



## HERBS FOR CARDIO VASCULAR SYSTEM

Achyranthes aspera  
Allium sativum  
Centella asiatica  
Inula racemosa  
Mimusops elengi  
Moringa oliefera  
Ocimum sanctum  
Phyllanthus niruri  
Terminalia arjuna  
Terminalia belerica  
Withania somnifera

### Allium sativum

The word garlic is derived from two old words – ‘gar’ meaning spear and ‘leac’ meaning herb. *Allium sativum* (Garlic) has been highly valued for centuries all over the world for its health-building qualities.

#### Antiatherosclerotic

To demonstrate the antiatherosclerotic effect of *Allium sativum* in a randomized, double blind, placebo-controlled clinical trial, the plaque volumes were determined on a test group of 152. Continuous intake of high-dose garlic powder significantly reduced the increase in arteriosclerotic plaque volume by 5-18% or even effected a regression within the observational period of 48 months. These results substantiated that not only a preventive but possibly also a curative role in arteriosclerosis therapy (plaque regression) may be ascribed to garlic remedies.

Inducible nitric oxide synthase (iNOS) has recently been shown to be present in human atherosclerotic lesions and to promote the formation of deleterious peroxynitrite. The aim of this study was to investigate the effect of allicin and ajoene on the iNOS system. Ajoene and allicin dose dependently reduced nitrite accumulation, a parameter for nitric oxide synthesis. Allicin and ajoene are active compounds with regard to the beneficial effects of garlic in atherosclerosis.

#### Antihypertensive

A study was designed to elucidate the antihypertensive effect of garlic. Since the hypertension depends largely on the increasing concentrations of vasopressor agents (prostaglandins and angiotensin II) there is a strong indication that reducing these factors could contribute in controlling the pathological rise in blood pressure. The study demonstrated that garlic used had a maximum antihypertensive effect 2-6 hr

after administration. The residual effect of this single dose continued for up to 24 h. The study suggests that garlic does have an effective antihypertensive ability, and may be used as a supplementary and natural remedy in cases of hypertension.

### **Achyranthes aspera**

Apamarg known to the research world as *Achyranthes aspera* traces its existence in manuscripts of Ayurveda and Chinese medicines. It is described in 'Nighantas' ancient Indian treatise as purgative, pungent, digestive, a remedy for inflammation of the internal organs, piles, itch, abdominal enlargements and enlarged cervical glands. The diuretic properties of this plant are well known to the India and European physicians.

Preclinical studies reveals that the saponins present in *Achyranthes aspera* shows stimulant action on the myocardium of rat and also increased the phosphorylase activity of the heart, the effect being comparable to that of adrenaline. These saponins also caused significant increase in force of contraction of the isolated hearts of frog, guineapig and rabbit. Achyranthine, a water- soluble alkaloid, present in whole plant of *Achyranthes aspera* is reported to dilate the blood vessels, lower the blood- pressure, depress the heart, and increase the rate and amplitude of respiration.

### **Inula Racemosa**

*Inula Racemosa* traditionally known as Pushkarmoola has been reported in ancient Indian literature to support healthy blood sugar and cholesterol levels. It is therefore also used as a cardioprotectant.

The traditional use is justified by scientific studies. *Inula racemosa* root powder was investigated in patients with proven ischaemic heart disease. The powder prevented ST-segment depression and T-wave inversion as observed in the post-exercise electrocardiogram. In human trials, a combination of *Inula racemosa* and *Commiphora mukul* was shown to be superior to nitroglycerin in reducing the chest pain and dyspnea associated with angina.

The petroleum ether extract of roots lowered plasma insulin and glucose levels within 75 min of oral administration to albino rats and it significantly counteracted adrenaline-induced hyperglycaemia in rats. The extract further showed negative inotropic and negative chronotropic effects on frog heart. All these findings indicate that one of the constituents of *Inula racemosa* may have adrenergic beta-blocking activity.

### **Ocimum sanctum**

*Ocimum sanctum* a well-known Indian herb has been used historically since the Vedic period in the treatment of a range of illnesses.

Therapeutic effect of Tulsi leaves on hypertension was tested on rats and dogs with induced hypertension and then on human subjects suffering from essential hypertension. 60 ml of 75 percent leaf extract administered orally in two halves resulted in a fall of diastolic as well as systolic pressure to the normal level with no adverse side effects.

*Ocimum sanctum* leaves were found to increase cell-mediated immune response, which is contributory to the adaptogenic action of this plant. *Ocimum sanctum* has been reported to modulate the humoral immune responses by acting at various levels in the immune mechanism such as antibody production, release of mediators

of hypersensitivity reactions and tissue responses to these mediators in the target organs.

### **Withania somnifera**

Ashwagandha botanically known as *Withania somnifera* is described in Ayurvedic literature, is as a "rasayana" or rejuvenating drug. The word Ashwagandha indicates the equine (of horses) odor of the plant. *Withania somnifera* is used in several indigenous drug preparations for maintaining health as well as treatment of several disease conditions.

Studies have shown that alkaloids exhibited prolonged hypotensive, bradycardiac, and respiratory-stimulating action in dogs. The hypotensive effect is due mainly to autonomic ganglion-blocking action. The depressant action on the higher cerebral centres also contributes to the hypotension. 56

Hypoglycemic, diuretic and hypocholesterolemic effects of roots of *W. somnifera* (ashwagandha) were assessed on human subjects. Six mild NIDDM subjects and six mild hypercholesterolemic subjects were treated with the powder of roots of *W. somnifera* for 30 days. Suitable parameters were studied in the blood and urine samples of the subjects along with dietary pattern before and at the end of treatment period. Decrease in blood glucose was comparable to that of an oral hypoglycemic drug. Significant increase in urine sodium, urine volume, significant decrease in serum cholesterol, triglycerides, LDL (low density lipoproteins) and VLDL (very low density lipoproteins) cholesterol were observed indicating that root of *W. somnifera* is a potential source of hypoglycemic, diuretic and hypocholesterolemic agents. Clinical observations revealed no adverse effects.11

Pharmacological and metabolic effects of ashwagandha (*Withania somnifera*) used in Ayurveda as a herbal tonic and health food were studied. Ashwagandha was shown to increase swimming time in rats in physical working capacity test, i.e. rats swimming endurance test. Significant increase in relative heart weight and glycogen content in myocardium and liver was also observed in ashwagandha treated group. Ashwagandha treatment increased the duration of contractility in functional test for the resistance of frog heart muscle towards the toxic action of strophanthin-K. Ashwagandha treatment also resulted in significant increase in coagulation time which attains normalcy 7 days after cessation of treatment. Ashwagandha possesses no toxicity up to a dose of (100 mg/kg; p.o. for 180 days) and does not cause significant changes in biochemical parameters in the blood serum of rats. Increase in catecholamine content in the heart and aortic tissues and their decrease in adrenal glands are unfavourable effects of high doses of ashwagandha. On the basis of these observations, it was concluded that ashwagandha possesses adaptogenic, cardiotropic, cardioprotective and anticoagulant properties.18

The effect of [*Withania somnifera*] extract on arterial blood pressure in 'normotensive' pentobarbital anaesthetized dogs was studied. Also a possible effect of [*Withania somnifera*] on blood pressure in dogs administered either with adrenaline and acetylcholine was investigated. Thirty mongrel dogs of both sexes were distributed randomly in three series of ten animals each. Each animal was administered at intervals of 4 min with either a neurotransmitter, saline or the extract until a cycle of 32 minutes was completed. It is concluded that the [*Withania somnifera*] extract induced a significant decrease ( $p < 0.05$ ) in the arterial and diastolic blood pressure in 'normotensive' pentobarbital anaesthetized dogs.

[*Withania somnifera*] also significantly prevented the hypotensive effect of acetylcholine and increased the hypertensive effect of adrenaline.<sup>54</sup>

Effect of *Withania somnifera* was examined on risk factors in convalescent angina pectoris was studied. The drug was administered in a capsule form (Cardipro) in twice daily dosage. A total of 30 unecom divided into two groups A and B of 15 each. Group's patients were given Cardipro (1 Cap BD) in addition to conventional antischaeamic therapy, while group B patients were put on conventional regimen alone. Risk factor profile particularly lipids and left ventricular ejection fraction (LVEF) and left ventricular mass (LVM) of each subject were assessed before starting indigenous therapy and again after three months of therapy. Administration of *Withania somnifera* resulted in significant reduction in systole and diastolic blood pressure and elevation in HDL cholesterol was observed at the end of 3 month in the indigenous drug treated patients. About 6.7 percent of patients in Group A development fresh ST-T changes and compared to 26.7 percent in the Group B. Significant improvement in LVEF and reduction LVM were also noted.<sup>95</sup>

### **Terminalia arjuna**

*Terminalia Arjuna* is a deciduous tree found throughout India growing to a height of 60-90 feet. The thick, white-to-pinkish-gray bark has been used in India's native Ayurvedic medicine for over three centuries, primarily as a cardiac tonic.

The effect of bark powder of *Terminalia arjuna*, an indigenous drug, on anginal frequency, blood pressure, body mass index, blood sugar, cholesterol and HDL-cholesterol was studied in angina patients before and 3 months after *Terminalia Arjuna* therapy. There was 50% reduction in anginal episodes. The time to the onset of angina after *Terminalia Arjuna* was delayed significantly. However patients with unstable angina needed other antianginal drugs along with *Terminalia arjuna*. The drug lowered systolic blood pressure and body mass index to a significant level and increased HDL-cholesterol along with marginal improvement in left ventricular ejection fraction in stable angina patients. There were no deleterious effects on liver or kidney functions. The results suggest that monotherapy with *Terminalia Arjuna* is fairly effective in patients with symptoms of stable angina pectoris.

Twelve patients with refractory chronic congestive heart failure, related to idiopathic dilated cardiomyopathy (10 patients); previous myocardial infarction (one patient) and peripartum cardiomyopathy (one patient), received *Terminalia Arjuna*, or matching placebo for 2 weeks each, separated by 2 weeks washout period, in a double blind cross over design as an adjuvant to maximally tolerable conventional therapy (Phase I). *Terminalia Arjuna*, compared to placebo, was associated with improvement in symptoms and signs of heart failure, increase in left ventricular stroke volume index and increase in left ventricular ejection fractions. On long term evaluation in an open design (Phase II), wherein Phase I participants continued *Terminalia Arjuna* in fixed dosage in addition to flexible diuretic, vasodilator and digitalis dosage for 20-28 months (mean 24 months) on outpatient basis, patients showed continued improvement in symptoms, signs, effort tolerance, with improvement in quality of life.

Effect of *Terminalia Arjuna* on angina pectoris, congestive heart failure and left ventricular mass was studied in patients of myocardial infarction with angina and/or ischaemic cardiomyopathy. *Terminalia arjuna* was administered to 10 patients of postmyocardial infarction angina and two patients of ischaemic cardiomyopathy for a

period of three months (Group A). These patients were also on conventional treatment comprising of nitrates, aspirin and/or calcium channel blockers. Twelve age-, sex-, body mass index- and ECG-matched patients of postmyocardial infarction angina receiving only conventional treatment served as controls (Group B). Significant reduction in anginal frequency was noted in both groups. However, only Group A patients showed significant improvement in left ventricular ejection fraction and reduction in left ventricular mass following three months of therapy. Both patients with ischaemic cardiomyopathy showed significant symptomatic relief in coronary heart failure. Prolonged administration of Terminalia arjuna did not show any adverse effects on renal, hepatic and haematological parameters.

### **Tribulus terrestris**

Tribulus terrestris Terrestris is an herb commonly known as "Puncture Vine" or Caltrop fruit, grown in various parts of the world and conventionally used as diuretic, antiurolithiatic, sexual tonic, painful micturition etc. Chinese herbalists have used it in the treatment of liver, kidney and urinary tract disease, and all types of skin disorders.

Coronary heart disease (CHD) was treated with saponin of Tribulus terrestris. According to 406 cases of clinical observation and a cross test (67 cases treated with Yufen Ningxin Pian as control), the results showed that the total efficacious rate of remission angina pectoris was 82.3%. It was higher than the control group with a total effective rate of 67.2% (P less than 0.05). The total effective rate of ECG improvement (52.7%) was even higher than that of the control group (35.8%). It is shown that saponin of Tribulus terrestris has the action of dilating coronary artery and improving coronary circulation, and thus has better effects on improving ECG of myocardial ischemia. If taken for a long time, it has no adverse reaction on blood system and hepatic and renal functions. Neither does it have side effects. It is one of the ideal medicines to treat angina pectoris.

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