

RESEARCH ARTICLE

Hypolipidemic activity of *Alternanthera ficoidea* Linn in Triton wr-1339 induced hyperlipidemic rats.

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ABSTRACT:

The increased lipid profile is the greatest risk factor for atherosclerosis and other associated complications. Currently, available allopathy medicine has related to the number of side effects. Medicinal plants for hyperlipidemia has no side effects and is relatively inexpensive and locally available. The antihyperlipidemic activity of ethanolic extract of leaves of *Alternanthera ficoidea* Linn against Triton wr-1339 induced hyperlipidemia in rats. *Alternanthera ficoidea* Linn administered at a dose of 200mg/kg (p.o) to the triton induced hyperlipidemic rats. *Alternanthera ficoidea* Linn shows a significant decrease lipid profile levels like serum cholesterol, phospholipids, triglyceride, LDL, VLDL and the significant increase in the level of serum HDL level.

KEYWORDS: *Alternanthera ficoidea* Linn, Hyperlipidemia. LDL, VLDL, HDL.

1. INTRODUCTION:

Hyperlipidemia is a highly predictive risk factor for atherosclerosis, coronary artery diseases and cerebral vascular diseases. Coronary heart disease and stroke. Hyperlipidemia is the primary cause of death due to elevated serum total cholesterol and characterizes by hyperlipidemia. Low density and very low-density lipoprotein cholesterol and decreased high-density lipoprotein levels¹. Hyperlipidemia associated lipid disorders are considered to cause atherosclerotic cardiovascular disease². Atherosclerosis (Sclero-hardening) of arteries is a generalized disease of arterial network known as a progressive and silent killer disease characterized by the formation of lesions called atherosclerosis plaques in the walls of large and or medium sized coronary arteries and reduces blood flow to the myocardium called coronary artery diseases (CAD)³.

Hyperlipidemia classified into a primary and a secondary type, which indicates the complexities associated with the disease. The primary disease may be treated using antilipidemic drugs, but the secondary type originating from diabetes, renal lipid nephrosis or hypothyroidism demands the treatment of the primary disease rather than hyperlipidemia. Medicinal plants play a significant role in the hypolipidemic activity, and literature suggests that the lipid lowering action mediated through, inhibition of hepatic cholesterol biosynthesis and reduction of lipid absorption in the intestine.⁴

In many developing countries, most hyperlipidemic individuals use medicinal plants as folk medicine to treat hyperlipidemia and prevent atherosclerosis. Therefore, there is a high interest, locally, in natural hypolipidemic substances derived from herbs. Vast numbers of plants have received attention in this regard and have been shown to lower plasma lipid levels.

Alternanthera ficoidea Linn is monoecious herb and is around 100-300 cm height. It probably cultivated in

India and China and found throughout India in waste places. It's widely spread in tropical and subtropical regions of the world. The common name of this plant known as green amaranth in English. This plant is growing under a wide range of climatic conditions, and they can produce leafy edible vegetables.⁵ Current industrial and public use of Amaranth plant has not only been linked to its recognized nutritional properties but also to its potential beneficial use as the therapeutic adjunct in diets for hypercholesterolemia susceptible individuals.

2. MATERIALS AND METHODS:

2.1 Collection of Medicinal plant:

Fresh leaves of *Alternanthera ficoidea* Linn collected from Gingee fort at Villupuram district, Tamil Nadu, India. The plant was identified by local farmers and authenticated by Dr.P.Jayaraman, Director, Plant Anatomy Research Centre (PARC) Tambaram, Chennai. A herbarium specimen of the plant (APCP-7/2015) preserved in the Department of Pharmacognosy for further reference.

2.2 Preparation of Plant Extract:

The leaves are shade dried, and pulverized and made coarse powder with the help of dry mechanical grinder, and passed through the sieve number 60. The powdered leaves were extracted by using cold maceration and followed by soxhlet method. The powder defatted with petroleum ether (40-60°C) cold maturation process and extracted with ethanol in Soxhlet apparatus. Extracts were evaporated to dryness and preliminary phytochemical screenings was done using the standard procedure⁶.

2.3 Animals:

Female Swiss albino mice weighing between 25-35gms were used for oral acute toxicity study(423) because it shows greater sensitivity to treatment. Male Wistar albino adult rats used for this pharmacological study. The animals were allowed to acclimatize to the environment for seven days and supplied with a standard pellet diet were collected from Hindustan Lever Ltd, Bangalore. Ethical clearance for the animal study obtained from Institutional Animal Ethical Committee (09MP03AUG2009) of CPCSEA (887/AC/CPCSEA).

2.4 Pharmacological Evaluation:

The Wistar albino rats were divided into four each group of six rats. The first group was given orally administered with 5% CMC. The second group given a single dose of Triton wr-1339 administered 400 mg/kg. with 5% CMC. After 72 hours of Triton injection received a daily dose of 5% CMC (p.o) for one week. Based on OECD- 423 guidelines extract value third group administered a daily dose of ethanolic extract of *Alternanthera ficoidea* Linn 200mg/kg suspended in 5% CMC (p.o) for one week, after inducing hyperlipidemia. The fourth group was received Fenofibrate 65mg/kg for one week⁷.

2.5 Collection of blood:

On the 8th day the blood was collected from the eye by aseptic retro orbital sinus puncture method, under mild ether anesthesia. The collected samples centrifuged for 10 minutes⁸⁻⁹ Then separate serum samples collected and its used for various biochemical parameters, Then animals were sacrificed with used decapitation with scissors method and collected the liver¹⁰

2.6 Liver lipid extraction:

The collected liver homogenized with 0.15M KCl in cold condition. And extracted with CHCl₃: CH₃OH (2% v/v). This lipid extract used for the estimation of lipid parameters¹¹.

2.7 Biochemical analysis:

The serum and liver were collected and assayed the parameters like total cholesterol, triglycerides, phospholipids, low-density lipoprotein (LDL), very low-density lipoprotein (VLDL), and high-density lipoprotein (HDL). Estimated the serum cholesterol levels by Zak's method¹². The triglyceride, phospholipids, LDL and VLDL and serum HDL evaluated by using standard methods^{13&14}

3. RESULTS:

Preliminary phytochemical tests of the ethanolic extract of *Alternanthera ficoidea* Linn revealed that presence of phytoesters, Alkaloids tannins, bioflavonoids, carbohydrates, saponins, and amino acids. In acute toxicity study, the ethanolic extract of *Alternanthera ficoidea* Linn did not produce toxicity up to the dose level of 2000mg/kg.

Table 1. Effect of Ethanolic Extract of *Alternanthera ficoidea* Linn on HDL, LDL, and VLDL in the serum of control and experimental rats.

Groups	Parameters Mean ± SEM		
	HDL	LDL	VLDL
Control	23.22± 2.31	24.67 ± 1.78	14.66 ± 2.51
Triton treated	17.70 ± 6.10a	154.52 ± 8.51 a	23.1 ± 2.01 a
Triton + <i>Alternanthera ficoidea</i> Linn (200 mg/ kg)	22.10 ± 3.11b	24.33 ± 3.51b	13.32 ± 2.11 b
Triton + Fenofibrate (65mg/kg)	24.30 ± 3.10 b	25.71 ± 3.34 b	14.3 ± 2.10 b

Values are in mean ± SEM; Number of animals in each group = 5; a p < 0.001 Vs Group I; b p < 0.001 Vs Group II.

Table 2. Effect of Ethanolic Extract of *Alternanthera ficoidea* Linn on Cholesterol, Triglycerides, Phospholipids in serum of control and experimental rats

Groups	Parameters Mean ± SEM		
	Cholesterol	Triglyceride	Phospholipids
Control	62.57 ± 5.52	73.30 ± 5.57	156.25 ± 9.32
Triton treated	195.22 ± 10.58a	115.1 ± 5.57 a	208.27 ± 10.81 a
Triton + <i>Alternanthera ficoidea</i> Linn (200 mg/ kg)	65.70 ± 5.53b	72.53 ± 5.96 b	176.70 ± 6.23 b
Triton + Fenofibrate (65mg/kg)	68.43 ± 2.51b	75.0 ± 11.01 b	160.54 ± 7.54 b

Values are in mean ± SD; Number of animals in each group = 5; a p < 0.001 Vs Group I; b p < 0.001 Vs Group II.

The results shown in Table 1, 2, 3 and 4. *Alternanthera ficoidea* Linn markedly lowers the levels of serum cholesterol and VLDL. The decrease in cholesterol level may indicate increased oxidation of mobilized fatty acids of lipolysis. The present study shows that all triton induced rats displayed hyperlipidemia as shown by their

elevated serum and liver cholesterol, triglyceride, Phospholipids, VLDL, LDL and also the reduction in the HDL level. It concluded that *Alternanthera ficoidea* Linn 200 mg/ kg treatment was effective lowers cholesterol, Phospholipids TG, VLDL, LDL and increases the HDL level.

Table 3. Effect of Ethanolic Extract of *Alternanthera ficoidea* Linn on Cholesterol, Triglycerides, Phospholipids in Liver of Control and Experimental Rats.

GROUPS	Parameters Mean ± SEM		
	Cholesterol	Triglyceride	Phospholipids
control	63.81 ± 1.73	61.23 ± 0.67	85.42 ± 0.51
Triton treated	265.0 ± 3.55a	113.5 ± 0.86 a	144.2 ± 0.93 a
Triton + <i>Alternanthera ficoidea</i> Linn (200 mg/ kg)	99 ± 1.31b	91.3 ± 1.07 b	90.5 ± 1.60 b
Triton + Fenofibrate ((65mg/kg)	88.52 ± 2.33 b	81.5 ± 1.89 b	75.24 ± 2.55 b

Values are in mean ± SD; Number of animals in each group = 5; a p < 0.001 Vs Group I; b p < 0.001 Vs Group II.

This model is widely used for many different aims particularly, in rats it has been used for screening natural or chemical hypolipidemic drugs Interestingly, the results of the present study show that extract of

Alternanthera ficoidea Linn produced a significant reduction in cholesterol level and also it reversed Triton induced hyper lipidemic in rats.

Table 4. Effect of Ethanolic extract of *Alternanthera ficoidea* Linn on HDL, LDL and VLDL in Liver of Control and Experimental Rats.

GROUPS	Parameters Mean ± SEM		
	HDL	LDL	VLDL
Group-I control	25.99 ± 1.14	21.52 ± 0.38	12.21 ± 0.38
Group-II Triton treated	19.23 ± 0.67a	176.20 ± 0.51 a	21.51 ± 0.51 a
Group-III Triton + <i>Alternanthera ficoidea</i> Linn (200 mg kg/1)	27.92 ± 2.01b	20.09 ± 3.06 b	18.09 ± 0.68 b
Group-IV Triton + Fenofibrate	36.46 ± 3.9 b	20.91 ± 2.1 b	13.56 ± 1.5 b

Values are in mean ± SD; Number of animals in each group = 5; a p < 0.001 Vs Group I; b p < 0.001 Vs Group II.

4. CONCLUSION:

Alternanthera ficoidea Linn administered a dose of 200µg/kg (p.o) to the triton induced hyperlipidemic rats. *Alternanthera ficoidea* Linn shows a significant decrease in the levels of serum cholesterol, phospholipids, triglyceride, LDL, VLDL and the significant increase in the level of serum HDL level. The antihyperlipidemic activity of *Alternanthera ficoidea* Linn (200 mg/ kg) against Triton Wr-1339 showed significant lipidemic activity when compared to hypolipidemic drug fenofibrate treated groups.

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