CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.1421345

Available online at: http://www.iajps.com Research Article

ANTIHYPERLIPIDEMIC ACTIVITY OF CISSUS QUADRANGULARIS STEM EXTRACTS IN FRUCTOSE INDUCED AND TRITON-INDUCED HYPERLIPIDEMIC RATS

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Abstract:

Hyperlipidemia is a disorder of lipid metabolism which is major risk of coronary heart disease. Now day's synthetic drugs have been associated with number of side effects but herbal medicines have lipid lowering and antioxidant activities without any side effects. Some traditionally herbs like: - Terminalia Arjuna (Arjun), Commiphora mukul (Gugglul), Picrorrhiza Kurroa(Kutki), Allium Sativum (Lasuna), etc. are used as Antihyperlipidemic drug as per ayurvedic literature. The review article is undertaken to investigate the herbal Plants for Antihyperlipidemic activity and models use in this investigation. This review is given on the anti- hyperlipidemic activity of the most familiar medicinal plants of medicine. This matter may be helpful for the researchers, academician and preclinician about the potential herbs having anti-hyperlipidemic activity.

Keywords: *Hypolipidemic agents, Hypolipidemic medicinal herbs, Animal models, Phytoconstituents.*

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Please cite this article in press Y. Anil Kumar et al., ***Antihyperlipidemic Activity of Cissus Quadrangularis Stem Extracts in Fructose Induced and Triton-Induced Hyperlipidemic Rats.,*** *Indo Am. J. P. Sci, 2018; 05(09).*

INTRODUCTION:

Hyperlipidemia [1-3] is a secondary metabolic dysregulation associated with diabetes. Besides the cause effect relationship with diabetes, elevated serum level of triglycerides, cholesterol and LDL are major risk factors for the premature development of cardiovascular disease like arthrosclerosis, hypertension, coronary heart disease etc. Increased plasma lipid levels mainly total cholesterol; triglycerides and LDL along with decrease in HDL are known to cause hyperlipidemia which is the reason for initiation and progression of atherosclerosis impasse. Antihyperlipidemic agents having various pharmacological actions are being tested clinically. Elevated lipid levels result from increased absorption through the gut or enhanced endogenous synthesis and therefore two ways are feasible to reduce hyperlipidemia to block endogenous synthesis or to decrease absorption. Both factors can be evaluated in normal animals without artificial diets. Cissus quadrangularis is a perennial plant of the grape family. It is also known as veld grape, devil's backbone, adamant creeper, asthisamharaka, hadjod, pirandai, and patah tulang Cissus quadrangularis has been used as a medicinal plant since antiquity. Cissus has been used in various Ayurvedic classical medicines to heal broken bones and injured ligaments and tendons. In siddha medicine it is considered a tonic and analgesic, and is believed to help heal broken bones, thus its name asthisamharaka (that which prevents the destruction of bones). The Assamese people and the Garo tribe of Meghalaya and Bangladesh have used C. quadrangularis as a medicinal plant for bone fracture. A paper published in the World Journal of Gastroenterology in October 2010, on conflicts of interest in alternative weight loss product research, noted that at least three studies supported the safety and effectiveness of CQ for weight loss, but "lack financial disclosures or funding sources, beyond mentioning that the CQ being tested was provided by" General Health Alliances, an herbal products manufacturer. The studies did not disclose that one of its authors was a chief scientific officer for GHA that holds a patent on a CQ product. C. quadrangularis has been studied for its effects in a rat model for osteoporosis. C. quadrangularis has been studied in animal models of bone fracture. Its bactericidal effects on Helicobacter pylori indicate a potential use for treating gastric ulcers in conjunction with NSAID therapy. Several studies showed that systematic administration of triton –X-100 (ionic surfactant) in fasted rats causes elevation in plasma lipid level. Initially, there is a sharp increase in lipid level reaching a peak two to three times the control value by 24 h after the administration of triton injection phase I (synthetic phase),this hyperlipidemia falls within next 24 h i.e. 48 h after triton administration, phase II (Excretion phase). This increase in plasma lipid by triton is thought to be due to one of the following mechanisms; as due to increased hepatic synthesis of cholesterol or removal of very low density protein (VLDL) from the blood due to their physical alteration by triton. Antihyperlipidemic drugs interfering with cholesterol synthesis were shown to be active in phase I while drug interfering with cholesterol excretion and metabolism were active in phase II. Triton-induced hyperlipidemia [4-6] is rather simple and rapid for evaluation of test substance and can be considered as the useful method for preliminary screening of antihyperlipidemic drugs. The search for new drug with the ability to reduce or regulate serum cholesterol and triglyceride concentrations has gained momentum over the years, resulting in a plethora of publications reporting significant activity of a variety of natural and synthetic agents. Molecular modification of naturally occurring compounds has also given rise to potent agents like pravastatin and simvastatin; the former prepared by replacement of the methyl group of naturally occurring lovastatin by a hydroxyl group and the latter by a methylated derivative of compaction. In continuation of our search for plant-derived antihypercholesterolemic and hypolipidemic agents, we directed our attention to some Indian medicinal plants for which antihyperlipidemic activity has not been scientifically validated [7-10].

MATERIALS AND METHODS:

Plant extract

The powder of Cissus quadrangularis was subjected to successive solvent extraction using sohxlet apparatus the powder was extracted with ethanol extract was filtered through No.1whatman filter paper extract was then evaporated at 40.C to dryness, and stored at 40.C for further use. Extract was sticky in nature, green in colour and percentage yield was 5.6 w/w gm.

Animals

Adult albino rats of Wistar strain (150-200g) of either sex were procured and housed in the animal house of College of Pharmacy, Ankola with 12 h light and 12 h dark cycles. Standard pellets obtained from Goldmohar rat feed, Mumbai, India, were used as a basal diet during the experimental period. The control and experimental animals were provided food and drinking water ad libitum.

Preparation of standard drugs

Simvastatin 10 mg/kg was used as the reference standard drug for evaluating the antihyperlipidemic activity which was made into suspension in distilled water using 5% CMC as a suspending agent.

RESULTS AND DISCUSSION

Fructose induced hyperlipidemic model

The animals were selected, weighed then marked for individual identification. In this model, rats were made hyperlipidemic by the oral administration of Fructose (60%) 100mg/kg, for 7 days by mixing with regular pellet diet and rats were given free access to the feed ad libitum. The rats were then given plant extracts suspended in 5% CMC at the dose of 100mg/kg, 200mg/kg, 400mg/kg (p.o) once daily in the morning for 7 consecutive days. During these days, all the groups also received fructose diet in the same dose as given earlier. The control animals received the fructose diet and the vehicle. At the end of treatment period, the animals were used for the study of various biochemical parameters. Blood was collected by orbital plexus of rat under mild ether anesthesia and centrifuged by using centrifuge at 2000 rpm for 30 min to get serum.

Tab.1: Effect of Cissus Quadrangularis on total cholestrol Triglycerides HDL-C levels in Fructose induced rats.

S.NO	Groups	Total cholestrol	Triglycerides	HDL-C
I	Normal control	67.80±1.70	58.0±2.15	36.27±2.86
II	Hyperlipidemic control	191.1±3.05	167.3±2.90	29.1±1.06
III	CSQ (100mg/kg)	138.43±1.39	115.43±2.1	29.6±1.21
IV	CSQ (200mg/kg)	113.15±1.67 *	103.0±2.26*	38.0±0.58*
V	CSQ (400mg/kg)	99.81±2.20 **	85.52±2.9**	39.84±0.39**
VI	Simvastatin (10mg/kg)	81.16±2.2314 ***	77.0±2.49***	39.83±0.35***

Values were mean ± SEM (n=6). Values are statistically significant at *P and more significant at **P Vs hyperlipidemic control using one way ANOVA followed by Dunnet's test.

Tab.2: Effect of Cissus Quadrangularis on total cholestrol Triglycerides HDL-C levels in Fructose induced rats.

S.No	Groups	Total cholestrol	Triglycerides	HDL-C
I	Normal control	69±0.70	61.52±2.94	39.21±0.45
II	Hyperlipidemic control	176.6±2.06	155.31±0.79	17.7±0.91
III	CSQ(100mg/kg)	146.0±1.19	114.1±0.69	21.14±0.36
IV	CSQ(200mg/kg)	121.2±1.9*	101.41±0.47*	26.05±0.45*
V	CSQ(400mg/kg)	99.39±0.94**	89.13±0.39**	29.36±0.27**
VI	Simvastatin	87.15±1.05***	73.27±0.7***	31.7±0.6***

Values were mean ± SEM (n=6). Values are statistically significant at *P and more significant at **P Vs hyperlipidemic control using one way ANOVA followed by Dunnet's test

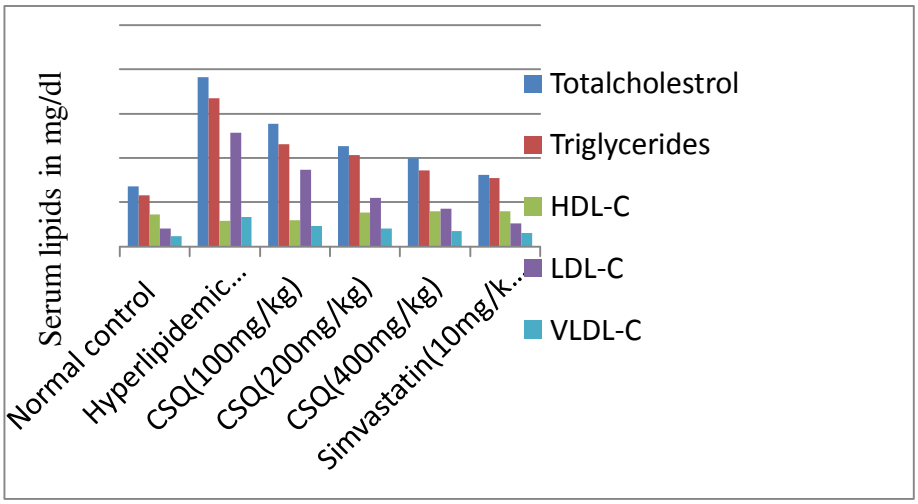

Fig.1: Effect of Cissus Quadrangularis on lipid profile levels in fructose induced rats.

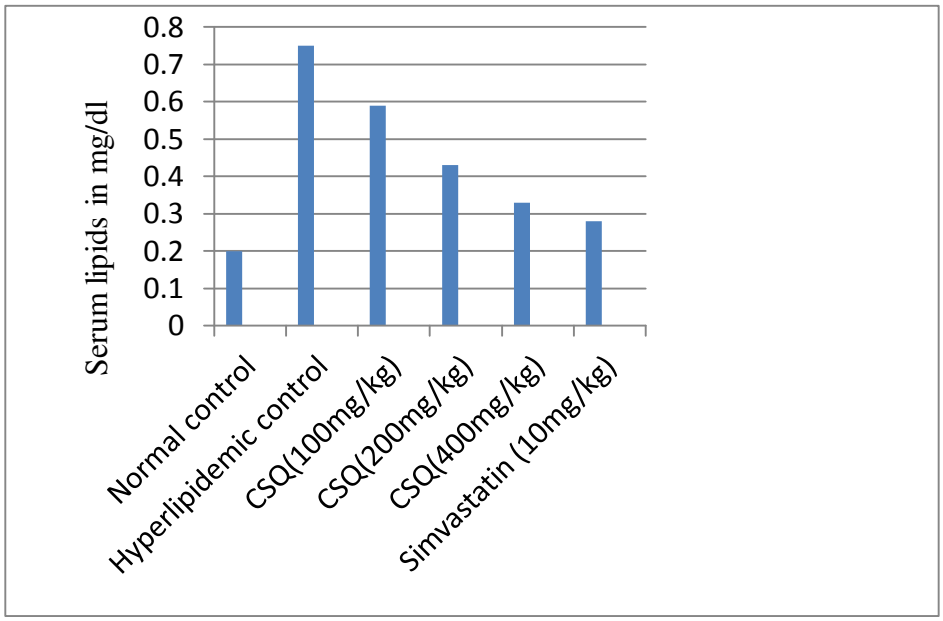

Fig.2: Effect of Cissus Quadrangularis on Atherogenic index in fructose induced rats.

Triton-induced hyperlipidemic model

Wister rats weighing 150-200gms were randomly divided into six groups each containing five animals. The first group was administered with 5% CMC along with normal feed and water. The II,III,IV,V,VI group animals were injected with 10% aqueous solution of triton 100mg/kg. After 72hrs of triton injection, the second group received daily of 5% CMC (p.o) daily for 7 days. The third, fourth, fifth, groups received daily doses of test compound (Cissus Quadrangularis) CSQ 100,200 and 400mg/kg suspended in 5% CMC (p.o) for 7 days. After treatment for 7 days, food is withdrawn 10hrs prior to blood sampling. On the 8th day blood was collected by retro orbital sinus puncture, under mild ether anesthesia. The collected samples were centrifuged for 20 minutes at 2500rpm.Then serum samples were collected, analysed for serum total cholesterol, triglycerides, High density lipoproteins (HDL-C), Low density lipoproteins(LDL-C), Very low density lipoproteins(VLDL-C) and atherogenic index were calculated.

Tab.3: Effect of Cissus Quadrangularis stem extract on serum total cholesterol, triglycerides and high density lipoprotien level in triton-induced hyperlipidemic rats.

S.No	Groups	Total cholestrol	Triglycerides	HDL-C
I	Normal control	69±0.70	61.52±2.94	39.21±0.45
II	Hyperlipidemic control	176.6±2.06	155.31±0.79	17.7±0.91
III	CSQ(100mg/kg)	146.0±1.19	114.1±0.69	21.14±0.36
IV	CSQ(200mg/kg)	121.2±1.9*	101.41±0.47*	26.05±0.45*
V	CSQ(400mg/kg)	99.39±0.94**	89.13±0.39**	29.36±0.27**
VI	Simvastatin	87.15±1.05***	73.27±0.7***	31.7±0.6***

Values were mean ± SEM (n=6). Values are statistically significant at *P and more significant at **P Vs hyperlipidemic control using one way ANOVA followed by Dunnet's test.

Tab.4: Effect of Cissus Quadrangularis extracts on LDL, VLDL and Atherogenic index level in triton-induced hyperlipidemic rats.

S.No	Groups	LDL-C	VLDL-C	Atherogenic index
I	Normalcontrol	17.49±0.5	12.30±0.58	2.19
II	Hyperlipidemic control	145.84±2.3	13.06±0.15	0.94
III	CSQ(100mg/kg)	102.04±2.02	22.82±0.13	0.73
IV	CSQ(200mg/kg)	74.87±1.7*	20.28±0.09*	0.59
V	CSQ(400mg/kg)	52.01±1.02**	17.82±0.07**	0.48
VI	Simvastatin (10mg/kg)	40.08±1.9***	14.65±0.14***	0.36

Values were mean ± SEM (n=6). Values are statistically significant at *P and more significant at **P Vs hyperlipidemic control using one way ANOVA followed by Dunnet's test.

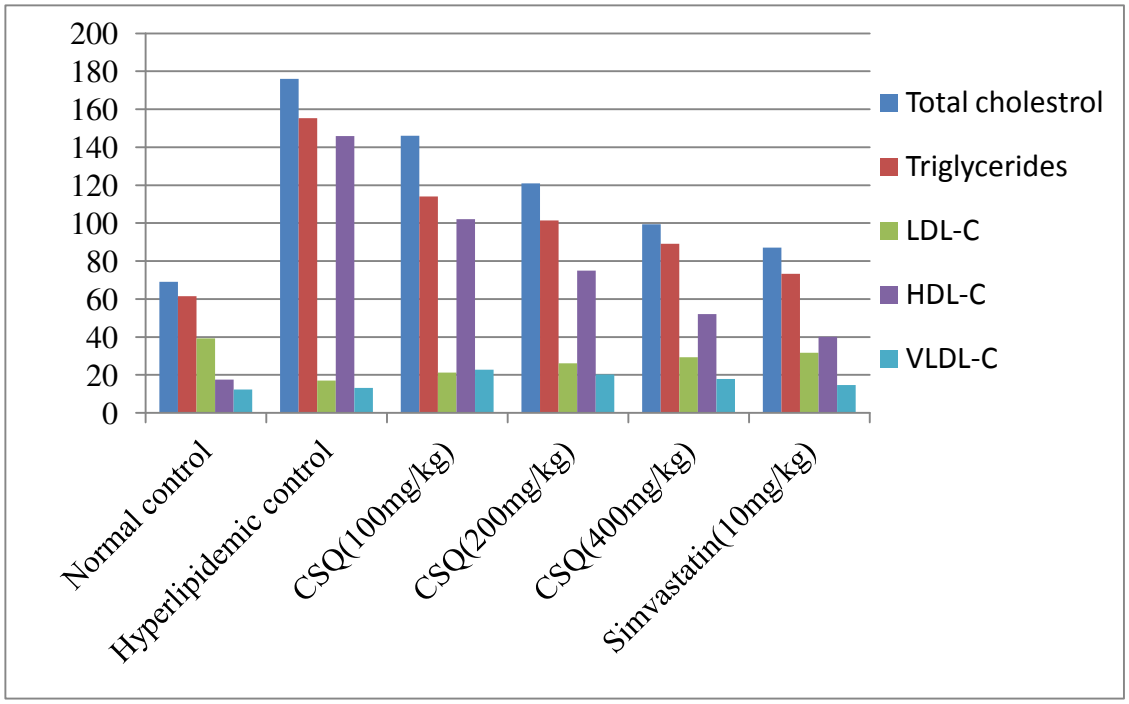

Fig.3: Effect of Cissus Quadrangularis on Total cholestrol, Triglycerides, HDL-C, levels in Triton induced hyperlipidemic rats.

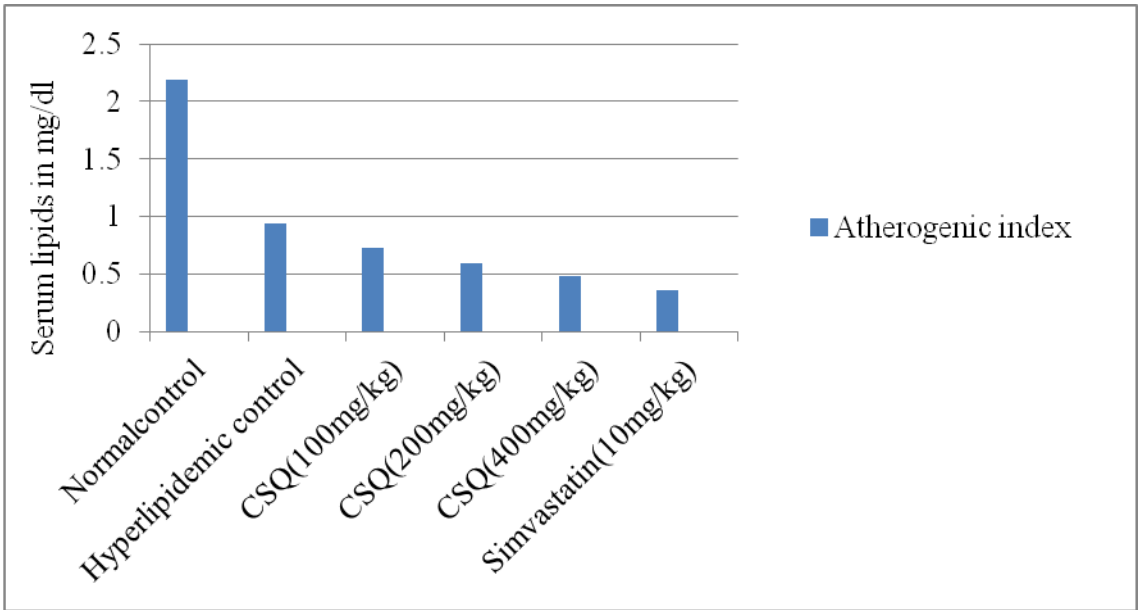

Fig.4: Effect of Cissus Quadrangularis on Atherogenic index in Triton induced hyperlipidemic rats.

Collection of blood

Blood was collected by retro-orbital sinus puncture, under mild ether anesthesia. The collected samples were centrifuged for 10 min.

Biochemical analysis

The serum was assayed for total cholesterol, triglycerides, phospholipids, high-density lipoprotein (HDL), low density lipoprotein (LDL), and very low density lipoprotein (VLDL) using standard protocol

method. Serum total cholesterol, triglyceride were estimated by the method of CHOD-PAP and high density lipoprotein by the method of GPO-PAP. Low density and very low density cholesterol were calculated by using Friedewald formula and VLDL: TG/5 respectively.

Statistical analysis

The results of the study were expressed as mean± S.E. Data was analyzed by using one way analysis of variance test (ANOVA) followed by Dunnett's t-test for multiple comparisons. Values with $P < 0.05$ were considered as significant.

CONCLUSION:

The results obtained from the pharmacological screening have led to the conclusions that, Ethanolic stem extract of *Cissus Quadrangularis* have significant antihyperlipidemic activity. Hence it can be exploited as an antihyperlipidemic therapeutic agent or adjuvant in existing therapy for the treatment of hyperlipidemia. Further study by measurement of heparin-releasable plasma LpL activity and LCAT activity is significant and can be undertaken.

REFERENCES:

1. Ansarullah, Jadeja RN, Thounaojam MC, Patel V, Devkar RV, Ramachandran AV. Antihyperlipidemic potential of a polyherbal preparation on triton WR 1339 (Tyloxapol) induced hyperlipidemia: A comparison with lovastatin. Int. J Green Pharm. 2009;3:119–24.
2. Ghule BV, Ghante MH, Saoji AN, Yeole PG. Hypolipidemic and antihyperlipidemic effects of Lagenariasiceraria (Mol.) fruit extracts. Indian J Exp Biol. 2006;44: 905-9.
3. Nomura H, Kimura Y, Okamoto O, Shiraishi G. Effects of antihyperlipidemic drugs and diet plus exercise therapy in the treatment of patients with moderate Hypercholesterolemia. Clin Ther. 1996; 18:196.
4. Inman WD, Reed MJ. In-ventors; Shaman Pharmaceuticals, assignee Triterpenoid compound for the treatment of diabetes. US Patent 5, 691, 386. 1997 Nov 25;
5. Gopalakrishnan S, Ismail ST, Begum HV, Elango V. Anti-inflammatory activity of Salaciaoblonga Wall.And Azimatetracantha Lam. J Ethnopharmacol. 1997;56:145–52.
6. Naveen A. Hepatoprotective activity of ethanolic extract of root bark of *Salacia chinensis*. J Pharm Res. 2010;3:833–4.
7. Sellamuthu PS, Muniappan BP, Perumal SM, Kandasamy M. Antihyperglycemic effect of mangiferin in streptozotocin induced diabetic rats. J Health Sci. 2009;55:206–14.
8. Yoshikawa M, Zhang Y, Wang T, Nakamura S, Matsuda H. New triterpene constituents, foliasalacins A_1-A_4, B_1-B_3, and C, from the leaves of Salacia chinensis. Chem Pharm Bull (Tokyo) 2008;56:915–20.
9. Jansakul C, Jusapalo N, Mahattanadul S. Hypotensive effect of n-butanol extract from stem of Salacia chinensis in rats, ISHS Acta Horticulturae 678: III WOCMAP Congress on Medicinal and Aromatic Plants. Targeted Screening of Medicinal and Aromatic Plants, Economics and Law. Vol. 4
10. Ministry of Health (India) (948).Pharmacopoeia of India. Government of India. 1982:650.