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## A COMPARATIVE STUDY ON THE EFFECTS OF HERBAL AND CONVENTIONAL MEDICINE ON CARDIO VASCULAR DISEASE

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### ABSTRACT

*The present study has been carried out to determine the comparative effects of Terminalaya arjuna bark and Metoprolol on the sialic acid, MDA, LDH, SGOT, CPK and lipid profile in cardiac patients visited at Thanjavur Medical College, Thanjavur. The age of the subjects was 40-60years. Two groups of cardiac patients who were under herbal and conventional treatment for three months were chosen as test subjects. Fasting blood samples were taken and used for biochemical analysis. In Terminalaya arjuna bark treated group, the Sialic acid, MDA, LDH, SGOT, CPK, cholesterol, LDL, VLDL, TGL were significantly decreased 5.63%, 33%, 21%, 41.78 %, 12.34%, 12.%, 20 %, 6.1 %, 24% respectively, while HDL was significantly increased 6.8% when compared to Metoprolol treated group. The results of present study showed that Terminalaya arjuna bark had ability to reduce lipid markers which is a major risk factor for patients suffering from myocardial infarction. The results were also comparable with Metoprolol, the standard drug for myocardial infarction.*

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### Key Words

*Terminalaya arjuna bark,  
Metoprolol, cardio markers.*

## INTRODUCTION

Cardiovascular disease will continue to be a very important cause of mortality and morbidity (Horton, 1993). Cardiovascular disease is of multifactorial etiology, associated with a variety of risk factors for its development including hypercholesterolemia, hypertension, smoking, diabetes, poor diet, stress and physical inactivity amongst others.

During the last few decades, research data has prompted a passionate debate as to whether oxidation, or specifically, oxidative stress mediated by free radicals/reactive oxygen species (ROS)/reactive nitrogen species (RNS), is a primary or secondary cause of many chronic diseases. As a result, scientific resources have focused to a larger extent on the role that antioxidants could play to delay or prevent oxidative stress and consequently the incidence of chronic disorders. Oxidative stress induced by reactive oxygen species (ROS) is implicated in the pathogenesis of a variety of vascular diseases, including atherosclerosis, hypertension and coronary artery disease (Agarwal *et al.*, 2006).

*Terminalia arjuna* also called as Neer maruthu in Tamil, is a medicinal plant widely used by ayurvedic physicians for heart problems including angina, hypertension and deposits in arteries. It is thought to be a useful astringent, cooling, aphrodisiac, cardiogenic, and is used for ulcers, leucorrhoea, diabetes, cough, tumour, excessive perspiration, asthma, inflammation and skin disorders etc.<sup>[1]</sup> Maulik<sup>[2]</sup> in his study reported that powdered extract of the above drug provided very good results to the people suffering from Coronary heart diseases.

The cardioprotective effects of *Terminalia arjuna* are thought to be caused by the antioxidant nature of several constituent like flavonoids and oligomeric proanthocyanidins, while positive inotropic effects may be caused by the saponin glycosides. Its stem bark possesses glycosides, large quantities of flavonoids, tannins and minerals. Flavonoids have been detected to exert antioxidant, anti-inflammatory and lipid lowering effects while glycosides are cardiogenic, thus making *Terminalia arjuna*, a unique amongst currently used

medicinal plants. Experimental studies have revealed its bark exerting significant inotropic and hypotensive effect, increasing coronary artery flow and protecting myocardium against ischemic damage.<sup>[3]</sup>

Metoprolol is a selective  $\beta_1$  receptor blocker which is used in the treatment of several diseases of the cardiovascular system in allopathic treatment. The side effects, especially with higher dosages, include the following: dizziness, drowsiness, fatigue, diarrhea, unusual dreams, ataxia, trouble sleeping, depression, and vision problems.<sup>[4]</sup>

## METHOD AND MATERIALS

### Procurement of assay chemicals

The chemical used were of analytical grade and purchased from Southern India Scientific Company. Metoprolol was purchased from GlaxoSmithKline.

### Experimental design

A total of twenty patients who were suffering from myocardial infarction were selected from Thanjavur Medical College, Thanjavur. They were divided into two groups each with ten subjects. One group of cardiac patients were under herbal treatment and another group was under conventional treatment for three months.

Their ages was between 40 - 60 years. Equal number of subjects with normal physical and mental health was selected to serve as control in the same age group.

Group I: served as normal healthy control group

Group II: Heart patients treated with *Terminalaya arjuna* bark (200mg/day)

Group III: Heart patients treated with allopathic *Metoprolol* (100mg/day)

Fasting blood samples was collected and used for further biochemical analysis.

### Biochemical Analysis

Sialic acid level was determined by the method of Warren (1959) and expressed as  $\mu\text{g/ml}$ , Malondialdehyde was estimated by the thiobarbituric acid assay method of Nadigar and Chandrakala (1986) and expressed  $\mu\text{g/dl}$ . The activity of serum lactate dehydrogenase was measured by the method of King

(1965) and expressed as IU / L, the SGOT was estimated by the method of Reitman and Frankel (1957) expressed as IU / L, Serum Creatine Phospho Kinase was estimated by the method of Ochei & Kolhatkar (2000) and expressed as IU / L. Serum Cholesterol level was determined using the method of Allain *et al.*, (1974) HDL - Cholesterol by Steele BW *et al.*, triglyceride by Bucolo (1973). LDL and VLDL were calculated using the following formulae: LDL cholesterol = Total cholesterol – HDL + (TG/5) and VLDL cholesterol was calculated using the formula (TG/5).

### Statistical analysis

The results were presented as mean  $\pm$  SD. Data was statistically analyzed using student "t" test.

## RESULT

The present study was carried out to analyze the various biochemical parameters like Sialic Acid, Malondialdehyde, LDH, SGOT, CPK and lipid profile in normal and experimental groups. The observation made on different subjects of normal and experimental groups were compared.

Figure I shows the level of sialic acid, and MDA in normal, Metoprolol and *Terminalaya arjuna* treated groups. Sialic acid was significantly decreased (5.63%) in *Terminalaya arjuna* treated groups when compared to Metoprolol treated group. MDA was significantly decreased (33%) in *Terminalaya arjuna* treated groups when compared to Metoprolol treated group.

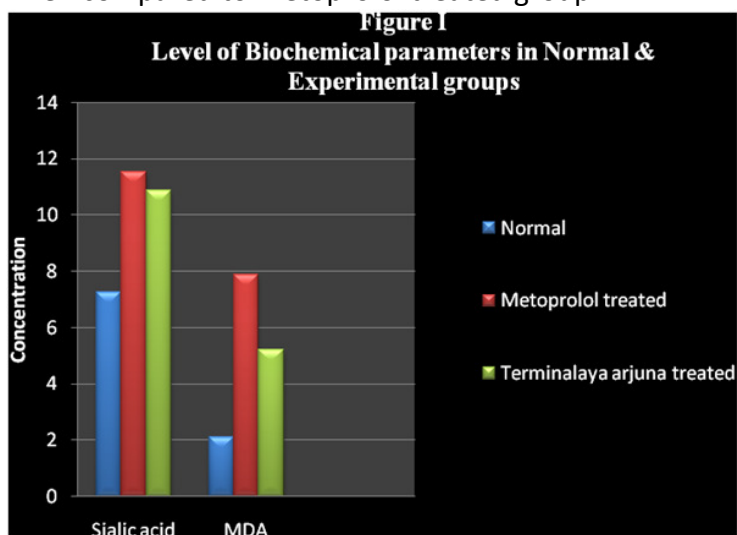


Figure II shows the level of LDH, SGOT and CPK in normal, Metoprolol and *Terminalaya arjuna* treated

groups. LDH was significantly decreased (21%) in *Terminalaya arjuna* treated groups when compared to Metoprolol treated group. The level of SGOT was significantly decreased (41.78 %) in *Terminalaya arjuna* treated groups when compared to Metoprolol treated group. The level of CPK was also significantly decreased (12.34%) in *Terminalaya arjuna* treated groups when compared to Metoprolol treated group.

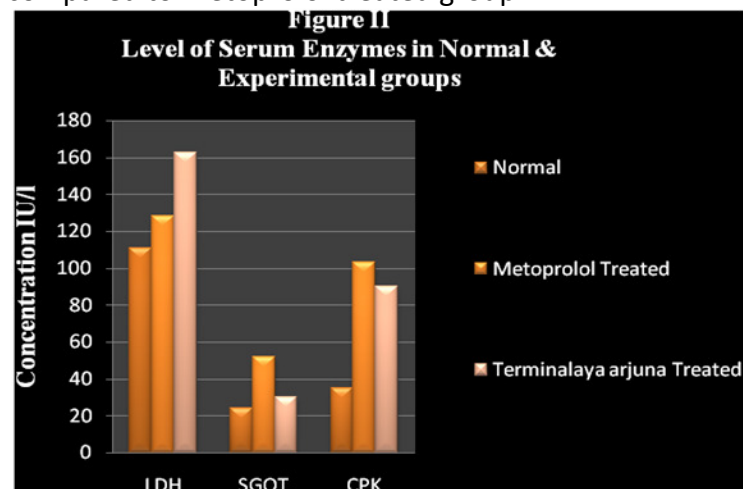
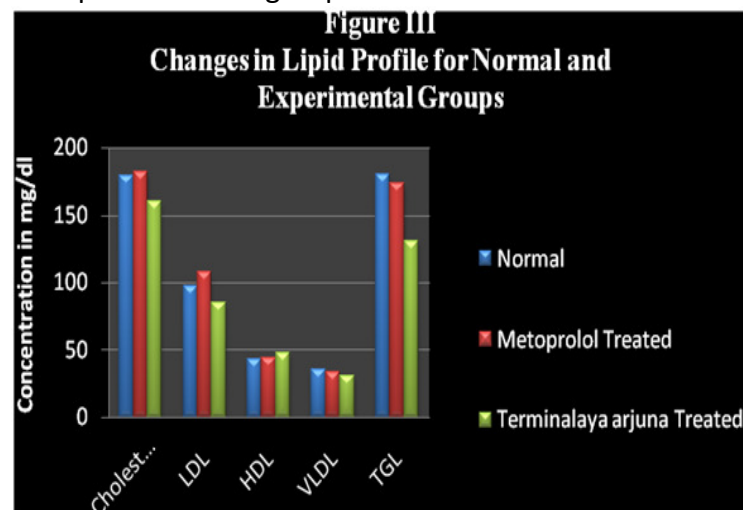


Figure III shows the level of lipid profile parameters like cholesterol, LDL, HDL, VLDL, TGL in normal, Metoprolol and *Terminalaya arjuna* treated groups. Cholesterol, LDL, VLDL, TGL was significantly decreased (12.08%, 20%, 6.1 %, 24%) in *Terminalaya arjuna* treated groups when compared to Metoprolol treated group. While the level of HDL was significantly increased (6.8 %) in *Terminalaya arjuna* treated groups when compared to Metoprolol treated group.



## DISCUSSION

The etiology of cardiovascular disease is generally associated with hypercholesterolemia, hypertension, poor diet, stress and physical inactivity (**Aviram, 2000**). Herbal remedies have been in use by people as a medicine that relieves disease.

The diagnosis of heart diseases is based on clinical symptoms, electrocardiographic changes and a characteristic pattern of changes in enzymes such as Creatine Phospho Kinase (CPK), Lactate Dehydrogenase (LDH), Transaminase (SGOT) (**Nigam, 2007**). The diagnosis of disease is measurement by the amount of enzyme released which depends on the degree of cellular damage. (**Vasudha et al., 2006**). The present study was carried out to determine the effects of *Terminalaya arjuna* (bark) on sialic acid, MDA, LDH, SGOT, CPK and lipid profile in patients having Myocardial infarction and compared with conventional drug Metoprolol to rule out the efficacy of *Terminalaya arjuna*.

The herbal remedies for cardiac disease were followed by many people in and around India. Bamosa *et al.* (1997) worked on the effects of oral ingestion of *Nigella sativa* seed on some blood parameters and reported a pattern of decreased levels of glucose and cholesterol. Qidwai *et al.* (2009) observed the effectiveness of *Nigella sativa* in dyslipidemia at Agha Khan University. The above researches supported the efficacy of herbal plants for cardiac diseases.

Studies have shown that serum sialic acid predicts both coronary heart disease and stroke mortality. Most of the studies have shown an elevation in serum sialic acid concentration in coronary heart disease. Serum sialic acid levels correlated with carotid atherosclerosis, independently of major cardiovascular risk factors (**Nigam et al., 2006**). In the present study treatment with herbal drug and conventional medicine to heart patients decreased the level of sialic acid. The herbal treatment has more potential to decrease the sialic acid content compared to conventional medicine.

Malondialdehyde (MDA) is the major aldehyde resulting from the peroxidation of polyunsaturated fatty acid present in biological membrane. MDA, a secondary product of lipid peroxidation and is used as an indicator of tissue damage by series of chain reactions. The study of lipid peroxidation is attracting much attention in

recent years due to its role as indicator of tissue damage. It has been implicated in the pathogenesis of a number of diseases and clinical conditions. Experimental and clinical evidence suggests that aldehyde products of lipid peroxidation can also act as bioactive molecule in physiological and pathological conditions. (**Lakshmi et al., 2005**). MDA is one of the indicators of oxidative stress. In the present study, treatment with *Terminalaya arjuna* and Metoprolol to heart patients decreased the level of MDA to near normal. The herbal treatment has potential to reduce the MDA content compared to Metoprolol, the conventional medicine.

The mechanism of action of *Terminalia arjuna* found to improve cardiac muscle function and subsequent pumping activity of the heart. It is thought that the saponin glycosides might be responsible for the inotropic effects of *Terminalia arjuna*, while the flavonoids and oligomeric proanthocyanidins (OPCs) provide free radical antioxidant activity and vascular strengthening. (Alan and Miller (1998)) In our present study the efficacy of *Terminalia arjuna* was also confirmed with decrease in cardiac marker enzymes such as SGOT, LDH and CPK in experimental subjects. The decreased activity of these enzymes might be by the above mechanism.

Studies by Dwivedi and Agarwal (1994) reported that *Terminalia arjuna* had 50 percent reduction of anginal episodes on patients with stable and unstable angina. Study conducted by Dwivedi and Jauhari (1997) on patients with post myocardial infarction and ischemic cardiomyopathy revealed that significant reductions in angina, left ventricular ejection fraction, and left ventricular mass in *Terminalia arjuna* treated group, whereas the control group taking only conventional drugs had decreased only angina. Ram *et al.* (1997) in their animal studies suggested *Terminalia arjuna* extract can reduce blood lipids.

*Terminalia arjuna's* lipid-lowering effects was due to inhibition of hepatic cholesterol biosynthesis, increased fecal bile acid excretion, and stimulation of receptor-mediated catabolism of LDL cholesterol (Khanna *et al.* (1996)) The animals treated with

*Terminalia arjuna* had a significant, dose related decrease in total and LDL cholesterol. In our present study decrease in concentration cholesterol, LDL, VLDL, TGL and increase in HDL in patients treated with *Terminalia arjuna* might be due to the presence of phytochemicals like flavonoids and oligomeric proanthocyanidins (OPCs).

From the experimental study it was suggested that *Terminalia arjuna* is very safe as compared with conventional medicine and herbal treatment is cost effective with no side effects for Myocardial Infarction.

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