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STUDIES ON THE ANTIHYPERLIPIDEMIC ACTIVITY OF FLAVONOIDAL FRACTION OF *LAGENARIA SICERARIA*

S. S. AGRAWAL*, D. S. MOHALE, B.V. GHULE, A. N. SAOJI and P. G. YEOLE

Department of Quality Assurance, Institute of Pharmaceutical Education and Research, WARDHA (M. S.) INDIA

ABSTRACT

Lagenaria siceraria (Cucurbitaceae), commonly known as Lauki (Hindi); Doodhi (Marathi); was used traditionally for cardiovascular diseases. The flavonoidal fraction of *Lagenaria siceraria* (FFLS) was studied for its effect on the triton induced hyperlipidemia in male albino rats. Oral administration of FFLS (10-40 mg/kg) significantly decreased the triglycerides (TG), total cholesterol (TC), low density lipoproteins (LDL) and very low density lipoproteins (VLDL). It also significantly increased the high density lipoproteins (HDL). The results obtained indicates the ability of flavonoidal fraction of *Lagenaria siceraria* to decrease the hyperlipidemia and thereby, decreasing the incidences of cardiovascular complications.

Key words: Antihyperlipidemic, Flavonoid, *Lageneria siceraria*.

INTRODUCTION

L. siceraria M (Cucurbitaceae) is commonly known as bottle gourd syn Calabash, syn Doodhi, syn Lauki (Hindi), Kadoo (Mar.). In the Ayurvedic system of medicine, fruits were used for its cardioprotective, cardiotonic, general tonic, diuretic, aphrodisiac, antidote to certain poisons and scorpion strings, alternative purgative, cooling effects. It cures pain, ulcers and fever and used for pectoral-cough, asthma and other bronchial disorders-especially syrup prepared from the tender fruit[1, 2].

It is also good source of minerals and amino acids[1-4]. Externally, the fruit pulp is applied as poultice and cooling application to the shaved head in the delerium and to the soles in the burning of the feet.[5] The fruit is reported to contain the triterpenoid cucurbitacins B, D, G, H and 22-deoxycucurbitacin the bitter principle of cucurbitaceae.

* Author for correspondence

The fruit juice contains β-glycosidase–elasterase enzyme.[6] Two sterols were identified and isolated from the petroleum ether fraction of ethanol extract of dried fruit pulp of *L. siceraria* namely fucosterol and campesterol.[5] HPLC analysis of extract of flowering plant of *L. siceraria* shows presence of flavone-C glycosides.[7]

Phytochemical investigation on *Lagenaria siceraria* revealed the presence of glycosides, rotenoids, isoflavones, flavonones, flavonols, flavones, sterols and saponins.

Recent investigations in our laboratory have shown that the ethanolic extract of fruits of *Lagenaria siceraria* exhibits significant antihyperlipidemic activity in the triton induced hyperlipidemia. Therefore, the main objective of the present study was to investigate the effect of the flavonoidal fraction of *L. Siceraria* on triton induced hyperlipidemia in male albino rats.

EXPERIMENTAL

Plant material

The fresh fruits of *L. siceraria* (Molina) stand. were collected in the months of August - December from the local market of Wardha, Maharashtra state, India, and authenticated by the authority of botany department, Nagpur university, Nagpur. A voucher specimen (specimen No. 9013) was submitted at institutes' herbarium department for future reference.

Preparation of the flavonoidal fraction

Dried fruit pulp of *Lagenaria siceraria* (500 g) was Soxhlet-extracted with petroleum ether and with methanol. After concentration under vacuum, the methanolic extract (62 g) was resuspended in distilled water and partitioned into ethyl acetate. The residue obtained after evaporation was dissolved in ethanol and treated with neutral lead acetate solution. The precipitate obtained was centrifuged, resuspended in ethanol, treated with hydrogen sulphide and filtered. The filtrate was evaporated under vacuum to yield the flavonoidal fraction (4.2 g), which gave positive Shinoda test. An aqueous suspension in saline was used for experimental studies.

Experimental animal

The male albino rats of Wistar strain weighing between 200-300 g were used in the study with prior approval and scrutinization from the Institutional Animal Ethical Committee (IAEC). The animals were housed in clean and spacious cages provided with

net and feeding bottle, at ambient temperature of 25 ± 2^0C with 12 hrs. light and 12 hrs dark cycles and provided free access to standard laboratory chow mixture provided water *ad libitum* for fixed period so as to acclimatize all animals and to achieve normal constant basal food intake in all.

Evaluation of antihyperlipidemic activity in triton induced hyperlipidemic rats

Investigation of flavonoidal fractions of methanolic extract of *L. siceraria* fruit for antihyperlipidemic activity was done as per the method described previously.[8,9] Antihyperlipidemic activity was evaluated using triton (a surfactant) induced hyperlipidemic rats.

Method

The male albino rats of Wistar strain weighing between 200-250 g were employed. Rats were starved for 18 hrs. and then injected with triton *i.p.* (100 mg/kg) prepared in NS. Sterile syringes were used for injecting inducer. The test fractions and standard were administered by oral intubations, simultaneously with triton injection The serum was analyzed for lipid profile after 18 hrs. of triton administration.

Parameters assessed

Following parameters were assessed in the evaluation of antihyperlipidemic activity in triton induced hyperlipidemic rats. Average values (mean ± S.E.M.) of total cholesterol, triglycerides, HDL, LDL and VLDL are expressed as percentage of initial values for each group at the end of experiment.

Table 1. Protocol for antihyperlipidemic activity evaluation

Group(s)	Treatment	Dose (mg/kg)	Legends
I	Control	-----	
II	TRN control	100	TRN – triton *i.p.*
III	TRN + STD	10	STD – Lovastatin
IV	TRN + FFLS	10	FFLS – Flavonoidal Fraction of *L. siceraria*
V	TRN + FFLS	20	
VI	TRN + FFLS	40	

Statistical analysis

Data was statistically analyzed using ANOVA followed by Dunnett's t-test. *P < 0.05, significant; **P < 0.001, very significant; ns P > 0.05, non-significant; compared to respective control (n = 5).

RESULTS AND DISCUSSION

The presence of antihyperlipidemic compounds in higher plants has been extensively studied but only limited amount of antihyperlipidemic products of plant origin have been reported. Such products if well tolerated, by the patient, may be developed into alternative coadjuvants in the treatment of disorders, such as atherosclerosis and further coronary artery diseases (CAD).

In the present investigation, blood profile LDL, VLDL, TC, TG and HDL were used to assess the effect of flavonoidal fraction on hyperlipidemic rats. The high fat diet model is one of the good model but has disadvantage of inducing oxidative stress in the animals during the period of hyperlipidemia.[9] The experimental model i.e. triton–a surfactant induced hyperlipidemia provides additional advantage of initial screening for antihyperlipidemic evaluation along with benefit to study the action mechanism of newer drugs.[10,11] Drugs interfering with cholesterol absorption and biosynthesis are active in phase I (synthetic phase), while drugs interfering with cholesterol excretion and metabolism are active in phase-II (Excretory phase).[11,12]

Table 2. Effect of flavonoidal fraction methanolic extract of of *L. siceraria* fruits on triglycerides (TG) in triton induced hyperlipidemic rats

Groups	TG (mg/dL) ± S.E.M
I	70.02 ± 0.92
II	172.22 ± 0.63
III	94.07 ± 1.02**
IV	149.75 ± 1.19**
V	168.22 ± 1.07**
VI	164.25 ± 1.35**

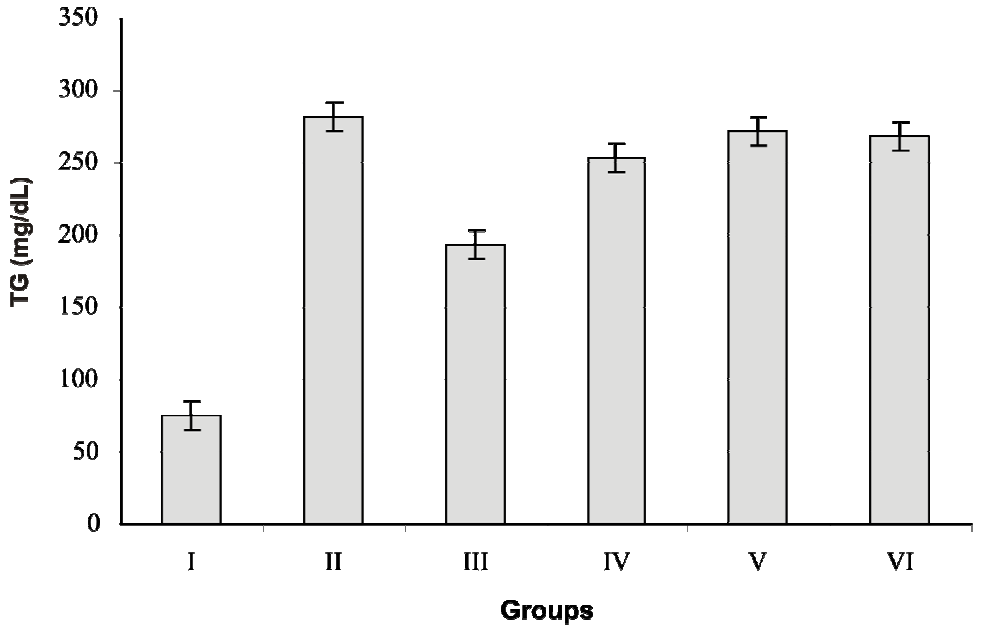

Fig. 1: Effect of flavonoidal fraction methanolic extract of of *L. siceraria* fruits on triglycerides (TG) in triton induced hyperlipidemic rats

Table 3. Effect of flavonoidal fraction methanolic extract of of *L. siceraria* fruits on total cholesterol (TC) in triton induced hyperlipidemic rats

Group	TC (mg/dl) ± S.E.M.
I	75.81 ± 1.41
II	282.31 ± 1.90
III	194.03 ± 1.82**
IV	252.71 ± 1.91**
V	272.07 ± 1.97**
VI	268.94 ± 1.42**

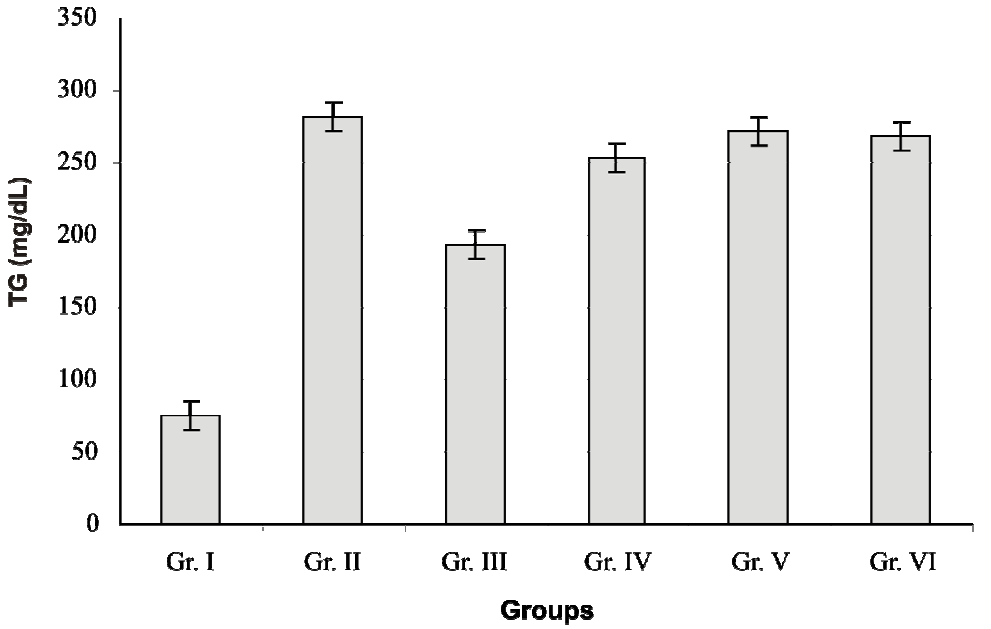

Fig. 2. Effect of flavonoidal fraction methanolic extract of of *L. siceraria* fruits on Total cholesterol (TC) in triton induced hyperlipidemic rats

Table 4. Effect of flavonoidal fraction methanolic extract of of *L. siceraria* fruits on HDL-C in triton induced hyperlipidemic rats

Groups	HDL - C (mg/dL) ± S.E.M.
Gr. I	27.42 ± 1.47
Gr. II	14.93 ± 1.00
Gr. III	23.19 ± 0.81**
Gr. IV	18.77 ± 0.45**
Gr. V	21.78 ± 0.07**
Gr. VI	21.19 ± 0.18**

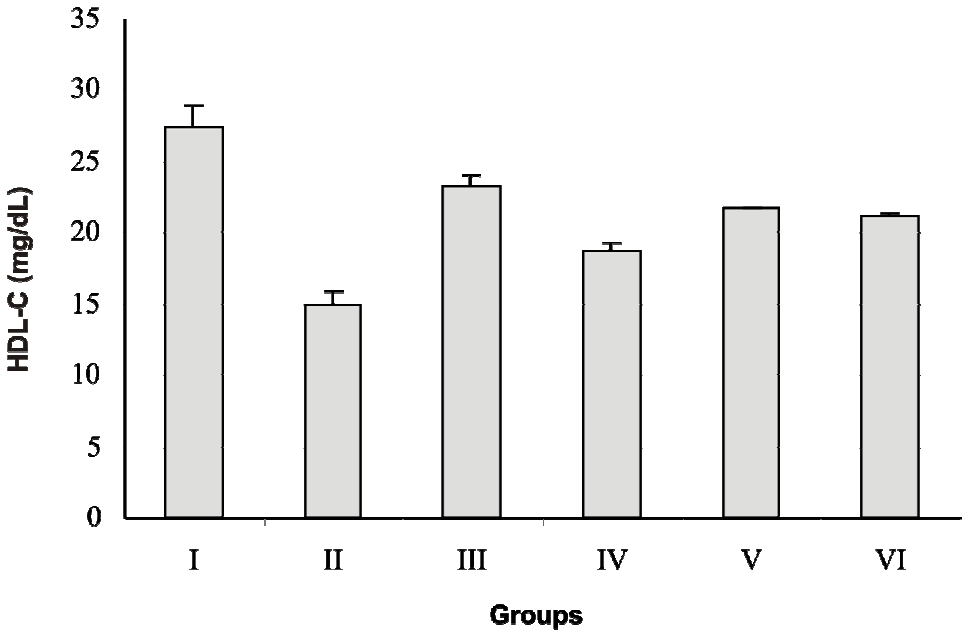

Fig. 3. Effect of flavonoidal fraction methanolic extract of of *L. siceraria* fruits on HDL - C in triton induced hyperlipidemic rats

Table 5. Effect of flavonoidal fraction methanolic extract of of *L. siceraria* fruits on LDL in triton induced hyperlipidemic rats

Groups	LDL (mg/dL) ± S.E.M
I	62.39 ± 1.57
II	299.83 ± 2.46
III	189.65 ± 2.14**
IV	263.89 ± 1.87**
V	283.93 ± 1.74**
VI	280.6 ± 1.09**

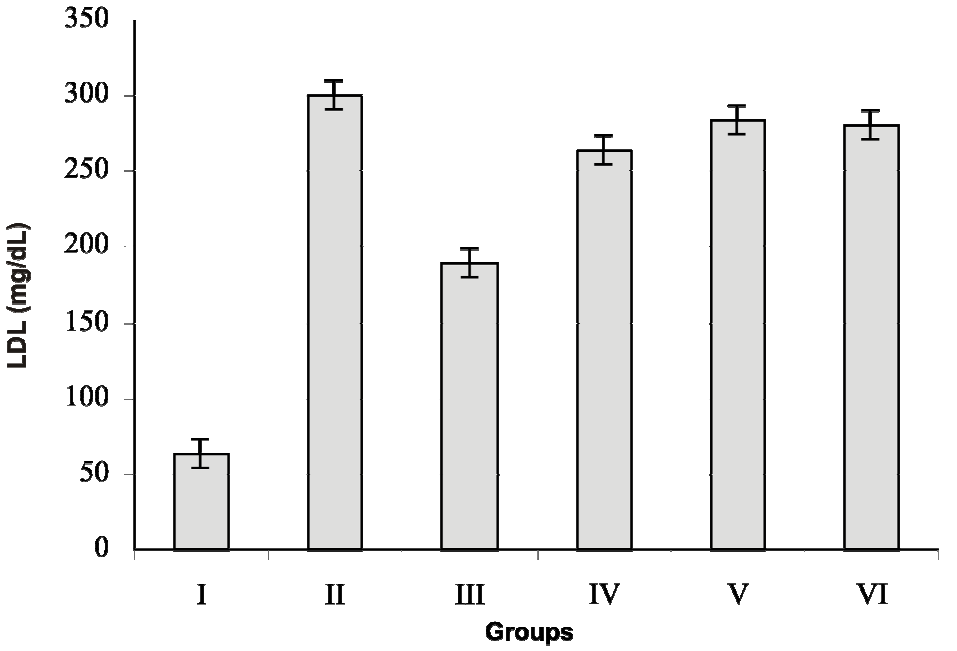

Fig. 4: Effect of flavonoidal fraction methanolic extract of of *L. siceraria* fruits on LDL in triton induced hyperlipidemic rats

Table 6. Effect of flavonoidal fraction methanolic extract of of *L. siceraria* fruits on VLDL in triton induced hyperlipidemic rats

Groups	VLDL(mg/dl) ± S.E.M
I	14.004 ± 0.2
II	32.45 ± 0.14
III	18.81 ± 0.29**
IV	29.95 ± 0.24**
V	33.64 ± 0.27**
VI	32.85 ± 0.33**

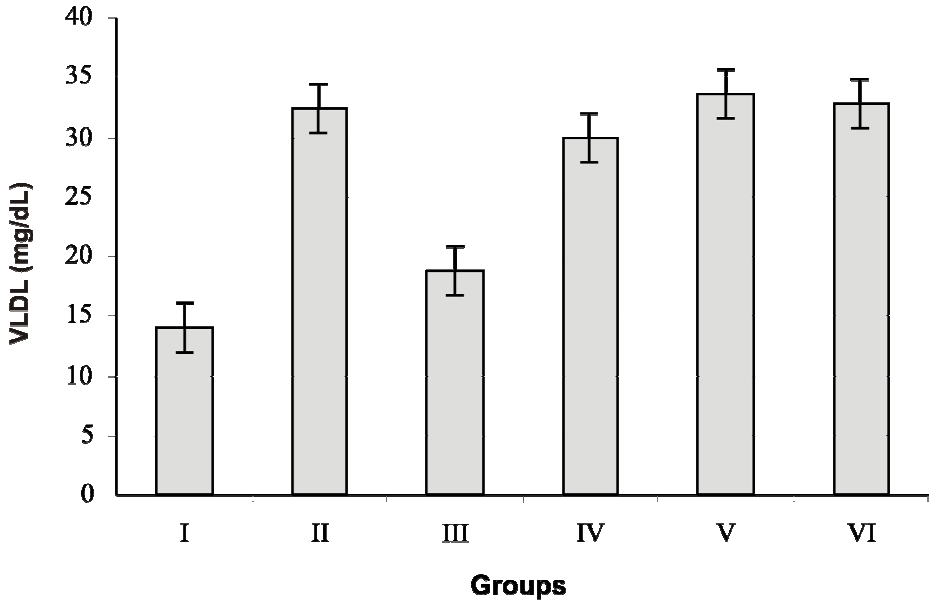

Fig. 5: Effect of flavonoidal fraction methanolic extract of of *L. siceraria* fruits on VLDL in triton induced hyperlipidemic rats

The fractions from the methanolic extract of *L. siceraria* fruit had significantly reduced the elevated triglyceride, cholesterol, and LDL and increased HDL level of triton treated hyperlipidemic rats.

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