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CARDIO PROTECTIVE ACTIVITIES OF HERBAL FORMULATION OF BHAVAMISHRA- A REVIEW

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ABSTRACT

Cardioprotection includes all mechanisms and means that contribute to the preservation of the heart by reducing or even preventing myocardial damage. Description about heart diseases delineated in Ayurvedic texts are very brief in comparison to cardiac diseases classified in modern medicine. Among cardiac diseases ischemic heart diseases are occupying second place among top ten diseases listed by World health organization WHO). A thorough scan of ayurvedic literature indicates that certain drugs (single and compound recipes) mentioned for the management of *Hridroga* found to possess antianginal, fibrinolytic, hypocholesterolemic, hypotensive, antioxidant and thrombolytic activities. In the present paper one of the reputed herbal formulations mentioned in *Bhavaprakashasamhitha* (16thcentury work) was taken up for enumerating scientifically validated activities of the individual drugs of the formulation. The modern scientific validations support the use of the herbal formulation as an effective cardioprotective.

Keywords: Antimicrobial activity, Antioxidant activity, Antiplatelet activity Cardioprotection, ,Herbal formulation, *Hridroga*, Hypolipidemic activity.

INTRODUCTION

Globally, Cardiovascular diseases (CVD) 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[1]. CVD is a group of disorders/diseases of the heart and blood vessels, including heart attack and stroke. Cardiovascular diseases include: coronary heart disease (heart attacks), cerebrovascular disease, raised blood pressure (hypertension), peripheral artery disease, rheumatic heart disease, congenital heart disease, and heart failure[1]. The variety and scope of cardiovascular drugs have increased tremendously in the past few decades, and new drugs are being added annually. Therapeutic drug categories in CVD include antianginal drugs, anticoagulants, diuretics, antiarrhythmic drugs, hypotension and anticholesterol drugs[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 also great theoretical implications, because all adaptive and compensatory mechanisms that directly or indirectly contribute to myocardial preservation have to be classified as "cardioprotective"[3].

Historically heart and its disorders have been mentioned in the Vedas (Rigveda& Atharvaveda)[4]. Thereafter it has been described in Chikitsasthana of Chara-

ka,Susrutha and Vagbhata's Ashtangahridaya and Ashtangasangraha. *Hridaya* is the origin or seat of *Pranavaha* and *Rasavahasrotas*[5] and is one among the three important marmas(vital spots) in human body[6]. The human body is nourished by Sudharakta circulated by *Hridaya* with the help of *Vyanavayu*[7]. Acharya Charaka mentioned about the five types of *Hridroga* nearly 2500 years ago. Charaka discusses about the role of improper exercise, stress, physical and mental trauma, excessive use of *Tikshna ahara*(pungent and spicy foods) and *Amadosha* (Undigested substances which act as toxin)in the etiology of *Hridroga*[8].Many medicinal plants like, Arjuna (*Terminalia arjuna*), Guggulu (*Commiphora mukul*), Pushkaramoola (*Inula racemosa*), Kushta (*Saussurea lappa*) which are indicated in the treatment of *Hridroga* are extensively studied for their cardioprotective effects. This review discusses about the modern scientific validations supporting the cardioprotective activity of individual drugs of a Classical Yoga from Bhavaprakashasamhita.

METHODS AND MATERIALS

Ayurvedic classics, compendia and journals are thoroughly reviewed for compiling the relevant data with regard to the drugs of formulation mentioned by Bhavamisra.

DESCRIPTION OF THE YOGA

The yoga consists of Harithaki (*Terminalia chebula*), Vacha (*Acorus calamus*), Rasna (*Alpinia galanga*),Pippali(*Piperlongum*),Nagaram/Shunthi(*Zingiber officinale*), Shati (*Hedychium spicatum*) and Pushkaramool (*Inula racemosa)*[9]. According to Acharya Susrutha Harithaki(*Terminalia chebula*) is the best drug to be used in *Santharpanotha vikaras*[10] (diseases due to impaired fat metabolism) and is indicated in *hridroga* by Bhavamisra[11]. Vacha (*Acorus calamus*) is included in *Lekhaneeya Dashemani* by Acharya Charaka which acts as *Kaphamedohara*[12]. Rasna is the best *Vatahara* drug according to Charakasamhitha[13] and has *Amapachana* property[14] .Pippali Is *Kaphapithahara*, *Deepana*, *Vrishya* and *Rasayana*[15]. Piperine the pungent alkaloid present in piper longum acts as a bioavailability enhancer[16].Shunthi is *Pachana*, and indicated in *Hridroga*.[17] .Shathi is *Laghu*, *Grahi* and is indicated in *Sopha*, *Swasa* and *Soola*[18]. Pushkaramoola is *vatakaphahara* and is specially indicated in *parswasoola* and *hritsoola*[19].

Table:Ingredients along with Part used and Major Chemical constituents of yoga[20]

Drugs	Botanical source	Part Used	Major chemical constituents.
Haritaki	*TerminaliaChebula*Retz Combretaceae	Fruit rind	Tannin,gallicacid, mucilage,chebulinic acid
Vacha	*Acorus calamus* Linn Araceae	Rhizome	**α & β** asarons, glucoside acorin ,calamine, calammenol, eugenol, calamol
Rasna	*Alpinia galanga* Linn Zingiberaceae	Root	Galongin,Kaempferol,eugenol, Cedrol,galand A&B galanolactone
Pippali	*Piper longum.*Linn.	Fruit	Piperine and

	Piperaceae		piperatine, alkaloids, tannins, phenols, coumarins, essential oil, piperlongumine, piper longuminine
Shunthi	*Zingiber officinale*Rosc Zingiberaceae	Rhizome	Volatile oil, gingerol, alkaloids,flavonoids,carbohydrates, proteins,glycosides,saponins, steroids,terpenoids . Aldose reductase inhibitors, curcumene, calamine
Shati	*Hedychium spicatum* Buch-Ham ex Smith Zingiberaceae	Rhizome	Hedychynone, 7- hydroxyhedychynone.
Pushkaramoola	*Inula racemosa* Hook.f Asteraceae	Root	Alantolactone,Isoalantolactone Inunolide, dihydroisoalantolactone inunolise, alantodiene.

HARITHAKI *(Terminalia chebula* Retz)

Cardio protective activity: Protective effect of *Terminalia chebula* against lysosomal enzyme alterations in isoproterenol-induced cardiac damage in rats was studied.. Pretreatment with an ethanol extract of *Terminalia chebula* was found to retain near normal activities of lysosomal enzymes in rats given *Terminalia chebula* or *Terminalia chebula* plus isoproterenol compared to rats given isoproterenol alone[21].

In vitro study with various extracts of the fruit rind showed cardiotonic activity in experiments with normal and hypodynamic isolated frog hearts. It increased the force of contraction and cardiac output without altering the heart rate[22].

Hypolipidemic activity: In a study on atherogenic diet induced hyperlipidemic model, the rats receiving treatment with Haritaki showed significant reduction in total cholesterol, triglycerides, total protein and elevation of high density lipoprotein cholesterol. The results also suggest that Haritaki at 1.05 and 2.10 mg/kg b.wt. concentrations provided significant lipid lowering activity.[23].

Antioxidant activity: A study on the Antioxidant activity of ethanolic extract of fruits of Terminalia chebula (500 mg/kg body wt, orally for 30 days) against isoproterenol-induced oxidative stress was investigated in rats. The pre-treatment with ethanolic extract of fruits significantly prevented the alterations induced by isoproterenol, and maintained a near normal antioxidant status. Results suggest that the cardioprotective effect of T. chebula fruit may partly be attributed to its antioxidant properties[24].

Six extracts and four pure compounds of *Terminalia chebula* were investigated for anti-lipid peroxidation, anti-superoxide radical formation and free radical scavenging activities. The superoxide radical scavenging activity of the 4 pure compounds was further evaluated using electron spin resonance (ESR) spectrometry. The results showed that all tested extracts and pure compounds of *T. chebula* exhibited anti-

oxidant activity at different magnitudes of potency[25].

Antimicrobial activity: In a study an ethanol extract of *Terminalia chebula* fruit was tested for its antibacterial activity against clinically important standard reference bacterial strains. The results showed that it was active against both gram-positive and gram-negative bacteria[26].

In another study the effect of ether, alcoholic and water extracts of black myrobalan *(Teminalia chebula Retz)* on Helicobactor pylori were examined using an agar diffusion method on Columbia Agar. Water extracts of black myrobalan showed significant antibacterial activity.Water extracts of the black myrobalan at a concentration of 1-2.5 mg/ml inhibited urease activity of H. pylori[27].

Antiplatelet activity: An investigation was carried out to assess the anti-platelet activity of crude methanolic extracts of *Grewia asiatica* L. leaves and *Terminalia chebula* Retz. fruits. Both crude extracts exhibited potent platelet aggregation inhibition activity in a dose-dependent manner at concentration range (1 to 10 mg/ml).[28]

VACHA(*Acorus calamus* Linn)

Hypolipidemic activity: Administration of the 50% ethanolic extract (100 and 200 mg/kg) as well as saponins (10 mg/kg) isolated from the extract demonstrated significant hypolipidemic activity. On the contrary, the aqueous extract showed hypolipidemic activity only at a dose of 200 mg/kg[29].

Antihypertensive activity: In a study in normotensive anesthetized rats, crude extract of *Acorus calamus* and its ethylacetate and nHexane fractions caused a fall in mean arterial pressure. In rabbit aorta rings. crude extract was more potent against high K(+) (80 mM), ethylacetate against phenylephrine (1 mu M), whereas nHexane fraction was equipotent against both precontractions, crude extract exhibited a vasoconstrictor effect oil baseline. Pretreatment of aortic rings with crude extract and its fractions shifted Ca(+2) concentration-response curves to the right, similar to verapanil. Crude extract and ethylacetate fraction suppressed phenylephrine peak formation in Ca(+2)-free medium. In rat aorta preparations, crude extract exhibited endothelium-independent relaxation with a vasodilatory effect against high K(+). nHexane fraction caused all endothelium-dependent N omega-nitro-L-arginine methyl ester-sensitive vasorelaxant along with ryanodine-sensitive vasoconstrictor effect on baseline tension and partially inhibited high K(+), although ethylacetate fraction caused an endothelium-independent relaxant and endothelium-dependent vasoconstrictor effect. These data indicate that crude extract possesses a combination of effects. Relaxant effects mediated possibly through Ca(+2), antagonism in addition to a nitric oxide pathway, although the associated vasoconstrictor effects may be meant by nature to offset excessive vasodilatation, thus providing a pharmacologic rationale to its cardiovascular medicinal uses[30].

Antimicrobial activity: Antimicrobial activity of *Acorus calamus* rhizome and leaf extracts obtained with different solvents viz., petroleum ether, chloroform, hexane and ethyl acetate was evaluated. Extracts obtained with ethyl acetate among others were found to be highly effective. Rhizomes and leaf ethyl acetate extracts exhibited pronounced antifungal activity as well as antiyeast activity. In addition, authentic A- and B-asarones were also tested for their antimicrobial potential. Both A- and B-asarones exhibited very strong antimicrobial activities against the fungi and yeasts than those of rhizome and leaf extracts.. Both rhizomes and leaf extracts,

however, had no antibacterial activity except E. coli[31].

Antioxidant activity: A study was conducted to find the phenolic content and antioxidant activities of methanol extracts of *Acorus calamus* leaves and rhizomes.. The leaf extract exhibited striking 2,2-diphenyl-1-picrylhydrazyl radical scavenging activity, ability of chelating ferrous ions, and reducing power, whereas rhizome extract displayed the strongest superoxide anion-scavenging activity. These activities of *A. calamus* leaf and rhizome extracts were comparable to the standard antioxidants used[32].

RASNA (*Alpinia galanga* Linn)

Cardioprotective activity:In a study albino rats were pretreated with vehicle, Galangin and Vit-C for 28 days. On 25thday, a single dose of Doxorubicin was administered to groups. After 72 h of Doxorubicin administration, ECG, serum and tissues biomarkers were evaluated. Histopathological examination of the heart was performed. Pretreatment with different doses of Galangin and Vit-C significantly reduced the serum biomarkers and increased the tissue antioxidant level when compared to Doxorubicin alone treated groups. Moreover, pretreatment also improved Doxorubicin induced changes in ECG pattern and histopathology of heart[33].

Antimicrobial activity: Methanol, acetone and diethyl ether extracts of *Alpinia galanga* have been evaluated against pathogens using Agar well diffusion method.. Methanol extracts have shown excellent activity towards all the pathogens. [34]

Antioxidant activity: In a study Ethanolic extract of *Alpinia galanga* showed the potent scavenging activity by DPPH method with the IC 50 value of 69.5±1.375 µg/ml, by lipid per oxidation method with the IC 50 value of 77±1.876 µg/ml, hydrogen peroxide radical scavenging activity with the IC 50 value 55±1.59 µg/ml, ABTS radical scavenging method with the IC 50 value 0.086±1.10 µg/ml[35].

Antiplatelet activity: *A.galanga* acts as a potential source of platelet –activating factor (PAF) antagonist. In rabbit platelets, methanolic extract showed significant inhibitory effects on PAF with IC_{50} value of 5.5µg/ml[36].

Hypolipidemic activity: The ethanolic extract of *A.galanga* is reported to possess hypolipidemic activity in rats. It caused reduction in the serum and tissue levels of total cholesterol, triglycerides, phospholipids and significantly increased the serum levels of high density lipoprotein(HDL) in rats. Effect of extract on lipid profile exhibited the efficacy of *A.galanga* in lowering the risk of arteriosclerosis[37].

PIPPALI(*Piper longum.* Linn.)

Antimicrobial activity: Three isolates of *Piper longum* were active against Gram-positive bacteria and moderately active against Gram-negative bacteria. Each isolate was highly active against at least one particular species of bacteria; piper longuminine against Bacillus subtilis, piperine against Staphylococcus aureus, and pellitorine against Bacillus sphaericus[38].

Anti-oxidant activity: Petroleum ether extract of root and piperine from roots of *Piper longum* were subjected for evaluation of their anti-oxidant activity by DPPH scavenging method. Lipid peroxide and Glutathione values in myocardial ischemic rats have also been estimated by inducing myocardial ischemia by using isoproterenol. The study shows that the extract of the root of the plant and piperine exert antioxidant activity and are protective in the myocardial ischemic condition[39].

Another study was conducted to find and evaluate antioxidant activities of proteins isolated from boiling water extract of *Pi-*

per longum. The antioxidant activity of the proteins was analyzed using Hydroxyl radical scavenging assay and lipid peroxidation inhibition assays. The proteins were analyzed for their thermal stability. The cytotoxic studies showed that, the proteins are non toxic. The results obtained are promising when compared with standard antioxidants Vitamin E, BHA, and Ascorbic acid[40].

Antiplatelet activity: In a study the inhibitory effects of four acidamides, piperine,pipernonaline, iperoctadecalidine, and piperlongumine, isolated from the fruits of *Piper longum* on washed rabbit platelet aggregation were examined. All of the four tested acidamides showed dose-dependent inhibitory activities on washed rabbit platelet aggregation induced by collagen, arachidonic acid (AA), and platelet-activating factor (PAF), except for that induced by thrombin. Piper longumine, in particular, showed stronger inhibitory effects than other acidamides to rabbit platelet aggregation induced by collagen, AA and PAF[41].

Cardioprotective activity:

Cardio protective effect of methanolic extract of *Piper longum* (MePl) was evaluated in a rat model having acute myocardial infarction, induced by Isoproterenol . MePl (250 mg/kg and 500 mg/kg) pretreatment orally for 28 days significantly prevents the damage induced by isopreterenol, is supported in histopathological examination evinced by decreased vacular and fatty degeneration, granular disintegration and hyaline necrosis of muscle fibers.[42]

SHUNTHI. ***(Zingiber officinale*Rosc)**

Antihypertensive activity: The antihypertensive effect of Pet ether extract (PE) of ginger rhizome; its toluenefraction (TF) and Korean ginseng extract (KGE) was investigated in deoxy corticosterone acetate (DOCA) – salt induced and fructose induced hypertensive rats. Chronic administration of PE , TF and KGE significantly reduced the blood pressure in DOCA salt whereas PE and KGE reduced the blood pressure in fructose induced hypertensive rats[43].

Antioxidant activity: The antioxidant effect and the total phenols of ginger extract were studied. The total phenols of the alcohol extract were found to be 870.1 mg/g dry extract. 2,2-Diphenyl-1-picril hydrazyl radical (DPPH) scavenging reached 90.1% and exceeded that of butylated hydroxytoluene (BHT).The ginger extract inhibited the hydroxyl radicals which showed a higher antioxidant activity than quercetin.. The ginger extract chelated Fe3+ in the solution[44].

Antiplatelet activity:In a study Some of the isolates from *Z.officinale* were subjected into the evaluation of their antiplatelet aggregation and vaso-relaxing bioactivities. Among the tested compounds, [6]-gingerol and [6]-shogaol exhibited potent anti-platelet aggregation bioactivity. In addition, [10]-gingerol inhibited the Ca^{2+} -dependent contractions in high K^{+} medium. [45].

Hypolipidemic activity: A study was done to evaluate the hypolipidemic effect of ginger in vanaspati fed rats. The administration of vanaspati augmented the total cholesterol, LDL-C, triglycerides levels and decreased the HDL-C level significantly. Simultaneous administration of ginger extract significantly prevented the rise in total cholesterol, LDL-C, triglycerides levels and rise HDL. In histopathological study, no significant changes were found in the liver and aorta of all treated groups as compared with control group. It is concluded that ginger extract showed hypolipidemic effect in vanaspati supplemented rats[46].

SHATI (*Hedychium spicatum* Buch-Ham ex Smith)

Antimicrobial activity: In a study Essential oil extracts from the rhizome of *H. spicatum* showed antimicrobial activity.Petroleum ether and chloroform extracts showed inhibitory activity against gram (+), gram (-) bacterial cultures, including a strain of methicillin and vancomycin resistant *Staphylococcus aureus* and fungal cultures[47].

In another study Terpenoid compositions of the rhizome of *H.spicatum* also showed significant antimicrobial activity against *Staphylococcus aureus*, *Shigella flexneri*, *Pasteurella multocida* and *Escherichia coli*[48].

Ethanol extract of fruits of *H. spicatum* was reported to possess antibacterial and antifungal properties against *Salmonella* sps. *Escherichia coli* and filamentous fungi[49].

Anti-oxidant activity: Terpenoid compositions of rhizome of *H. spicatum* were found to possess antioxidant activity. The rhizome essential oils of *H.spicatum* collected from three different regions exhibited\difference in the relative content of essential oils which were studied for their antioxidant activity by DPPH radical scavenging activity, reducing power, and effect on the chelating properties ofFe2+. The rhizome essential oil from all the regions exhibited moderate to good Fe2+chelating activity where as the essential oil exhibited a completely different DPPH radical scavenging activity.[50]

PUSHKARAMOOLA.(***Inula racemosa* Hook.f*)***

Cardioprotective activity: Assessment of the adrenergic beta-blocking activity of *Inula racemosa* was studied. *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. 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 hyperglycemia 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[51].

In human trials, a combination of *Inula racemosa* and *Commiphora mukul* (Pushkaraguggulu) was shown to be effective in reducing the chest pain and dyspnea associated with angina[52].

In another study Cardioprotection by *Inula racemosa* in experimental model of myocardial ischemic reperfusion injury was done in wistar male albino rats. Treatment with *Inula racemosa* significantly restored the myocardial anti oxidant status evidenced by increased superoxide dismutase, catalase, glutathione peroxidase, and reduced glutathione and prevented leakage of cardiospecific enzymes. Further more ischemic reperfusion induced lipid peroxidation was significantly inhibited by inula racemosa. The cardioprotective effect of Inula racemosa likely resulted to improved antioxidant status, haemodynamic and left ventricular contractile function subsequent to suppression of oxidative stress[53].

Extract of roots of the plant *Inula racemosa* 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 bodyweight) induced in the rats by isoproterenol administration. Lipid peroxides and glutathione contents were estimated. It has been found that the alantolactone effectively reduces the lipid

peroxide levels in the ischemic rats and bring the glutathione content to near normal level as compared to the petroleum ether extract[54].

Antimicrobial activity:In a study, attempt has been made for isolation of root constituents of *Inula racemosa* (Compositae) and evaluation of its antibacterial activity. The constituents were isolated and purified by column chromatography. The constituent alantolactone showed maximum antibacterial activity as compared to other constituents and ethyl acetate extract of the roots[55].

DISCUSSION

Among three bio humors, that is *Vata, Pitta* and *Kapha* it is referred by Acharyas of Ayurveda that vitiated *Vata I*nduces degeneration and death of every tissue and cell. *Vyanavata* a subtype of *Vata* which monitors the functions of heart is mainly involved in initiating the pathogenesis in the *Rasavaha srotas* leading to atherosclerosis and arteriosclerosis which contribute for ischemic heart diseases (IHD), and those conditions are more akin to *Vataja Hridroga*. Angina pectoris and myocardial infarction presents with pain and heaviness at cardiac region which reflect the vitiation of *Vata* which causes constriction of coronary blood vessels *(srotas)* and impedes flow of blood depriving the heart tissue from decreased oxygen supply. Pushkaramoola is listed among the prime drugs for the management of *Hikka* (Hi-cough),*Swasa* (Breathlessness) *Kasa* (cough) and *Parshwashoola* (Pain in the flanks).Compendia of medieval period clearly mentioned the application of Pushkaramoola in the management of *Hritshoola*(cardiac pain).Research studies confirmed that *Inula racemosa* (Pushkaramoola) significantly shown recovery from myocardial injury. Diabetes, one of the coronary profiles also can be controlled by *Inula racemosa*,which has shown significant hypoglycemic activity. Haritaki(*T.chebula*) and Vacha(*A.calamus*) by their hypolipedemic activity can prevent premature degenerative changes in coronary arteries by their lekhaniya activity and helps in preventing atherosclerotic changes.

Fruits like Haritaki, Pippali and rhizomes like Vacha and Shunthi facilitate for proper functioning of *Medodhatwagni* (metabolic component of fat) and helps in prevention of dyslipedimia which is one of the important factors of IHD. Shati and Pushkaramoola which are indicated in swasa play a significant role in controlling breathlessness. Four out of seven drugs in this formulation namely *T.chebula* (Haritaki), *A.galanga* (Rasna), *P.longum* (Pippali) and *Z.officinale* (shunthi) have exhibited anti platelet activity and helps in prevention of the formation of coronary thrombus and ensures a proper coronary arterial function. The drugs namely Vacha and shunthi have exhibited antihypertensive activity may play a crucial role in controlling hypertension which is enumerated under coronary profiles. The drugs like Harithaki (*T.chebula*), Vacha (*A.calamus*) Rasna (*A.galanga*) Pippali (*P.longum*) Shati(*H.spicatum*)and Pushkaramoola (*I.racemosa*) have shown antimicrobial activity which may help in the management of sub bacterial endocarditis and helps in prevention of inflammation due to ischemic injury. Five drugs namely Haritaki, Rasna, Pippali, Shunthi and Shati have more significant antioxidant activity and by their *Rasayana* activity they may act as cardiotonic or cardioprotective (Hridya) drugs. A careful review of the reported activities of individual drugs of classical formulation mentioned by Bhavamishra indicates that the formulation can

play a significant role in addressing the coronary profile like hypertension, obesity, diabetes and dyslipedimia. Clinical studies with this formulation in controlling stable angina gives a scope to consider the herbal formulation for its cardioprotective activity and can be recommended in ischemic heart disease[56].

CONCLUSION

A classical herbal formulation designed by Bhavamisra appears to be a judicious combination of cardiovascular drugs with hypolipidemic, hypoglycemic, antiplatelet, antioxidant and antihypertensive activities and protects the heart from ischemia. This ideal combination may be useful in prevention of stroke also. Evidence based data has to be generated by conducting randomized controlled clinical trials for incorporating it as a useful agent in the therapeutic armamentarium of Ayurvedic physician.

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