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PLANT USED IN CARDIOVASCULAR DISEASES – A REVIEW

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ABSTRACT

We are using herbs as a medical treatment since beginning of civilization and some derivatives (eg. Reserpine, digitalis, and aspirin) have become mainstays of human pharmacotherapy. Patients with congestive heart failure, systolic hypertension, angina pectoris, atherosclerosis, venous insufficiency, arrhythmia can use herbal treatments for cardiovascular diseases. However many herbal remedies used to day have not undergone careful scientific assessment and some have the potential to cause serious toxic effects and major drug to drug interactions. Nature is very crucial source for finding various drugs that leads to the treatment of disease. Famous drugs from herbal and plants sources include aspirin from *Salix alba L.* tree, digoxin (cardiac glycoside) from *Digitalis purpurea*, and so on.... In 1985 WHO estimated that's around 65% of world population mostly depended on plant derived traditional medicines. This article will be focusing on the plant and plant products which we use to treat cardiovascular diseases keeping in mind that plant based medicines are cheaper alternative with fewer side effects.

Keywords: Cardiovascular diseases, Medicinal plants, Hypertension, Angina pectoris, Congestive heart failure, Venous insufficiency

INTRODUCTION

The heart is a muscular organ having size of a fist, located just behind but slightly left to the breastbone. The heart pumps blood through the lattice of arteries and veins which is called cardiovascular system [1].

The heart has 4 chambers;

1. The right atrium collects blood from the veins and pumps it to right ventricle.
2. The right ventricle receives blood from the right atrium and pumps it to lungs, where it is loaded with oxygen.
3. The left atrium receives oxygenated blood from lungs and pumps it to left ventricle.
4. The left ventricle (the strongest chamber) pumps oxygenated blood to rest of body. Vigorous contractions of left ventricles create our blood pressure [2].

The coronary arteries run along the surface of heart and provide oxygenated blood to heart muscle. A web of neural tissue also runs through the heart, intricated the complex signals that govern contraction and relaxation. Heart is surrounded by a sac called the pericardium [3].

Heart disease symptoms depends on what type of disease you have. In atherosclerosis one can have symptoms like; chest pain,

angina, shortness of breath, pain in neck, jaw, throat, upper abdomen or back [4]. Arrhythmias symptoms are fluttering in the chest, tachycardia, bradycardia, syncope. CDV have a global annual toll of more than 17 million deaths. Most common cause of death worldwide is CDV and also major economic and health burden. Vascular dysfunction is the major cause of heart diseases which if not treated adequately leads to organ damage [5].

Heart disease are the range of condition that affects your heart which include;

- a) Cognitive heart failure
- b) Hypertension
- c) Angina pectoris
- d) Atherosclerosis
- e) Venous insufficiency
- f) Arrhythmia

1. Conginital heart failure

The herbs that contain potent cardioactive glycosides, which gives a positive inotropic action on the heart. The drugs digitoxin, that is derived from either *D purpurea* (foxglove) or *Digitalis lanata*, and digoxin, which is derived from *D lanata* alone [6]. Some common plant sources of cardiac glycosides are *D. purpurea* (foxglove), *Adonis microcarpa*, *Apocynum cannabinum* (black Indian hemp), *Asclepiascurassavica* (redheaded

cotton bush), *Calotropis precera* (king's crown) [7].

Cerebra manghas (sea mango), *Cheiranthus cheiri* (wallflower), *Cryptostegia grandiflora* (rubber vine), *Helleborus niger* (black hellebore), *Nerium oleander* (oleander), *Plumeria rubra* (frangipani) [8]. *Strophanthus hispidus*, *Strophanthus kombe* (strophanthus), *Urginea maritima* (squill) *Adonis vernalis* (adonis), *Asclepias friticosa* (ballon cotton), *Crissa spectabilis* (winter sweet), *Helleborus viridus*, *Thevetia peruviana* (yellow oleander) [9]. Even animal having venom glands *Bufo marinus* (cane toad) contain cardiac glycosides [10]. Recently, in the venom of the *B marinus* toad, digitalis like steroid was identified which is a previously described steroid, marinobufagenin. Marinobufagenin indicate high digoxin like immunoreactivity and was antagonized with an antidigoxin antibody [11].

2. Hypertension

The first drugs used on a large scale to treat systemic hypertension was Reserpine. It acts by irreversibly intercepting the uptake of biogenic amines (norepinephrine, dopamine, and serotonin) in the storage vesicles peripheral and central adrenergic neurons, thus leaving the catecholamines to be obliterated by the intraneuronal monoamine

oxidase in cytoplasm [12]. The reduction of catecholamines accounts for reserpine's sympatholytic and antihypertensive actions. Reserpine reduces the blood pressure by decreasing cardiac output, peripheral vascular resistance, and also renin secretion [1].

Rauwolfia alkaloids are not to be used in patients with previous hypersensitivity to these substances and in patients with a history of mental depression (especially with suicidal tendencies) and also in patients with active peptic ulcer disease or ulcerative colitis [14].

Veratrum (hellebore) is a herb grown in many parts of the world. Its varieties include *Veratrumviride* from Eastern US, *Veratrum californicum* from the western US, *Veratrumalbum* from Europe, and *Veratrum japonicum* from Asia [15]. Bradycardia, and Hypotension is caused by all *Veratrum* plants containing poisonous alkaloids [16].

Veratrum alkaloids increase sodium ion conductivity and thus enhance nerve and muscle excitability [17]. They act on the coronary sinus baroreceptors and posterior wall of left ventricle causing bradycardia via the vagus nerve and reflex hypotension [18].

3. Angina pectoris

Crataegus hawthorn, a name encircling many *Crataegus* species (such as *Crataegus oxyacantha* and *Crataegus monogyna* and *Crataegus pinnatifida*) is an important stimulant for the cardiovascular system that is principally useful for angina. *Crataegus* leaves, fruits, and flowers contain many biologically active substances, such as oligomeric procyanins, flavonoids, and catechins. From current studies, *Crataegus* extract turned out to have antioxidant properties and can inhibit the formation of thromboxane as well [19].

Also, extract of *Crataegus* antagonizes the increases in triglyceride, cholesterol, and phospholipid levels in LDL. It prevents cholesterol accumulation in the liver by enhancing cholesterol deteriorate to bile acids and also by suppressing cholesterol biosynthesis [20].

Parenteral and oral administration of oligomeric procyanins of *Crataegus* has been shown that it increases coronary blood flow. Double-blind clinical trials have shown simultaneous vasodilatory and cardiotropic actions of *Crataegus*. Also increases coronary perfusion and has a mild hypotensive effect further it antagonizes atherogenesis, and has positive inotropic and negative chronotropic actions. [21]

4. Atherosclerosis

Garlic (*Allium sativum*) has been used for centuries for its medicinal properties. Scientific community has examined garlic as a herbal medicine very closely. In recent decades, garlic has been in focus of research for use in preventing atherosclerosis. Herbs are found to be very effective on blood and heart related diseases that include lowering blood pressure, inhibiting platelet aggregation, enhancing fibrinolytic activity, reducing serum cholesterol and triglyceride levels, and protecting the elastic properties of the aorta [22].

Garlic has also been studied in patients having hypertension as a blood pressure-lowering agent. Similar to its lipid effects. In a recent study we observed the effect of the consumption of a fresh clove of garlic on platelet thromboxane production and revealed that after 26 weeks, serum thromboxane levels were reduced to 80%. In this way prevention of thrombosis in the future may be possible. Standardized garlic powder of 300mg/dl was given to the Participants in the trial (limited to those aged 50-80 years) for more than 2 years. The results suggested that the pulse-wave velocity and standardized elastic vascular resistance of aorta were less in the garlic group as compared in the control group. So, long-term use of garlic powder

may have a protective effect on the elastic properties of the aorta [23].

Garlic bulbs intact cells include an odorless, sulfur-containing amino acid known as *allinin*. When we crush garlic, allinin comes into contact with allinase, which gets converted into allicin. Allicin is highly odiferous and unstable but has potent antibacterial properties. Ajoenes, self-condensation products of allicin, is possibly responsible for garlic's antithrombotic activity. Fresh garlic releases allicin in the mouth during the chewing process, whereas dried garlic preparations lack allicin but contain allinin and allinase. Since stomach inactivate allinase, dried garlic preparations should be coated with enteric so that they pass through the stomach into the small intestine where allinin can be enzymatically converted to allicin [24].

5. Venous insufficiency

Aesculus hippocastanum, is used in Europe to treat venous disorders like varicose veins. The saponin glycoside aescin from horse chestnut extract (HCE) suppress the activity of lysosomal enzymes thought to contribute to varicose veins by weakening vessel walls and increasing permeability, which result in edema and dilated veins. Recent research study has shown that *A. hippocastanum* inhibits only against

hyaluronidase and not elastase, this activity is linked mainly to the saponin escin. HCE, in a dose-dependent fashion, increases venous tone, and lymphatic flow in animal studies [25].

Like *A hippocastanum*, *Ruscus aculeatus* is also used in treating venous insufficiency. In the Mediterranean region short evergreen shrub is commonly found *Ruscus aculeatus*. *R aculeatus* having two steroidal saponins, ruscogenin and neurogenin which is extracted from rhizomes are thought to be its active components. Moreover, topical *Ruscus* extract causes dose-dependent narrowing of venules without markedly affecting arterioles [26]. Also, *R aculeatus* exhibits powerful antielastase activity and has small effect on hyaluronidase in compared to *A hippocastanum*. This activity may contribute to their efficacy in the treatment of venous insufficiency as these enzyme systems are involved in the turnover of the main components of the perivascular amorphous substance [27].

6. Arrhythmia

Palpitations and abnormal pulse are characteristic symptoms of arrhythmias [28]. Patients having major symptoms like sick sinus syndrome, which include dizziness, palpitations, and chest pressure, improved

significantly after treatment. Although no serious side effects were noted [29]. Xin bao (herbal medicine from china) in the treatment of sick sinus syndrome is used. However, more scientific research on xin bao and other antiarrhythmic drugs are in progress [30].

RESULTS

Plants extracts and herbal medicines can be used to treat cardiovascular diseases thereby reducing premature disability and morbidity.

DISCUSSION

Here we discuss the main areas targeted for primary prevention of cardiovascular diseases, it's possible cure using natural herb, plants. Although the mechanism of the plant drugs are not much clear but there is enough evidence of their efficacy in various cardiovascular diseases.

CONCLUSION

The objective of cardiovascular prevention through herbs is to reduce premature disability and morbidity whilst prolonging survival and quality of life. Primary prevention continues to advance and with great availability of long term data comes improved understanding of the means by which we can reduce cardiovascular risk, Above all, the future clinical trials should address to the safety and toxicity of these herbal remedies.

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