Original Research Article

Evaluation of the Effect of *Termanalia arjuna* on Biochemical parameters in patients of Coronary Artery Disease

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Abstract: Coronary artery disease (CAD; also atherosclerotic heart disease) is the most common type of heart disease and cause of attacks. The disease is caused by plaque building up along the inner walls of the arteries of the heart, which narrows the arteries and restricts blood flow to the heart. Aim of present study was to see the effect of Termanalia Arjuna on Biochemical parameters in patients of coronary artery disease. The selected patients were divided randomly into two groups each comprised of 50 patients. Group-I-These patients were taken conventional treatment with placebo and served as the control group. Group-II These patients besides conventional treatment were given Terminalia arjuna (Arjuna Chhal) powder and served as the study group In our study it was observed that all the biochemical parameters except HDL-C should decline in study group after terminalia Arjuna (Arjuna Chhal) bark powder therapy and HDL-C level Increases after terminalia Arjuna bark power therapy in study group.
Keywords: terminalia Arjuna, Coronary artery disease

INTRODUCTION

Coronary artery disease is the most common type of heart disease and cause of heart attacks [1]. While the symptoms and signs of coronary artery disease are noted in the advanced state of disease, most individuals with coronary artery show no evidence of disease for decades as the disease progresses before the first onset of symptoms, often a "sudden" heart attack, finally arises. After decades of progression, some of these atheromatous plaques may rupture and (along with the activation of the blood clotting system) start limiting blood flow to the heart muscle. The disease is the most common cause of sudden death [2], and is also the most common reason for death of men and women over 20 years of age [3]. According to present trends in the United States, half of healthy 40-year-old males will develop CAD in the future, and one in three healthy 40-year-old women. Coronary artery disease has been defined as "Impairment of heart function due to inadequate blood flow to the heart compared to its needs, caused by obstructive changes in the coronary circulation to the heart" [4] the term occlusion signifies a sudden complete stoppage of coronary blood flow either in main artery or in one of its branches.

Atherosclerosis is a multifactorial process and consists of:-

Accumulation in intimal smooth muscle cell together with variable number of accumulated macrophages and T-lymphocytes

Formation of proliferated smooth muscle cell of large amount of connective tissue matrix, including collagen, elastin fiber and proteoglycan (Heparin Sulphate) and Accumulation of lipid, principally in the form of cholesterol ester and free cholesterol within cells and surrounding connective tissue [5, 6]. An Indian shrub, known as Arjuna, has been mainly used in Ayurvedic medicine to support cardiovascular health [7]. This Extract contains a variety of flavanoides and polyphenols, which help to reduce inflammation that cause plaque in the arteries [8]. It also supports healthy lipid profile [9].

Terminalia Arjuna is native to the Indian subcontinent. The deciduous tree could grow up to a height of 90 feet. For more than three hundred years,

the bark of the Arjuna tree is used in ayurvedic medicine as a cardiac tonic. The White to pinkish gray colored bark of the tree contains flavonoids, tannins, gallic acid, oligomeric proanthocyanidins, triterpenoid saponins, phytosterols, ellganic acid, magnesium, calcium, copper and zinc. Experimental studies and clinical trials indicate the usefulness of the active constituents of Arjuna bark in treating coronary artery disease and congestive heart failure. Intake of Terminalia Arjuna bark powder is associated with improved cardiac muscle function, which eventually boosts the pumping function of the heart. Scientists speculate that phytochemicals known as saponin glycosides help to improve the contraction of the heart muscles.

Oligomeric proanthocyanidins and flavonoids boost the natural antioxidant defense system of the heart and strengthen the vascular system of the body. Terminalia Arjuna might prevent atherothrombosis by inhibiting platelets aggregation in coronary artery disease patients [10, 11].
1. It helps to treat Angina.
2. It helps to lower blood pressure.
3. It is suitable for congestive heart failure.
4. It improves blood lipid profile and prevents atherosclerosis.

Arjuna has been a part of ayurvedic medicinal system. It is an herb that is of cool temperament and is Kapha and pitta modulator. It is cardiac restorative, promotes healing, helpful in treating aliments like tuberculosis and poisoning in the body and is effective in condition like overweight and urinary tract disturbances. Use of arjuna with milk in conditions like cardiac disorders, indigestion, fever, hemorrhages and bleeding and most importantly the fractures and related injuries. In last few decades many studies have been carried out by Indian Scientists and researchers to suggest the role of Terminalia Arjuna (Arjun Chhal) in coronary artery disease. All these uses of Arjuna Chhal in our society as mentioned also in our Ayurvedic literature created a great enthusiasm in our mind to go through this study to better serve the humanity by our own country product.

AIMS AND OBJECTIVES
1. To see the effect of Terminalia Arjuna on lipid profile in patients of coronary artery disease.
2. Whether it should be made as continued therapy in patients of coronary artery disease.

MATERIAL AND METHODS
This study was conducted in the Department of Physiology, S.P. Medical College, and Bikaner. Patients were selected from the Haldiram Moolchand Govt. Center for Cardiovascular research of P.B.M. Hospital and Mohta Rasayan Shala, Bikaner.

Type of Study: Randomised case-control study.

Selection of Patients:
This study was conducted in the Department of Physiology, S.P. Medical College, and Bikaner. One hundred patients of coronary artery disease were selected for this study attending the Haldiram Moolchand Govt. Center for Cardiovascular research of P.B.M. Hospital and Mohta Rasayan Shala, Bikaner within 15 days baseline investigation were completed. A detailed history of each patient was obtained as per the attached proforma.

Exclusion Criteria:
Patients suffering from liver disease, arthritis, Asthma, pulmonary tuberculosis, Malabsorption and non-co-operative patients were excluded from the study.

Method:
The selected patients were divided randomly into two groups each comprised of 50 patients. Coronary artery disease is diagnosed on the basis of ECG and other clinical findings.

Group-I
These patients were taken conventional treatment with placebo and served as the control group.

Group-II
These patients besides conventional treatment were given Terminalia Arjuna (Arjuna Chhal) powder and served as the study group.

Arjuna Chhal Powder: Arjuna Chhal powder was collected from Mohta Rasayan Shala.

Procedure:
Patients included in this study were asked to take 3gm of Arjuna chhal powder mixed in 250ml of milk and the milk were heated till it boils, and it was taken twice a day for one month regularly. Before starting Arjuna Chhal Powder baseline parameters were taken of every patients i.e. pulse, weight, and lipid profile. After one Month above parameters were estimated again. These under control group were also evaluated baseline and after one month for these above mentioned parameter.

SERUM LIPID PROFILE:
A.Estimation of Serum Triglyceride:
The quantitative estimation of serum triglyceride was done calorimetrically using enzymatic Kits (GPO-PAP with ATCS) provided by DCRC.

(b) EXTIMATION OF TOTAL CHOLESTEROL:
The quantitative estimation of total serum cholesterol was done calorimetrically using CHOD-PAP with ATCD enzymatic kit, supplied by DCRC.

(c) ESTIMATION OF HDL-CHOLESTEROL:

The quantitative estimation of HDL cholesterol was done calorimetrically using CE-Co-PAP enzymatic end point, supplied by DCRC.

(d) Estimation of VLDL cholesterol and LDL cholesterol
VLDL and LDL cholesterol were calculated by using Friedewald (1972)
Formula:
VLDL-C (mg/dl) + Triglyceride/5
LDL-C (mg/dl) = Total cholesterol- (HDL-C+VLDL-C)

OBSERVATION

Table 1: Total Cholesterol

	Pre Treatment	Post treatment	t/p
Control	227.38± 44.14	217.78± 52.28	0.99/ 0.34
Cases	235.02± 47.58	210.82± 41.36	2.71/ 0.007

Table 2: Serum Triglyceride

	Pre Treatment	Post treatment	t/p
Control	134.18± 41.82	132.6± 54.28	0.16/ 0.87
Cases	151.3 ± 49.92	124.08± 39.86	3.01/0.003

Table 3: HDL

	Pre Treatment	Post treatment	t/p
Control	41.36 ± 4.84	42.62± 5.09	1.26/ 0.210
Cases	42.34± 9.27	46.78 ± 6.52	2.77/ 0.006

Table 4: LDL

	Pre Treatment	Post treatment	t/p
Control	130.62 ± 29.60	125.62 ± 31.12	0.82/0.414
Cases	134.40 ± 25.16	121.5 ± 21.45	2.75/ 0.007

Table 5: VLDL

	Pre Treatment	Post treatment	t/p
Control	34.66 ± 9.69	30.80 ± 6.82	2.30/0.023
Cases	36.78± 11.93	30.86 ± 7.64	2.95/ 0.003

RESULTS
The body weight had shown decrease by 0.22% in study group after Arjuna chhal therapy. The total cholesterol had shown decrease by 10.2% in study group after Arjuna chhal therapy. The serum triglycerides had shown decrease by 17.9% in study group after Arjuna chhal therapy .HDL level had shown increase by 10.48% in study group after Arjuna chhal therapy. LDL level had shown decrease by 9.59% in study group after Arjuna chhal therapy. VLDL level had shown decrease by 16% in study group after Arjuna chhal therapy.

DISCUSSION
In our study it was observed that all the biochemical parameters except HDL-C should decline in study group after terminalia Arjuna (Arjuna Chhal) bark powder therapy and HDL-C level Increases after terminalia Arjuna bark power therapy in study group.

A report published in Journal of Research in Education in Indian Medicine (1988) has stated Arjuna to be shown to increase the HDL-C levels. Recent studies have shown a dose- dependent regulation of blood pressure and heart rate. There was also a slight

increase in the HDL-to-total cholesterol ratio and an overall improvement of the cardiovascular profile.

Role on Lipid Profile:

Hypolipidemic effects i.e. normalizing the increased lipid in blood is exerted by this medical herb. Increased triglycerides and cholesterol levels are normalized. It enhance the turn over cycle of LDL-cholesterol in liver by enhancing the synthesis of Apo-ß or LDL apoprotein and by inhibiting the oxidation of LDL. Lowering of Beta-lipoproteins lipids and increase in HDL component of lipid profile results from suppression of cholesterol biosynthesis in liver.

Dulivedi reports that a study described in a thesis by S. Khalil in 2005 found that Arjuna bark powder along with statin for 3 months resulted in a 15% decrease in total cholesterol, 11% in serum Triglyceride and 16% in LDL cholesterol. There was a minimal decline in Lipoprotein and nitrite levels. The results suggest that Arjuna may work synergistically with statin in hyperlipidaemia [12, 13].

Its protective cardio vascular effect was due to its combined vascular effect like hypolipidemic effects, drug dosage dependent reduction in heart rate and blood pressure. Subramaniam S et al finding in animals studies shows that therapy with Arjuna bark reduces the total cholesterol, LDL and triglycerides levels and increases the HDL or the good cholesterol level in the blood [14].

SUMMARY AND CONCLUSION

In our study we found that all the biochemical parameters except HDL-C had shown decrease in study group patients after Arjuna Chhal therapy. We found that there is no significant results in Body weight decrease in study group after Arjuna chhal therapy.

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