ISSN NO. 2320–7418 DOI: 10.22270/jmpas.V10I4.1067

International open access journal

Journal of Medical Pharmaceutical and Allied Sciences

Journal homepage: www.jmpas.com

Research article

Chloroform extricate of trianthema portulacastrum, whole plant: an anti-hyperlipidemic in atherogenic diet induced hyperlipidemic rats

Yada Divya [1]*, T. Sivakkumar [2], M. Sudhakar[1]

1. Malla Reddy College of Pharmacy, Maisammaguda, Dhulapally, Secunderabad, telangana state, India
2. Annamalai University, Annamalai Nagar, Chidambaram, telangana state, India

ABSTRACT

Hyperlipidemia is contemplated to be among the considerable risk factor that contributes to the severity as well as incidence of cardiovascular diseases. The Anti hyperlipidemic effect of Chloroform extricate of entire plant Trianthema portulacastrum has been studied in atherogenic diet induced hyperlipidemic rats. Group-I acted as controls (untreated), Group-II acted as atherogenic diet induced controls, standard Hypolipidemic drug (Simvastatin 4mg/kg) used for treating Group-III. The Chloroform Extricate of Trianthema portulacastrum were administered orally at 100mg/kg and 200mg/kg doses for Group IV and V respectively. Serum lipid levels were evaluated after oral administration of standard drug and Chloroform extricate of Trianthema portulacastrum (100mg/kg as well as 200mg/kg) respectively at experimental study's end. With 200mg/kg of Trianthema portulacastrum Chloroform Extricate treatment, significant reduction in serum lipid parameters like VLDL, LDL, triglycerides, total cholesterol levels and increased HDL level were seen hyperlipidemic rats as compared to control statistically. From these results, it is evident that, Chloroform Extricate of Trianthema portulacastrum entire plant treats hyperlipidemia and improves the liver lipid profile.

Keywords: Atherogenic diet, Trianthema portulacastrum, Hypolipidemic activity, simvastatin.

Received - 11/05/2021, Reviewed - 23/05/2021, Revised/ Accepted- 29/05/2021

Correspondence: Divya Yada*✉ yada.divya@gmail.com

Department of Pharmaceutical Chemistry, Malla Reddy College of Pharmacy, Maisammaguda, Dhulapally, Secunderabad, telangana state, India

INTRODUCTION

In the atherosclerotic lesions' commencement and progression, hyperlipidemia is the key factor. Arteries' atherosclerosis is an arterial network's generalized disease that is acknowledged as a silent killer and progressive disease described by the lesions formation which is known as atherosclerosis plaques in the medium or large sized coronary arteries' walls that decreases flow of blood to the myocardium - known as "Coronary Artery Disease (CAD)".[1]

Hyperlipidemia is associated with the atherosclerosis through numerous evidences. It has indicated by the study evidences in both humans and animals that deceleration of progression is possible when atherogenic triglycerides and lipoprotein's increased serum concentration are decreased that results in reducing CAD mortality and morbidity in CAD established patients as well as also newer CAD occurrences as well as mortality in without CAD established patients are also reduced.[2] In hyperlipidemia patients' treatment's primary aim is reducing the occurrence of further cerebrovascular diseases or cardiovascular diseases or development risk of ischemic heart diseases.[3] Presently, there is progressive demand for the medicinal plant treatment even though a huge number of synthetic drugs are available to treat, because synthetic drugs are related to various side effects like abnormal liver function, gastric flushing, dry skin, myositis, irritation, diarrhoea, nausea, and hyperuricemia.[4] Condiments, medicinal plants, fruits(daily use) have been identified as hyperlipidemic in Ayurveda(Indian traditional system).[5]

Trianthema portulacastrum (Aizoaceae), discovered nearly throughout India as a weed in wastelands and cultivated lands. In taste, this plant is bitter as well as utilized as laxative, stomachic, and analgesic as well as rural people utilized it for inflammation, blood

anemia, heart disease, and bronchitis. For treating the night blindness, dimness of sight, itching, and corneal ulcers, the plant root is used to the eye.[6] Isolation of various bioactive compounds from this weed is performed as well as extensively utilized against various diseases.[7] The herb decoction is utilized as a vermifuge (an anthelmintic medicine) as well as beneficial to treat rheumatoid arthritis. Against the hepatotoxicity induction, a significant protection is exhibited by the plant.[8] Earlier, T. portulacastrum antifungal activity and in albino rats, Trianthema protulacastrum hepatoprotective activity[9] against thioacetamide, and paracetamol intoxication are reported by the researchers. Also, in alloxan-induced diabetic rats, TP's methanolic extricate's hyperlipidemic and hypoglycemic activities were reported.[10]

MATERIALS AND METHODS

Collection of Plant material and Plant Extrication

The Trianthema portulacastrum plant was accumulated from the forests of Maisammaguda, Secunderabad located in the state of Telangana (India), shade dried and powdered mechanically. The plant specimen was certified by pharamacognosist of Osmania University and authenticated voucher Number 145 of the plant has been preserved in department for future use. The dried plant were then mechanically milled to coarse powder and extracted with dichloromethane (CHCl3) in Soxhlet's apparatus and the extract was evaporated to dryness under vacuum and dried in vacuum desiccators. Later stored in refrigerator.

Animals

This study's an ethical approval was acquired from the "Institutional Animal Ethical Committee" with an Approval no: CPCSEA/IAEC/JLS/11/11/19/14. Albino rats with average body weight from 150 to 250 g were utilized for conducting this study. They were procured from Sanzyme Bio-analytical lab, Plot no. 8 Sys.No.542, Kothur (V), Shameerpet, RR dist. Polypropylene cages were used for housing rats as well as standard conditions (12h dark and light cycles at 35-60 % humidity and 25±3°C) were used for their maintenance. Standard tap water and pellet feed were allowed ad-libitum.

Experimental methodology

The rats will be randomly assigned into 5 different groups (n=6).

Group I	: Normal diet ad libitum
Group II	: Atherogenic diet
Group III	: Atherogenic diet + Simvastatin (4mg/kg)
Group IV	: Atherogenic diet+ CHCl3 Extricate of Trianthema portulacastrum (CETP) (100mg/kg)
Group V	: Atherogenic diet+ CHCl3 Extricate of Trianthema portulacastrum (CETP) (200mg/kg)

After the treatment duration, on 30th day the animals will be sacrificed and the following parameters will be evaluated.

Induction of hyperlipidemia

For inducing hyperlipidemia, Bopanna et al.[11] reported method is utilized for preparing the Atherogenic diet (Table 1). There were 5 animal groups, with 6 rats each. Group-I rats acts with normal diet while Group-II to Group-V served orally with standard powdered animal food following without or with treatment for 30days. The feed produced as pellets was carefully put in the cage as well as supplied for 30days.

Table1. Normal and Atherogenic diet compositions.

Ingredients	Normal	Atherogenic
Protein (Milk powder)	20g	15g
Sucrose	3g	-
Carbohydrate (Wheat flour)	65 g	57.6 g
Fat (Butter)	5g	15g
Salts	4g	4g
Vitamin mix	1g	1g
Fiber	2g	2g
Coconut oil	-	5 m
Cholesterol	-	0.4 g
Total weight	**100g**	**100g**

Fecal cholesterol excretion

During the treatment's last 3days, fecal matter was gathered. $CHCl_3$: MeOH (2:1) used for extricating the powered and dried fecal matter. After that, for cholesterol contents, analysis of resultant extricate was performed in a way same as that of serum. Further, the fecal matter excreted cholesterol (mg/g) was estimated.

Biochemical assays for Serum lipid profile

At the experiment's end, the rats were anaesthetized by CO_2 inhalation method, blood was collected via carotid bleeding permitted to clot for 10min at room temperature. Next, for 10min at 1000 rpm it was centrifuged, the serum was kept at 4°C, utilized for assessing the Serum triglycerides (TG), total cholesterol (TC) using CHOD-PAP approach as well as "HDL-c (high-density lipoprotein-cholesterol)" through GPO-PAP approach utilizing standard enzymatic colorimetric kits acquired from "M/s Qualigens Diagnostics, Mumbai, India". Serum LDL-c was measured by utilizing the following formula [12]:

$$\text{LDL-cholesterol} = \text{total cholesterol} - [\text{HDL-C} + (\text{triglycerides}/5)]$$

VLDL-cholesterol [13] was either measured directly (after ultra-centrifugation) or calculated as total triglyceride concentration/5.
The following formula was utilized for calculating atherogenic index [14]

$$\text{Atherogenic index} = (\text{total cholesterol} - \text{HDL-C})/\text{HDL-C}$$

Statistical analysis

Results were represented as mean ± SD. Between the groups the difference significance was evaluated with the help of "ANOVA (one way analysis of variance)" following Dunnet's test.

RESULTS AND DISCUSSION

The chloroform extricate had been tested for the anti-hyperlipidemic activity and the results were presented in (Table-2), gives us the data of the serum lipid profile in Atherogenic induced hyperlipidemia model. Mean ±SEM used for expressing values, n=6. Using t-test, the intergroup variation between various groups was conducted by using "ANOVA (one way analysis of variances)".

$***p < 0.001$, $**p < 0.01$, and $*p < 0.05$.

Table2: Effect of Chloroform extricate of Trianthema portulacastrum

Groups	Cholesterol (mg/dL)	Triglycerides (mg/dL)	VLDL (mg/dl)	LDL (mg/dl)	HDL (mg/dl)	Atherogenic index
Control	94.4 ± 0.16	90.2±0.78	18.04±1.35	23.16±1.09	53.2±1.50	0.77
Atherogenic diet.	216.8±1.01	172.2±0.31	34.44±1.06	141.76±0.45	40.60±1.29	4.33
Simvastatin(mg/kg)	114.20±1.74***	106.60±0.54***	21.32±0.71***	22.68±0.84***	70.20±0.45***	0.62
CETP(100mg / kg)	198.4±0.13*	162±0.89*	32.40±0.58*	107.5±1.21*	58.5±0.82*	2.39
CETP(200mg/kg)	142.6±0.92**	149.2±0.96**	29.84±0.80**	48.36±0.40**	64.40±0.21**	1.21

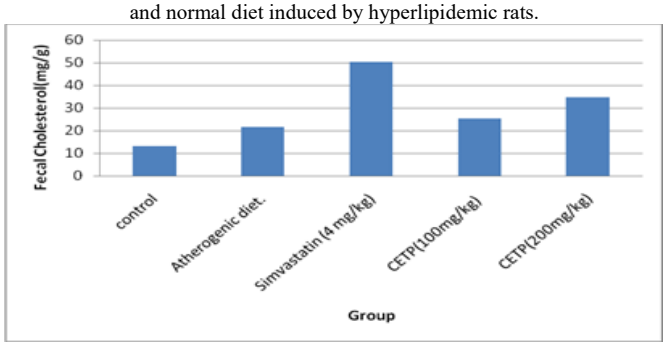
For the Hypocholesterolemic effect evaluation, we successfully used atherogenic diet induced hyperlipidemic model. In this study, it was observe that plasma HDL-cholesterol increases with other associated lipids' reduction. Hyperlipidemia was controlled and normalized with the treatment of chloroform extricate of Trianthema portulacastrum (200 mg/kg) significantly. Chloroform extricate at "100mg/kg ($p<0.05$), 200mg/kg ($p<0.01$)" doses as well as in comparison to Atherogenic diet control groups, a considerable rise in cholesterol excretion is shown by standard drug simvastatin 4mg/kg ($p<0.001$) (Table 3, Figure 1).The chloroform extricate of Trianthema portulacastrum (200 mg/kg) showed better control of the readings and lipid levels in the serum.

Table3: Effect of treatment of Chloroform extract of Trianthema portulacastrum entire plant on fecal cholesterol examination of atherogenic and normal diet induced by hyperlipidemic rats

Groups	Cholesterol (mg / 9)
Control	13.1± 0.16
Atherogenic diet.	21.7±1.01
Simvastatin (4 mg/kg)	50.20±1.74***
CETP(100mg/kg)	25.2±0.13 *
CETP(200mg/kg)	34.6±0.92**

Mean ±SEM used for expressing values, n=6. Using t-test, the intergroup variation between various groups was conducted by using "ANOVA (one way analysis of variances)". $***p < 0.001$, $**p < 0.01$, and $*p < 0.05$.

Figure 1: Treatment effect of Chloroform extricate of Trianthema portulacastrum entire plant on fecal cholesterol examination of atherogenic and normal diet induced by hyperlipidemic rats.



CONCLUSION

The Chloroform extricate of Trianthema portulacastrum entire plant showed a better hypolipidemic activities at 200mg/kg dose in Atherogenic diet induced hyperlipidemic models. Further research has to be done to prove the exact mechanism of action extricate to control the lipid levels in the serum and prevent unnecessary weight gaining of the animals.

ACKNOWLEDGEMENT

The authors are grateful to the "Malla Reddy College of Pharmacy" management for offering the requisite facilities for carrying out the research work.

REFERENCES

1. Brown MS, Goldstein JL, 1990. Drugs used in the treatment of hyperlipiproteinemia, In Goodman and Gilman, The p'cological basis of therapeutics. 8th ed., Maxwell MacMillan, International edition. New York, Bengmon Press. 874-96.
2. Brown SL, 1996. Lowered serum cholesterol and low mood. British Journal of medicine. 313, 637-638.
3. G Davey smith, J Pekkanen, 1992. moratorium on the use of cholesterol lowering drugs? Br. Med J. 304, 431-440.
4. Lal AA, Kumar T, Murthy PB, Pillai SK., 2004. Hypolipidemic effect of Corian drums sativum in triton induced hyperlipidemic rats. Indian J Exp Biol. 42, 909-12.
5. Amundsen AL, Ose L, Nenseter MS, Ntanios FY, 2002. Plant sterol ester-enriched spread lowers plasma total and LDL cholesterol in children with familial hypercholesterolemia. Am J Clin Nutr. 76, 338-44.
6. Chopra R N, S L Nayar, I C Chopra, 1956. Glossary of Indian medicinal Plants, CSIR, New Delhi. 246–248.
7. Kumar A, Saluja AK, Shah UD, Mayavanshi AV, 2007. Pharmacological potential of Albizzia lebbneck: a review. Pharmacogn Rev. 1, 171–174.
8. Sarkar A, S Pradhan, I Mukhopadhyay, S K Bose, S Roy, M Chatterjee, 1999. Inhibition of early DNA-damage and chromosomal aberrations by Trianthema portulacastrum in carbon tetrachloride-induced mouse liver damage. Cell Biol. Int. 23, 703–708.
9. Kumar G, G S Banu, P V Pappa, M Sundararajan, M R Pandian, 2004. Hepatoprotective activity of Trianthema portulacastrum L. against paracetamol and thioacetamide intoxication in albino rats. J. Ethnopharmacol. 92, 37–40.
10. Reddy R N R, M Porika, N R Yellu, R K Devarakonda, 2010. Hypoglycemic and hypolipidemic activities of Trianthema portulacastrum Linn Plant in normal and alloxan induced diabetic rats. Int. J. Pharmacol. 6, 2, 129–133.
11. Bopanna KN, Bhagyalakshmi N, Rathod SP, Balaraman R, Kannan J, 1997. Cell culture derived Hemidesmus indicus in the prevention of hypercholesterolemia in normal and hyperlipidemic rats. India J Pharmacol. 29, 105-109.
12. Noda Y, Kneyuki T, Igarashi K, Mori A, Packer L, 2000. Antioxidant activity of nasunin, an anthocyanin in eggplant peels. Toxicology. 148, 119–123.
13. Friedwald W T, Levy R J, 1972. Estimation of concentration of the preparative ultracentrifuge. Clin Chem. 18, 499-509.
14. Kayamori F, Igarashi K, 1994. Effects of dietary nasunin on the serum cholesterol level in rats. Bioscience, Biotechnology and Biochemistry. 58, 570–571.

How to cite this article

Yada Divya, T Sivakkumar, M Sudhakar, 2021. "Chloroform extract of trianthema portulacastrum l. whole plant: an anti-hyperlipidemic in atherogenic diet induced hyperlipidemic rats". Jour. of Med. P'ceutical & Alli. Sci. V 10 - I 4, 1067 P-3094-3096. doi: 10.22270/jmpas.V10I4.1067