



## Anti-hyperlipidemic Activity of *Lannea coramandelica* Leaf Extract Against Experimentally Induced Hyperlipidemia in Rats

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### ABSTRACT

Hyperlipidemia and hypercholesterolemia are interrelated terms and the same course of disorders which raise the serum levels of cholesterol and triglycerides. Herbs are used for treating diseases and used in the traditional systems of medicines like Ayurveda. As science is evolving, research to prove the pharmacological activity of the herbs and establishing scientific proof is also important. *Lannea coramandelica* is a native plant for tropical countries like India. It is considered one of the lifesavers of the area with abundant polyphenols, flavonoids, gums and other chemical constituents. Most of the antioxidant chemical components like flavonoids are potent in treating and lowering lipids in the body and reduces the oxidative stress in the human body to process fats. *Lannea coramandelica* has been proven to have vast amounts of flavonoids and antioxidant principles. Current research has been designed to confirm the hyperlipidemia controlling property of *Lannea coramandelica* extracts. The *Lannea coramandelica* extract showed a better hyperlipidemic activity at a dose of 500mg/kg in both the events.

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that covers all the abnormalities in lipid profile of the person and associated symptoms. There are numerous associate diseases with hyperlipidemia like Atherosclerotic heart disease, Congestive heart failure, overweight, metabolic disorders like diabetes, endocrine dysfunction etc. considering the risk factors, hyperlipidemia is to be treated with caution and the defects in lipid metabolism and the enzymes used to digest lipids are to be adequately fortified using supplementation (Prashar and Venkataraman, 2010).

### INTRODUCTION

Hyperlipidemia and hypercholesterolemia are interrelated terms and the same course of disorders which raise the serum levels of cholesterol and triglycerides. But this is an umbrella term

Herbs are used for treating disorders and used in the traditional systems of medicines like Ayurveda. As science is evolving, research to prove the pharmacological activity of the herbs and establishing scientific proof is also essential (Soudahmini et al., 2005). Plants have been viewed as the source of chemical constituents for most of the moieties that are used as

drugs of choice for treating heart failures, tumours etc. Considering the side effects of synthetic drugs, herbs serve as alternatives for the treatment of diseases safely and effectively (Shiddamallayya *et al.*, 2010).

*Lannea coramandelica* is a native plant for tropical countries like India. It is considered one of the lifesavers of the area with abundant polyphenols, flavonoids, gums and other chemical constituents. It is used for toothaches, stomach aches and skin diseases externally. In folklore, the decoctions of the plant were used to treat seminal weakness and injuries to heal wounds. It is used to treat body pains and dyspepsia (Reddy *et al.*, 2011). The plant had screened earlier and proven for hypotensive activity, wound healing activity and antimicrobial activity.

Most of the antioxidant chemical constituents like flavonoids are potent in treating and lowering lipids in the body and reduces the oxidative stress in the human body to process lipids. *Lannea coramandelica* has been proven to have vast amounts of flavonoids and antioxidant principles. Current research has been designed to establish the hyperlipidemia controlling property of *Lannea coramandelica* extracts.

## RESEARCH DESIGN AND PROCESS

### Extraction

The leaves of the plant *L. coramandelica* were collected from a farm near our nativity and were authenticated. The herbarium sample was submitted in the college library for further reference. These leaves were dried in an oven at 45 c for 2 days. After ensuring the complete drying, these leaves were ground and finely powdered. The powder is used for extraction using distilled water by macerating them for five days with constant stirring for every 6hrs using a magnetic stirrer. The extract is filtered and concentrated by evaporating the water on a water bath until it yielded a paste-like consistency. The yield was calculated as 17.35%w/w (LCE).

### Induction of Hyperlipidemia

Albino wistar rats were used to study the anti-hyperlipidemic activity of the extract in two doses 250 and 500mg/kg body weight. The rats weighed around 200-210gm and were kept in normal conditions under conditioned air with free access to water. The rats were divided into five groups with the first group treated as a normal group which did not receive any drug or inducing agent but were given only saline 0.9% at 1.5ml/kg of a rat. The second group were assigned only induction agent without any drug treatment. Third, the fourth and

fifth group were given standard drug, Atorvastatin at 10mg/kg, lannea extract; LCE 250mg/kg and LCE 500mg/kg respectively, along with the induction agent. The rats were divided in such a way that each group contained five rats.

### Triton method

In this method, Triton is used as an inducing agent for hyperlipidemia (Prashar and Venkataraman, 2010; Kumar *et al.*, 2013). 220mg/kg of Triton was given to the animals through IV injection 30mins before the administration of the drugs and extracts (Sathivel *et al.*, 2008).

### High-fat diet method

In this method, cholesterol was used as a lipidemia induction agent. A mixture of cholesterol at a dose of 400mg/kg and cholic acid at a dose of 50mg/kg suspended in coconut oil was added to the diet for 20days daily. From 5 days after starting of the high-fat diet, Groups received drugs and extracts till the last day of the experiment.

On the last day of the experiment, rats were anaesthetized used ether, and the blood was withdrawn from the plexus. The samples were centrifuged and the serum was collected. It was estimated for the lipid profile which contained Triglycerides TG's, Total cholesterol TC's, High-density lipoproteins HDL's and low-density lipoproteins LDL's and very-low-density lipoproteins VLDL's according to standard procedures (Venkidesh *et al.*, 2010; Deguchi and Miyazaki, 2010).

## RESULTS AND DISCUSSION

The extracts had been tested for the anti-hyperlipidemic activity and the results were tabulated in tables. Table 1 gives us the Data of the serum lipid profile in Triton induced hyperlipidemia model. It shows clearly the elevation of TC, TG and LDL with the induction of lipidemia and lowering of HDL too. Hyperlipidemia was controlled and normalized with the help of extracts and it is comparably similar to the effect of standard drug, Atorvastatin. Also, it was identical in case of the high-fat diet-induced hyperlipidemia (Table 2). The high-fat diet also induced the lowering of HDL and elevation of TG, LDL and cholesterol. The extracts showed better control of the readings and lipid levels in the serum (Giriya and Lakshman, 2011; Reddy *et al.*, 2011).

The body weight changes were significant in Table 3. The rise in the body weight was prevented by the administration of the extracts and the standard drug. It was comparable to the drugs and was

**Table 1: Lipid profile in Triton induced method**

Groups	TC's	TG's	HDL	LDL	VLDL
Normal control	65.12±6.64	79.45±6.11	26.43±3.52	29.01±2.35	16.43±1.68
Triton	196.43±11.21	119.2±6.73	19.66±3.73	139.43±9.64	22.05±1.61
Triton+ atorvastatin	66.56±3.03	75.1±10.46	28.11±4.90	38.26±4.02	15.68±1.40
Hyperlipidemia	76.38±1062	81.00±5.85	21.42±2.54	66.32±4.76	17.39±1.71
LCE 250mg/kg					
Hyperlipidemia	81.82±5.94	90.7±7.23	22.26±2.95	52.69±5.21	18.2±1.08
LCE 500mg/kg					

**Table 2: Lipid profile in High-fat diet-induced method**

Groups	TC's	TG's	HDL	LDL	VLDL
Normal control	90.25±1.67	62.25±1.97	40.74±1.59	28.61±1.18	15.85±1.45
Standard atorvastatin(10mg/kg)	93.365±1.04	66.217±2.53	38.42±2.999	29.04±2.15	16.9±1.6
Hyperlipidemia LCE 500mg/kg	121.56±14.68**	70.231±1.90**	36.475±3.11	30.211±1.97**	14.76±1.9**
Hyperlipidemia LCE 250mg/kg	194.589±10.2**	96.382±3.01*	25.631±1.84	35.810±1.76**	19.91±2.8*
High fat-induced group	229.42±10.01**	127.629±2.68**	22.322±2.67	38.725±2.24**	26.35±2.4**

**Table 3: Bodyweight comparison in animals in both the methods**

Groups	0days	3days	6days	9days	12days	15days	18days	21days	25days	35days	45days
Normal	202.9	206.1	209.2	208.7	210.2	213.3	215.8	214.5	214.6	212.7	214.9
Triton induced	204.6	209.7	215.8	222.4	229.1	235.7	238.2	240.4	255.8	263.9	271.7
Fat induced	204.4	209.9	215.6	222.1	228.6	235.9	238.1	240.7	255.9	263.7	271.9
Standard	208.7	208.6	216.4	225.7	226.9	232.7	239.8	240.9	217.6	196.2	155.2
LCE 500mg/kg	208.8	208.9	216.5	225.9	226.8	232.9	239.7	240.6	217.5	195.8	155.3
LCE 250m/kg	207.2	210.5	220.6	224.6	229.3	236.2	239.3	219.8	224.1	215.4	209.6

significant too. It can be advocated that the lannea possess anti-hyperlipidemic activity in wistar rats (Kooti *et al.*, 2016; Shimoda *et al.*, 2003).

## CONCLUSIONS

The lannea extract showed a better hyperlipidemic activity at a dose of 500mg/kg in both the activities. Further research has to be done to prove the exact

mechanism of action of the extract to control the lipid levels in the serum and prevent unnecessary weight gaining of the animals.

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**Conflict of Interest**

The authors declare that they have no conflict of interest for this study.

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