTECTIVE ACTIVITY IN VARIOUS MEDICINAL PLANTS–A REVIEW

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ABSTRACT

Siddha system of medicines is known for its herbal in origin. Herbal plays a major role in treating acute and chronic diseases. Cardiovascular diseases (CVDs) is the life-threatening disease that contributes a leading cause of death day by day across the world.

INTRODUCTION
Cardiovascular diseases are the major health problem of advanced as well as developing countries of the world [1]. Cardiovascular diseases (CVDs) are the most prevalent cause of death and disability worldwide. CVD, a group of disorders of the heart and the vasculature, includes high blood pressure, coronary heart disease, myocardial infarction, congenital heart defects, cardiac arrhythmias, heart failure and stroke [2].

Cardioprotection includes "all mechanisms and means that contribute to the preservation of the heart by reducing or even preventing myocardial damage". Defining "Cardioprotection" as "preservation of the heart" has all theoretical implications because all adaptive and compensatory mechanisms that directly or indirectly contribute to myocardial preservation have to be classified as "cardioprotective" [3].

Some modern drugs like organic nitrates, calcium channel antagonist and β-blockers are effective in preventing the heart disorders; their use is often limited because of their side effects and adverse reactivity. So the wide variety of plants and its active principles, with minimal side effects, provide an alternate therapy for heart disease [4]. Nature has been a source of Medicinal treatments for years and plants derived products continue to play an important role in the primary healthcare of about 80-85% of the world population. A review of such plants with cardioprotective activity was carried out. Several herbs and herbal products have been recommended to promote a healthy heart [5].

Global burden of cardiovascular disease
The choice of lifestyle, obesity, diabetes mellitus and hypertension are causative factors of cardiovascular diseases. Globally, cardiovascular diseases (CVDs) are the number one cause of death and they are projected to remain so. An estimated 17 million people died from cardiovascular disease in 2005, representing 30% of all global deaths. If current trends are allowed to continue, by 2030 an estimated 23.6 million people will die from cardiovascular disease [6].

The major risk factors associated with CVD and stroke are tobacco and alcohol abuse, high blood pressure (hypertension), high cholesterol, obesity, physical inactivity, and unhealthy diets contributing to high prevalence across the world [7].

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Part used
Fruit rind

Major chemical constituents
Tannin, gallic acid, mucilage, chebulinic acid [10]

Cardioprotective activity
*Terminalia chebula* extract pretreatment was found to ameliorate the effect of isoproterenol on lipid peroxide formation and retained the activities of the diagnostic marker enzymes in isoproterenol-induced myocardial damage in rats [11]

Botanical name: *Piper longum*
Tamil name: *Thippili*

Taxonomy
Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Piperales
Family: Piperaceae
Genus: *Piper*
Species: *longum*

Distribution
The plant grows in evergreen forests of India and is cultivated in Assam, Tamil Nadu, and Andhra Pradesh. Long pepper is cultivated on a large scale in limestone soil and in heavy rainfall areas where relative humidity is high.

Description
*Piper longum* is a small shrub with a large woody root and numerous creeping jointed stems that are thickened at the nodes. The leaves are alternate, spreading, without stipules and with blades varying greatly in size. The lowest leaves are 5–7 cm long, whereas, the uppermost are 2–3 cm long. Flowers grow in solitary spikes. The fruits, which grow in fleshy spikes 2.5–3.5 cm long and 5 mm thick, are oblong, blunt, and blackish-green. The mature fruits are collected and dried as the commercial form of pippalimula. There are three grades of pipalimula: grade I with thick roots and underground stems fetch a higher price than grade II or III, which consist of thin roots, stems, or broken fragments. The commercial drug consists almost entirely of transversely cut pieces (length, 5–25 mm; diameter 2–7 mm), which are cylindrical, straight, or slightly curved; some have distinct, swollen internodes exhibiting a number of leaf and rootlet scars. The surface is a dirty light brown. The drug has a peculiar odor and a pungent bitter taste that produces numbness on the tongue.

Part used
Fruit

Major chemical constituents
Piperine and piperatine, alkaloids, tannins, phenols, coumarins, essential oil, piperlongumine, piper longuminine

Cardio protective activity
The effect of methanol extract of *P. longum* fruits was evaluated on adriamycin-induced cardiotoxicity (i.e., biochemical changes, tissue peroxidation damage, and abnormal antioxidant levels) in Wistar rats. Histopathological studies of the heart revealed degenerative changes and cellular infiltration in rats treated with adriamycin; however, pretreatment with *P. longum* reduced the intensity of these lesions. The results indicate that *P. longum* offers significant protection against adriamycin-induced oxidative stress and reduces cardiotoxicity by virtue of its antioxidant activity [12]
**Vijaya et al.**

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**Description**

*Tinospora cordifolia* is quite large, extensively-spreading, glabrous, dioecious, perennial deciduous climber grows on wide range of hedges and trees, typically found growing in dry deciduous forests of tropical and subtropical regions up to an altitude of 1000 m. It produces distinct male and female flowers. Its fresh stem has a green succulent bark covered by a thin brown-bark, and the bark separates from the wood turn brown with age.

The underground roots are tubercled. Leaves 5 to 10 cm, membranous, seven to nine veins diverging from the base, somewhat roundish to 'cordate' i.e. heart-shaped (that is why the species name of the plant is 'cordifolia') with a petiole of 2.5 to 7 cm long. The unisexual flowers bloom in summer in conspicuous racemes often found longer than that of the leaves. Yellowish green male flowers are quite small, occur in few-flowered clusters in the axis of small subulate bracts while the female-flowers are usually borne singly (i.e. solitary) along the axis. In both male and female flowers, Sepals are 6 numbers, 3 outer ones very-small, ovate-oblong and acute while the inner 3 are larger, membranous, broadly elliptical, concave and yellowish. Distribution of *T. cordifolia* 6 to 7 mm, rounded at both ends and papillose [15].

**Part used**

Herb

**Major chemical constituents**

Alkaloids include berberine, tinosporol, columbin, tinosporon, chasmanthin, tinosporic acid [16].

**Cardioprotective activity**

The result of the present study indicated that the prior administration of methanolic extract of *Tinospora cordifolia* attenuates isoprenaline-induced MI. The cardioprotective activity of *Tinospora cordifolia* probably related to its ability to strengthen the myocardial membrane by its membrane stabilizing activity [17].

**Botanical name:** *Asparagus racemosus*

Tamil name: *Thanneervitan*

**Taxonomy**

Kingdom: Plantae

Phylum: Angiosperms

Order: Ericales

Family: Primulaceae

Genus: *Embelia*

Species: *ribes* [20]

**Distribution**

It is an Indo-Malaysian species, reported from India, Srilanka, Singapore, Malaysia and S. China. It is found to occur throughout India in Central Himalayas, Arunachal Pradesh, Assam, Maharashtra, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. This species is globally distributed in Indo-Malaysia. Within India, it is found throughout up to an altitude of 1500 m (5000 ft).

**Description**

A large scandent Straggling shrub with a long slender brittle stem, It is a Climbing-111 creeper shrub, flexible, and terete branches; bark studded with lenticles Leaves simple, coriaceous, alternate, elliptic-ovate-lanceolate, smooth leaves gland-dotted, broad, and obtusely acuminate, broad, entire perfectly glabrous. It is about 3 inch long and 1 ½ inches broad, shiny above. Petiole; 1.0 cm to 0.8 cm margined, Midrib; prominent Flowers; small, greenish yellow to whitish pink colored. In racemes at end of branches Small, globular Fruits about the size of white pepper, reddish brown to blackish. It is found in bunches. Root; brownish grey Rootlets; hairy reddish. Fruit: The fruits are brownish-black on ageing, globular to sub-globular, 2-4 mm in diameter, and style at apex. In a few fruits, the pedicel along with persistent calyx is present. Surface is warty, pericarp brittle, enclosing a single seed, speckled with yellowish brown or white spots. Most of the seeds are striate. Transverse section of fruit shows epicarp consisting of a single row of tabular cells of the epidermis, generally not distinct due to deposition of coloring matter.

**Parts used**

Berries, roots, bark

**Major chemical constituents**

The main component of vidanga is Embelin containing Embelic acid: 2, 5-dihydroxy-3-undecyl-1, 4-Benzoxonine and also contains christembeline, an alkaloïd and resinoid and volatile oil [21].

**Cardioprotective activity**

Cardioprotective effect of aqueous extract of *E. ribes* was evaluated in a rat model having an acute myocardial infarction, induced by attractive red berries. Flowers are white, fragrant, solitary or fascicles have a width of 0.3-0.4 cm. Berries are globose or obscurely 3 lobed. Seeds are black in colour and hard with brittle testa [18].
The protective effect of E. ribes on iso-proterenol (ISO)-induced cardiomyopathy in streptozotocin (STZ)-induced diabetic rats was studied by treatment of E. ribes ethanol extract (200 mg/kg) on pathogenic (STZ+ISO treated) rats resulted in a significant (p<0.01) increase in HR, blood glutathione, serum LDH, and myocardial endogenous antioxidant levels with a significant (p<0.01) decrease in BP, increase in HR, blood glutathione, serum LDH, and myocardial TBARS and increased the reduced levels of GSH, SOD and CAT in heart homogenates. Histopathological observation marked protection by the extract in myocardial necrotic damage.

The results of this study provide evidence that ethanol E. ribes extract treatment enhances the antioxidant defense against ISO-induced myocardial infarction in rats and exhibits cardioprotective properties.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally

CONFLICT OF INTERESTS

Declare none

REFERENCES


