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Review Article

ROLE OF TERMINALIA ARJUNA IN ISCHEMIC HEART DISEASE (HRIDAROGA): A REVIEW

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ABSTRACT

Now days, life is becoming very stressful and fast. As many diseases originate due to this hectic lifestyle. One of the important disease is *Hridaroga* (Ischemic heart disease), which is responsible for many deaths in early age. In *Ayurveda, Hridaroga* & their symptoms are described in many textbooks. Management of *Hridaroga* is also very critical and important. In modern medicine, only expensive interventional procedures are described but on the other hand, *Ayurvedic* herbs are better, cost effective & good therapeutic option for IHD *(Hridaroga*).

The review emphasizes on various properties of *Terminalia arjuna.* Many clinical & animal studies *on T.arjuna* show its effect on ECG changes, LV functions & myocardial ischaemic reperfusion injury-etc. Besides this it also has antiatherosclerotic, anticoagulant, anti-infarction, hypolipidemic & hypotensive properties. So, *Ayurvedic* drug (*T. arjuna)* is a better option for the treatment of IHD (*Hridaroga*) because it can improve the quality of life in individuals & potentially save millions of lives.

KEYWORDS: *Terminalia arjuna, Hridaroga,* Ischemic heart disease.

INTRODUCTION

Today, in this modern era, Ischemic heart disease (IHD) is a leading cause of morbidity and mortality. This problem is affecting all economic groups of society and also responsible for large number of deaths all over the world. So, IHD is now considered a modern epidemic.[1]

The main aim of this review article is to explore the scientific basis for the *Ayurvedic* treatment of IHD with *T. arjuna* because *Ayurvedic* substances may provide maximum benefit with cost effectiveness, minimum side effect & increase patient's compliance.

Definition

In *Ayurveda*, IHD or *Hridaroga*, is clinically characterized by chest pain produced by increased work load on the heart. The pain starts from sternum and radiates to the left arm, neck and upper part of the abd.[2]

Nidana (Etiopathogenesis)

In *Ayurveda*, *Kapha* (atherosclerosis), unhealthy lifestyle, excessive indulgences in sleep, lack of exercise, sedentary habits, eating *Kashaya* (astringent) & *Katu* (bitter) food and stress are major causes.[3, 4]

According to modern, heart suffers from ischemia either due to increased demand or decreased supply. Basically, ischemia is caused by the insufficiency of oxygen and reduced availability of nutrient substrates and inadequate removal of metabolites.[5]

Bheda (Types)

According to *Ayurveda*, there are 5 clinical descriptions of Ischemic heart disease (*Hridaroga*). 1) *Vataja*, 2) *Pittaja,* 3) *Kaphaja*, 4) *Tridoshaja*, 5) *Krimija*.[6]

Complications

According the clinical descriptions of IHD the main complications are angina, myocardial infarction, pulmonary embolism, arrhythmia, fibrillations, pericarditis, cardiogenic shock and sudden ischemic death.[7]

Management

The main aim of the treatment for all heart diseases is to promote *Agni* (bio-fire) and to purify the *Srotas* (channels) by *Panchakarma* (*Mridu sweda, Vamana & Langhana*) and use natural herbs that have hypolipedemic & antistress activity. There are many decoctions, medicated ghee, paste & powders for each type of diseases described in *Ashtanga Hridaya* & other *Ayurvedic* texts.[3,6]

The main formulations of *T. Arjuna* are *Kakubhadi choorna, Parthadyarista, Pushayanug choorna, Arjuna ghrit, Arvindasav, Ashwagandharisht, Devdarvyarishta etc.*[8]

Terminalia arjuna

All the names of *Arjun* is mentioned in Bhagavatgita'[8].Its bark contains B-citosterol, arjunic acid, arjunetin & fridelin. It also contains cal. Carbonate 34%, salts 9% & tannin 16%. It has *Kashaya* (astringent*) rasa, Laghu & Ruksha guna, Katu vipaka* (bitter) *sheet* (cold) *Veerya* with *Hridya prabhav* (cardiac effect).[9,10]

Most of the *Ayurvedic* formulations contain the bark of *T. arjuna*, one of the most popular herb for the precaution and management of various cardiovascular diseases. The stem bark of this plant is used for medicinal purposes.

Properties according to different *Samhitas*

T.arjuna is used in *Kaphapittajanya rogas*, helps in wound healing, join the bones & heamostatic due to *Kashaya* (astringent) property. It is cardiotonic, gives strength to cardiac muscles & improves cardiac function & rhythm. It increases peripheral resistance by constricting capillaries which leads to rise in blood pressure. It prevents accumulation of fluid & thereby reduces oedema. It reduces urinary discharges & relieving burning & pain during micturition. It is also effective in diabetes & gonorrhoea. Its bark is used in heart diseases with milk (by *Ksheerpaka* method).[11,12]

Scientific basis of *T. arjuna*

To explore the scientific basis for the use of *T. arjuna*, many pharmacological and clinical investigations are reviewed. It have been found that these studies include antiatherosclerotic, anti-infarction, anticoagulant & anticholesterol effects of *T. arjuna*. These all effects are cardioprotective and useful in management of IHD.

Clinical studies

The usefulness of *T. arjuna* in IHD (*Hridaroga*) has been confirmed in many clinical studies. It has found to be a mild diuretic without any cardiotonic action, but beneficial. Decoction prepared by its bark showed clinical improvement in patients of CHF (42%), essential hypertension (62%) & cirrhosis of liver (40%), respectively.[13]

It was further tested in 30 patients of stable angina pectoris. After 1 month, 10% patients did not require sublingual nitrate. ECG improvement was found in terms of reduction in depth of Q-waves & T-waves and changes in ST segment configuration, decrease in heart rate, correction of rhythm disturbance was also noted. A significant reduction in weight was also evident.[14]

In a study, 500mg of *T. arjuna* extract was administered twice daily in 25 patients with CAD. After 3 months, reduction in treadmill test response was observed in 6 patients with decrease in frequency of angina attacks and use of sublingual nitrates[15].

In another study, 500mg *T. arjuna* was administered twice daily to 20 patients, 15 had stable angina (gr. A) & 5 had unstable angina (gr. B). In both groups, patients experienced increase in LV ejection fraction and reduction in frequency of angina. Treadmill testing on 10 patients of stable angina showed moderate to mild changes after 3 months of therapy.[16]

In a double blind, crossover design, placebo controlled study, 500 mg of aqueous and alcoholic extract of the bark of T.arjuna was administered for every 8 hr to 12 patients of refractory chronic CHF (NYHA- classic). It was given in addition to maximal tolerable doses of conventional therapy. In this study, T.arjuna as compared with placebo was associated with following improvements- Symptoms and signs of heart failure, Improvement in NYHA classes (class iii), decrease in echo LV end systolic and end diastolic volume-etc. During second phase of study, (means 24 months) further improvement was found in all symptoms.[17]

In an other double blind placebo controlled study, *T.arjuna* is compared with ISMN in chronic stable angina patients. 58 patients with evidence of provokable ischaemia on the tread mill exercise test received *T. Arjuna* 500mg, isosorbide mononitrate 40mg/day or a matching placebo for 1 week. The treatment led to improvement in clinical & treadmill exercise parameters as compared with placebo. These

were similar to those observed with ISMN therapy and the extract was well tolerated.[18]

The antioxidant and hypocholesterolaemic effects of *T.arjuna* bark powder was compared with vitamin E, an known antioxidant, in a randomized control trial.105 patients were recruited and separated into three groups using lattin square design. Group 1 received placebo capsules, group 2 received vitamin E cap. (400 units/day) and group 3 received bark of *T.arjuna* (500 mg/day) in cap. In this study, *T.arjuna* exhibited a significant antioxidant effect in comparison with vitamin E.[19]

Animal studies

T.arjuna has also been reported to posses hypolipedemic effect in rabbits fed *T. arjuna* bark for 3 months.[20] In another study, rabbits fed bark of *T. arjuna* with a high cholesterol diet showed lesser increase in total cholesterol and triglycerides.[21] The chronic oral administration of *T.arjuna* also prevented oxidative stress associated with myocardial ischemic reperfusion injury.[22] An emulsion of *T. Arjuna* bark powder (10g/Kg) was given to rabbits orally for seven days. The treatment caused a significant increase in prothrombin time and decrease in platelet count. In a similar study with the alcoholic extract[23,24], there was no change in prothrombin time. A water soluble portion of the total alcoholic extract of *T.arjuna* was found to cause an increase in the force of contraction of a frog heart[25]. In later studies, both negative and positive ionotropic effects were observed in isolated perfused frog and rabbit hearts and isolated frog and rat Atria[26]. The extract consists of a mixture of substances capable of exerting both positive and negative ionotropic effects[27]. The aqueous extract of *T.arjuna* was also found to produce dose dependent sustained hypotension and bradycardia in dogs[28]. These observations led the authors to propose that the active constituent in the extract acts centrally.

In another study, it was observed that aortic prostaglandin E_2 like activity was enhanced in ischemic rabbit aorta. Pre treated with *T.arjuna* because PGE_2 causes coronary vasodilatation. This may explain the beneficial effect of *T.arjuna* in patients with coronary artery disease (CAD).[29] In a subsequent study, Abana a herbal formula containing *T.arjuna* significantly increased Creatinine Phophokinase (CPK), Glutamate Oxaloacetate, Transaminase (GOT), Glutamate, Pyruvate, Transaminase (GPT) and Gamma Glutamyl Transpeptidase in serum following myocardial necrosis. The beneficial effect of Abana was further evident form the reduction in mitochondrial enzymes .[30]

DISCUSSION

In recent years, traditional system of medicine including *Ayurveda* has been used in the management of IHD. *T. arjuna* is one of the popular *Ayurvedic* herb used by many practitioners for the prevention and management of IHD. According to *Ayurveda*, IHD is the outcome of stressful and sedentary lifestyle with wrong food pattern which leads to *ama* (i.e. hyperlipedemia) leading to *Dhamni pratichaya* (thickening of arteries) & *Dhamani kathinya* (hardening of arteries). The principal treatment is to promote *Agni* (bio-fire) and to purify all the channels by *Panchakarma* and to use natural drugs that have cardiotonic, hypolipedemic, anticoagulant and hypotensive properties. In all these studies, *T. arjuna* showed all these features.

In modern medicine, the treatment of IHD contains expensive interventional procedures, such as thrombolytic therapy and surgical recanalization. So, *T. arjuna* and other *Ayurvedic* herbs and drugs are best cost effective and acceptable therapeutic option for IHD.

The current review showed that *T. arjuna* provided relief in angina and its effect on ST segment changes & T-wave depression in IHD. There is no known side effect of this conventional therapy.

CONCLUSION

1. IHD is the outcome of sedentary lifestyle & faulty diet.
2. The principle treatment is to promote *Agni* (biofire) & to purify the channels (*Srotas).*
3. In the treatment of *Hridroga,* natural drugs should have cardiotonic, hypotensive, hypolipidaemic and haemostatic properties.
4. In modern, the treatment involves expensive interventional procedures but *T.arjuna* shows better & cost effective treatment.
5. The studies on *T.arjuna* shown improvement in LV function, ECG changes, decrease in prothrombin time, hypocholesterolaemic effect etc.
6. The widespread use of *T.arjuna* shows decrease in mortality rate by conventional treatment& improves quality of life.

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