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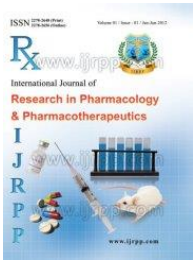

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Evaluate the anti-atherosclerotic activity of ethanol extract of *Ochna obtusata* DC. In the male wister albino rats by using High fat diet induced method

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ABSTRACT

Latest trends have been increasing demand of phyto drugs and some medicinal herbs have proven to be potential in anti-hyper lipedemic activity. Medicinal herbs and extracts are prepared from them are widely used in the treatment of atherosclerosis. The compounds that are responsible for medicinal property of the drug are usually secondary metabolites. The whole plant of *Ochna obtusata* was collected from Tirumala hills, Tirupati, Andhra Pradesh. India. Ochna is a genus comprising 86 species of evergreen trees, shrubs and shrublets belonging to the family Ochnaceae. The collected whole plant was dried at room temperature, pulverized by a mechanical grinder, sieved through 40 mesh. About 100g of powdered materials were extracted with Ethanol (90%) using soxhlet apparatus. The animals were dosed with the test and the standard drugs orally based on the body weights of the animals. The animals were dosed with the extracts for about 14 days. After this time i.e., 20 hrs after the last application of the test compounds the animals are anaesthetized with anaesthetic ether and 1.2ml of blood is withdrawn by retro orbital puncture. The blood samples will be collected on the 14th day for estimating biochemical parameters.

Keywords: *Ochna obtusata* DC, anti-atherosclerotic activity, Herbal plant, Ochnaceae.

INTRODUCTION

Herbal plant is a valuable plant that you can use some or almost every part of it for many treatments. Some people use its part such as dried leaves, roots, flowers, etc for curing diseases. Some use its chemical substance such as its extract oil for therapy. Furthermore, you can also use herbs as cooking recipes. Consequently, herbs have many benefits but the main purpose of using them is to maintain good health. [1]

Plant traditionally used in the Atherosclerosis might therefore provide a useful source of agents for development of pharmaceutical entities or as simple dietary adjuncts to existing therapies. Hence, the present study aims to screen anti-atherosclerotic activity of *Ochna obtusata* DC. [4]

There are many kinds of herbal plants and each part of herbal plant used is different. Herbal plants can be used for various purposes that depend on your demand. You can use them for relief healing such as Aloe and some kinds of herbs and can be grown for a garden full of their sweet smelling. Crafting with herbs can make a satisfactory and beautiful home. Artemisia is a beautiful herb that is easily grown in the garden or Giver King is a lovely herb that has a fresh herbal scent and dried floral such as sunflower, roses or anything else are suitable for your crafting. [3]

MATERIALS AND METHODS

Materials

Plant material

The plant material used for the study is

- The ethanol extract of powdered flowers of *Ochna obtusata* Dc.

Collection of plant material

- The whole plant of *Ochna obtusata* was collected from Tirumala hills, Tirupati, Andhra Pradesh. India. It was identified and authenticated by Prof. Madhava Chetty, K., Taxonomist, S.V. University, Tirupati, Andhra Pradesh, India. A voucher specimen has been kept in our laboratory for future reference.

PLANT PROFILE [69-76]

Botanical Name

Ochna obtusata

Family

Ochnaceae

Synonym

Ochna squarrosa Bennet

Classification

Rank	Scientific Name and Common Name
Kingdom	Plantae – Plants
Subkingdom	Tracheobionta – Vascular plants
Superdivision	Spermatophyta – Seed plants
Division	Magnoliophyta – Flowering plants
Class	Magnoliatae
Order	Theales
Family	Ochnaceae
Genus	*Ochna*
Species	*Ochna obtusata* - Ramdhan champa

Distribution

South Asia; in the Western Ghats- South, Central and Maharashtra Sahyadris.

Ochna obtusata Young Leaves and Flower

Common names

- Hindi - Ramdhan Champa
- Kannada - Ramatana Champaka
- Tamil Kalkuruvi, Chilanti, Padalakkonai, Panjaram
- Telugu – Sunari, Tammi, Erra Juvvi, Kukkamovi

Vernacular Names

- ✓ Golden Champak
- ✓ Mickey Mouse Plant
- ✓ Ramdhan Champa

Habit

Small trees up to 8 m tall.

Morphology or Botanical Description

Trunk and Bark

Bark grayish, smooth; blaze pinkish.

Branches and branchlets

Branchlets terete, lenticellate, glabrous.

Leaves

Young leaves simple, alternate, distichous; stipules caducous and leaving scar; petioles. 0.4 cm long, planoconvex, glabrous; lamina 16 x5 cm, elliptic or elliptic-oblongto obovate, apexacute to rounded, base acute to rounded, margin serrate, shining above, chartaceous, glabrous beneath; midrib

raised above; secondary nerves 12 pairs, ascending towards apex; tertiary nerves slender, reticulo-percurrent.

Inflorescence / Flower

Inflorescence axillary or lateral racemes; flowers yellow; pedicels up to 2.5 cm long.

Fruit and Seed

Drupe, 3-5 distinct drupes seated on the enlarged disk; seed 1 per drupe.

Chemical constituents

Ochna is a genus comprising 86 species of evergreen trees, shrubs and shrublets belonging to the family Ochnaceae. These species are native to tropical woodlands of Africa or Asia while some species are distributed in tropical and subtropical zones throughout the World. Species of this genus are usually called Ochnas or Mickey-mouse plants, a name coming from the shape of their drupelets fruit. Some species, especially Ochna serullata are widely cultivated for decorative purposes.

This family is characterized by the presence of flavonoids and biflavonoids and terpenoids as main secondary metabolites and several studies on other Ochna species were conducted and revealed that the phytochemical contained within this genus constitutes mainly glycosides, saponims, steroids, flavones and fatty acids. [54]. (Agra et al., 2007)

Medicinal uses and Pharmacological activities

Leaves & **Roots** of Ochna obtusata is used for ulcer, asthma and bronchitis.

The leaves and roots of Ochna obtusata is used as diuretic. [5]

The Ethanol extract of Ochna obtusata possess significant diuretic activity and may prove to be effective for the treatment of many life-threatening disease conditions such as congestive heart failure, nephritic syndrome, cirrhosis, renal failure, hypertension and pregnancy toxemia. [2]

Whole plants are used for the treatment of ulcers and sores. [6]

The Ethanol extracts from the leaves of Ochna obtusata exert protective effects against ethanol, indomethacin, and pylorus ligation and cold restraint stress-induced gastric mucosal damage. [7]

Ochna squarrosa L. (known as Xerra juvviY), a small shrub, has been used in indigenous systems of medicine for treating various ailments, i.e., the bark as a digestive tonic and the roots for its curative effect against asthma. [60].

The crude AcOEt fraction and the new constituents isolated from the root bark of O. squarrosa, were examined for analgesic (tail-flick method in Swiss mice) and anti-inflammatory (carrageenan-induced paw edema method in albino rats) activities.

The antibacterial activity of ethanolic and chloroform extracts of O.obtusata against selected pathogens in this investigation further encourages the possibility of using traditional medicine as a potential force to fight against microbial infections as they have opened a new avenue as a safe and more efficient therapy against the multidrug resistant pathogens. [8]

The investigation demonstrates that at doses consumed in the traditional medicine, the ethanol extract of Ochna obtusata may be considered as relatively safe, as it did not cause either any lethality or changes of in the general behavior in both the acute and chronic toxicity studies in rats. [9]

METHOD

Preparation of the plant extract

Preparation of *Ochna obtusata* Dc extract

The collected whole plant was dried at room temperature, pulverized by a mechanical grinder, sieved through 40 mesh. About 100g of powdered materials were extracted with Ethanol (90%) using soxhlet apparatus. The extraction was carried out until the extractive becomes colourless. The extracts is then concentrated and dried under reduced pressure. The solvent free semisolid mass thus obtained is dissolved in tween 80 and used for the experiment. The percentage yield of prepared extract was around 14.5%w/w. [10]

Animal selection

A total of 30 male Wistar rats were obtained from the animal facility Sigma institute of clinical research and administration and used for the study. All rats were certified with good health at the time of receiving. Age of the animals at the start of the treatment was approximately 8 to 12 weeks. [11]

Acclimatization

Wister rats were allowed to acclimatize to experimental room conditions for a period of 10 days prior to randomization and treatment. During the acclimatization period the rats are observed for the clinical signs. [12]

Environmental conditions

The rats were maintained in the separate polypropylene cages. In the experimental room, temperature of 23±2°c, controlled humidity (50-55%), 12 hrs of artificial lightening and 12 hrs of darkness cycle were maintained. The experimental room was cleaned and mopped with a disinfectant daily.

Housing conditions

The rats were housed based on the group size per polycarbonate cage. Each cage was fixed with a polypropylene water bottle with stainless steel nozzle. Feed was provided *ad libitum* throughout the study. The bedding material was changed daily.

Feeding conditions

Rats were provided with 150 gms of feed and sterilized water. Rat feed and supplied water was changed on alternative days. The amounts of the feed consumed by the rats were calculated on the successive days.

Grouping of animals: Anti atherosclerosis

The animals were divided into four groups. Each group contains five animals.

Grouping is as follows:

- Group 1: Normal Group (Tween 80)
- Group 2: Control Group (HFD)
- Group 2: Extract I- *Ochna obtusata* + HFD (200 mg/kg)
- Group 3: Extract II- *Ochna obtusata* + HFD (400 mg/kg)
- Group 4: Standard-Atorvastatin + HFD (10 mg/kg)

Dosing of animals

The animals were dosed with the test and the standard drugs orally based on the body weights of the animals. The animals were dosed with the extracts for about 14 days. During dosing of animals, the body weights of the animals and the food consumed by the animals were taken on successive days. The rats were treated with test and standard drugs by oral gavage for 14 days. After this time i.e., 20 hrs after the last application of the test compounds the animals are anaesthetized with anaesthetic ether and 1.2ml of blood is withdrawn by retro orbital puncture. The blood samples will be collected on the 14^{th} day for estimating biochemical parameters. The blood samples were taken from the rats after overnight fasting. [13]

Biochemical parameters were determined after treatment. The serum was labelled with the animal number and the estimations were made. The serum enzymes SGOT, SGPT and ALP level and the lipid profile (total cholesterol HDL, LDL, VLDL and triglyceride level) and total protein was determined enzymatically on prietest bio chemistry analyser. SOD, GSH, MDA were determined by using UV Spectrophotometer.

Acute toxicity studies

The procedure was followed by using OECD 423 (Acute Toxic Class Method). The acute toxic class method is a step wise procedure with three animals of a single sex per step. Depending on the mortality or moribund status of the animals and the average two to three steps may be necessary to allow judgment on the acute toxicity of the test substance. This procedure results in the use number of animals while allowing for acceptable data based scientific conclusion. The method used to defined doses (2000, 1000, 500, 50, 5 mg/kg body weight, Up-and-Down Procedure). The starting dose was 2000 mg/kg body weight p.o as most of the crude extracts posses LD 50 value more than 200 mg/kg p.o. Dose volume was administered 0.2ml per 100gm body weight to overnight fasted rats with were ad libidum. Food was withheld for a further 3-4 hours after administration of Extract and observed for signs for toxicity. The body weight of the rats before and after administration were noted that changes in skin and fur, eyes, mucous membranes, respiratory, circulatory, autonomic and central nervous system and motor activity and behavior pattern were observed and also sign of tremors, convulsions, salivation, diarrhea, lethargy, sleep and coma were noted for 14 days. The onset of toxicity and signs of toxicity also noted. Hence, 1/10th (200mg/kg) and 1/5th (400mg/kg) of this dose were selected for further study.

Atherogenic diet composition: [16]

Composition	Normal diet (%)	Atherogenic diet (%)
Protein (Milk powder)	12	10
Carbohydrates (Wheat flour)	71	61
Sugar	05	05
Fat (Butter)	05	16
Salts	04	04
Vitamins	01	02
Fibers	02	01
Cholesterol	--	01

RESULTS AND DISCUSSIONS

Preliminary phytochemical screening of *Ochna obtusata* extract

SLNO.	TEST	RESULT
1.	**ALKALOIDAL TEST**	
	a.Dragondroffs test	Positive
	b.Mayer's test	Positive
	c.Wagner's test	Positive
	d. Hager's test	Positive
2.	**CARBOHYDRATES TEST**	
	a.Molish's test	Positive
	b.Fehling's test	Positive
	c.Benedict's test	Positive
	d. Baeford's test	Positive
3.	**STEROIDS TEST**	
	a.Libermann Buchard test	Positive
	b. Salwoski test	Positive
4.	**GLYCOSIDES TEST**	
	a.Legal test	Positive
	b.Baljet test	Positive
	c.Killer kilaini test	Positive
	d. Borntagers test	Positive
5.	**SAPONINS TEST**	
	a.Foam test	Positive
6.	**FLAVONOIDS TEST**	
	a.Shinoda test	Positive
7.	**TRITERPINOIDAL TEST**	Negative
8.	**PHENOLICS & TANNINS TEST**	
	a.Ferric chloride test	Negative
	b.Gelatin test	Negative
	c.Lead acetate test	Negative
9.	**PROTIEN& AMINOACIDS TEST**	
	a.Buret's test	Positive
	b.Ninhydrin test	Positive
	c.Xanthoprotic test	Positive

10.	**FIXED OIL TEST**	
	a.Spot test	Positive
11.	**RESIN TEST**	
	a.Acetic anhydride test	Positive

ACUTE TOXICITY STUDIES

EVALUATION LD50 VALUE OF THE *Ochna obtusata* Dc. EXTRACT BASED ON OECD GUIDE LINE NO.423

GROUP NUMBER	NO. OF ANIMALS PER GROUP	DOSE IN mg/kg	REPORT
1	3	5 mg/kg	NO DEATH
2	3	50 mg/kg	NO DEATH
3	3	100 mg/kg	NO DEATH
4	3	300 mg/kg	NO DEATH
5	3	500 mg/kg	NO DEATH
6	3	1000 mg/kg	NO DEATH
7	3	2000 mg/kg	NO DEATH

According to the OECD guide linesno.423 toxicity studies were performed on the mice upto the dose levels of 2000 mg/kg, no death of the mice will be observed .So the LD50was found to be 2000mg/kg. ED50 was 1/10 th of LD50 value.
So, ED50 = 2000/10 = 200 mg/kg.

Evaluation of Anti Atherosclerotic activity of *Ochna Obtusata* In Rats

MEAN AND S.D. OF THE BODY WEIGHTS OF THE ANIMALS

SL NO.	GROUP NO.	TREATMENT	MEAN±S.E.M OF BODY WEIGHTS in gms		
			0 day	7 day	14th day
1	**I**	**CONTROL**	208±14.49	209±13.49	209±13.49
2	**II**	**HFD INDUCED CONTROI**	154.6±1.46	164±5.11	169±6.18
3	**III**	**HFD + EXTRACT-I [*Ochna obtusata* .] 200 mg/kg**	166±6.01	159.6±16.68	154±5.63
4	**IV**	**HFD+ EXTRACT-II [*Ochna obtusata* .] 400 mg/kg**	163±4.69	158±3.7	152±3.38
5	**V**	**HFD+STANDARD [ATORVASTATIN]**	158±4.69	154±4.4	150.6±3.96

N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control

MEAN AND S.E.M OF TOTAL CHOLESTEROL AND HDL CHOLESTEROL LEVEL

SL NO	TREATMENT	GROUP NO.	MEAN±S.E.M OF TOTAL CHOLESTEROL	MEAN±S.E.M OF HDL CHOLESTEROL
			14TH DAY	**14TH DAY**
1	**CONTROL**	I	71.55±1.23	44.12±0.99
2	**HFD INDUCED CONTROL**	II	143.17***±1.17	23.8***±0.94

3	**HFD + EXTRACT-I** *Ochna obtusata* **200 mg/kg**	III	113.2***±1.13	39.19**±0.78
4	**HFD+ EXTRACT-II** *Ochna obtusata* **400 mg/kg**	IV	70.93**±1.01	41.17±1.06
5	**HFD + STANDARD Atorvastatin**	V	77.37*±1.33	49.45**±0.92

N = 6; Significance: *** P<0.001, ** P<0.01, * P<0.05 from control

MEAN AND S.E.M OF TRIGLYCERIDES AND TOTAL PROTIEN LEVEL:

SL NO	TREATMENT	GROUP NO.	MEAN±S.E.M OF TRIGLYCERIDES	MEAN±S.E.M OF TOTAL PROTIEN
			14^{TH} DAY	**14^{TH} DAY**
1	**CONTROL**	I	81.02±0.87	12.59±0.23
2	**HFD INDUCED CONTROL**	II	242.11***±1.35	6.02***±0.44
3	**HFD + EXTRACT-I** *Ochna obtusata* **200 mg/kg**	III	152.66***±1.06	7.15***±0.12
4	**HFD+ EXTRACT-II** *Ochna obtusata* **400 mg/kg**	IV	98.28***±1.03	7.91***±0.1
5	**HFD + STANDARD Atorvastatin**	V	110.74***±1.16	9.86***±0.83

N = 6; Significance: *** P<0.001, ** P<0.01, * P<0.05 from control

MEAN AND S.E.M OF LDL AND VLDL LEVEL

SL NO	TREATMENT	GROUP NO.	MEAN±S.E.M OF LDL	MEAN±S.E.M OF VLDL
			14^{TH} DAY	**14^{TH} DAY**
1	**CONTROL**	I	11.22±2.15	16.2±0.17
2	**HFD INDUCED CONTROL**	II	70.94***±1.77	48.42***±0.27
3	**HFD + EXTRACT-I** *Ochna obtusata* **200 mg/kg**	III	43.48***±1.2	30.53***±0.21
4	**HFD+ EXTRACT-II** *Ochna obtusata* **400 mg/kg**	IV	9.3±1.8	19.62***±0.2
5	**HFD +Standard**	V	5.77±0.86	22.15***±0.23

MEAN AND S.E.M OF SGOT AND SGPT LEVEL

SL NO	TREATMENT	GROUP NO.	MEAN±S.E.M OF SGOT	MEAN±S.E.M OF SGPT
			14TH DAY	**14TH DAY**
1	**CONTROL**	I	40.96±0.91	24.51±0.92
2	**HFD INDUCED CONTROL**	II	46.06**±0.83	57.69***±1.01
3	**HFD + EXTRACT-I** *Ochna obtusata* **200 mg/kg**	III	31.44***±0.6	37.1***±0.94
4	**HFD+ EXTRACT-II** *Ochna obtusata* **400 mg/kg**	IV	27.62***±0.96	28.2±1.14
5	**HFD +Standard**	V	25.03***±1.26	24.89±1.18

MEAN AND S.E.M OF ALP LEVEL

SL NO	TREATMENT	GROUP NO.	MEAN±S.E.M OF ALP
			14TH DAY
1	**CONTROL**	I	65.93±1.04
2	**HFD INDUCED CONTROL**	II	97.44***±0.87
3	**HFD + EXTRACT-I** *Ochna obtusata* **200 mg/kg**	III	67.55±0.89
4	**HFD+ EXTRACT-II** *Ochna obtusata* **400 mg/kg**	IV	58.81***±0.88
5	**HFD + STANDARD Atorvastatin**	V	56.28***±1.29

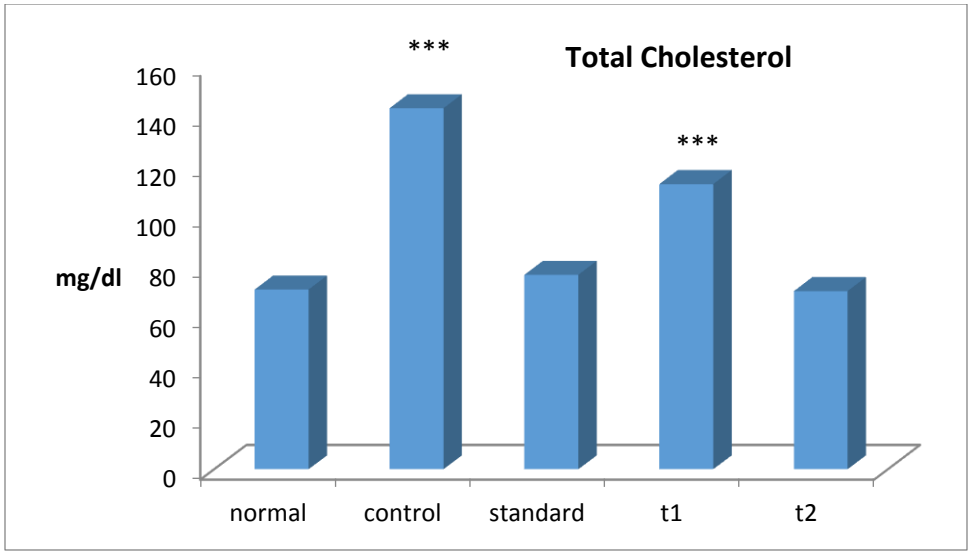
MEAN AND S.E.M OF GSH AND MDA LEVEL

SL NO	TREATMENT	GROUP NO.	MEAN±S.E.M OF GSH	MEAN±S.E.M OF MDA
			14TH DAY	**14TH DAY**
1	**CONTROL**	I	6.3±0.06	76.05±0.79
2	**HFD INDUCED CONTROL**	II	2.55***±0.05	141.67***±0.71
3	**HFD + EXTRACT-I** *Ochna obtusata* **200 mg/kg**	III	4.76***±0.05	88.87***±0.78
4	**HFD+ EXTRACT-II** *Ochna obtusata* **400 mg/kg**	IV	3.2***±0.12	131.34***±0.82
5	**HFD +Standard**	V	4.8***±0.04	99.04***±0.76

MEAN AND S.E.M OF SOD LEVEL

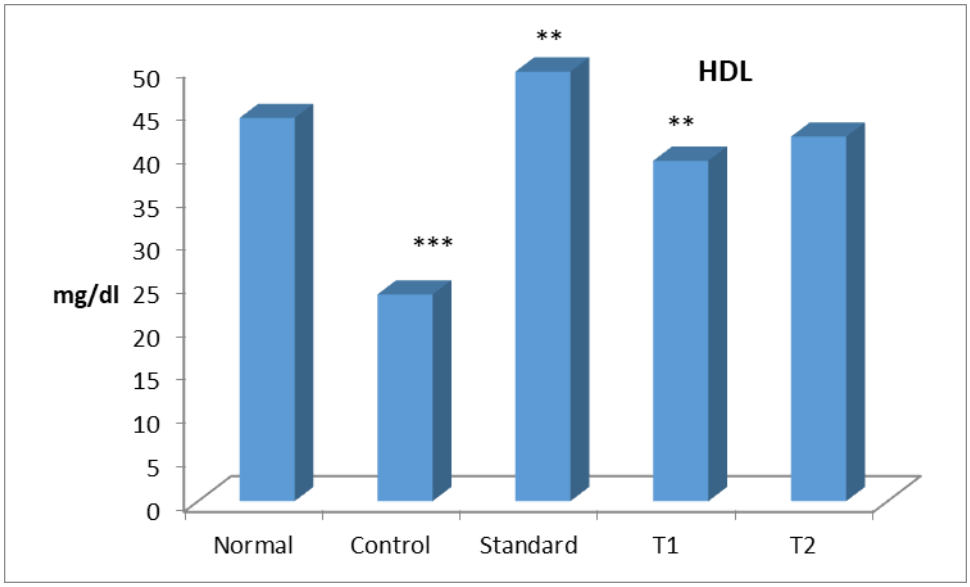
SL NO	TREATMENT	GROUP NO.	MEAN±S.E.M OF SOD
			14TH DAY
1	**CONTROL**	I	9.29±0.06
2	**HFD INDUCED CONTROL**	II	4.4***±0.08

3	**HFD + EXTRACT-I** *Ochna obtusata* **200 mg/kg**	III	8.72***±0.07
4	**HFD+ EXTRACT-II** *Ochna obtusata* **400 mg/kg**	IV	5.34***±0.08
5	**HFD + STANDARD Atorvastatin**	V	8.65***±0.04

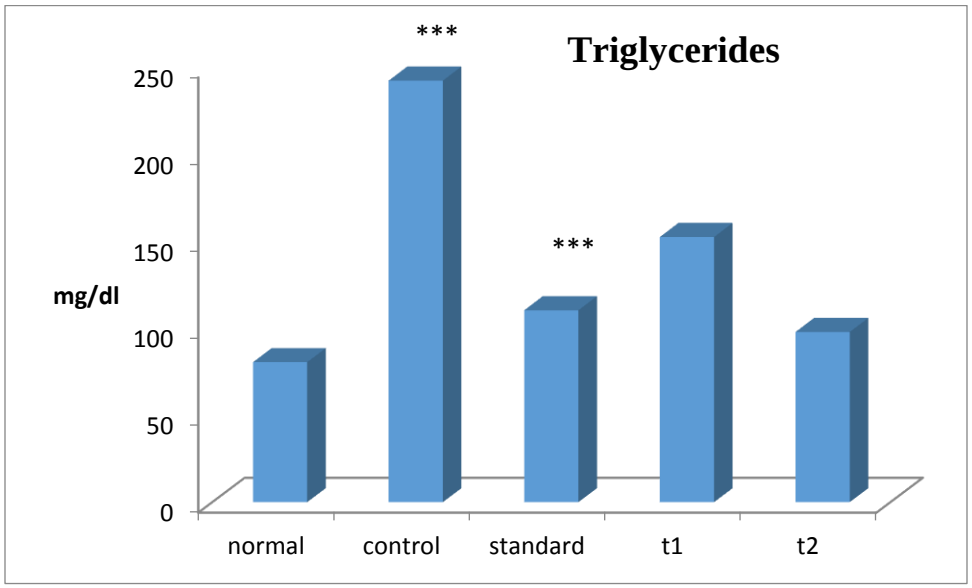


Histogram showing the effect of *Ochna obtusata* on total Cholesterol of animals

N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control

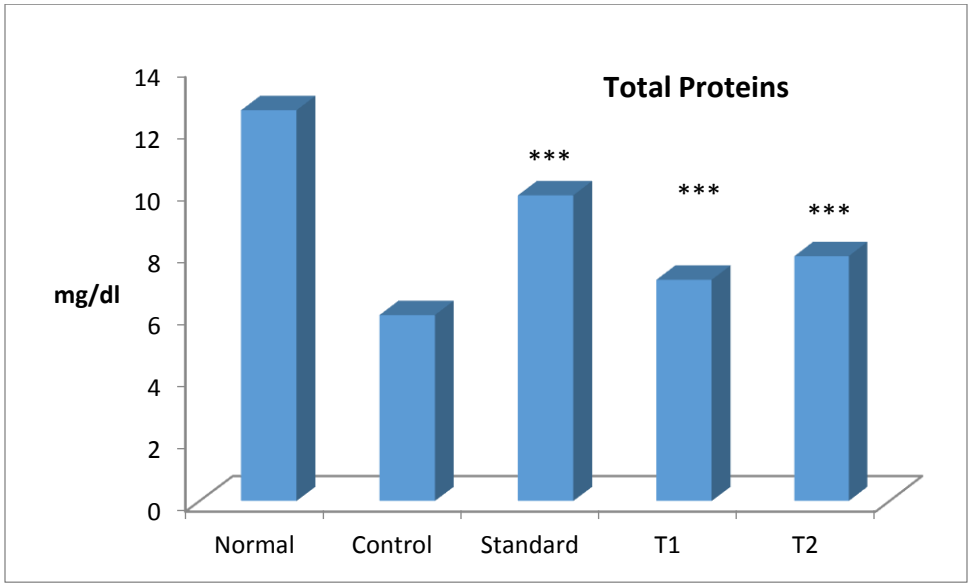


Histogram showing the effect of Ochna obtusata on HDL Cholesterol of animals



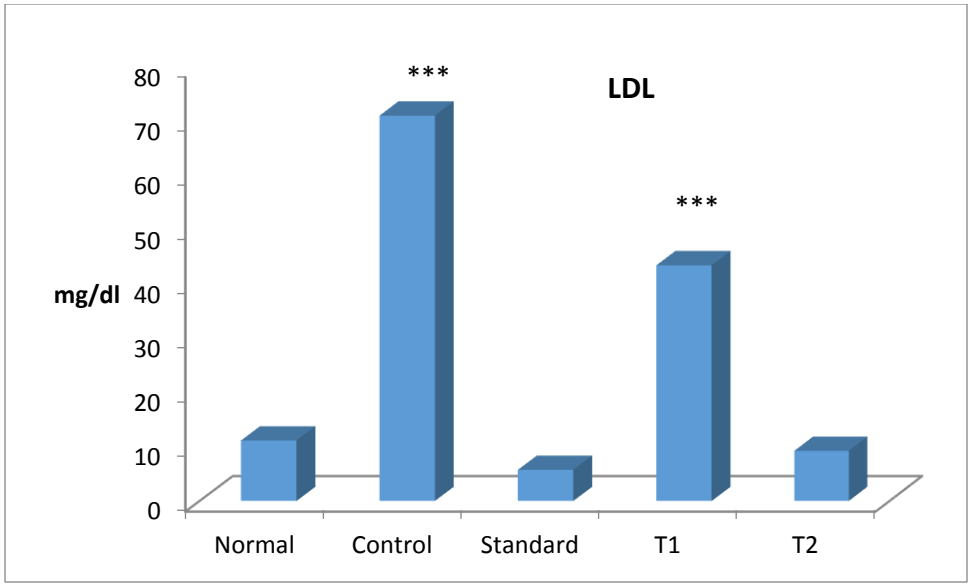
Histogram showing the effect of Ochna obtusata on Triglyrides of animals

N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



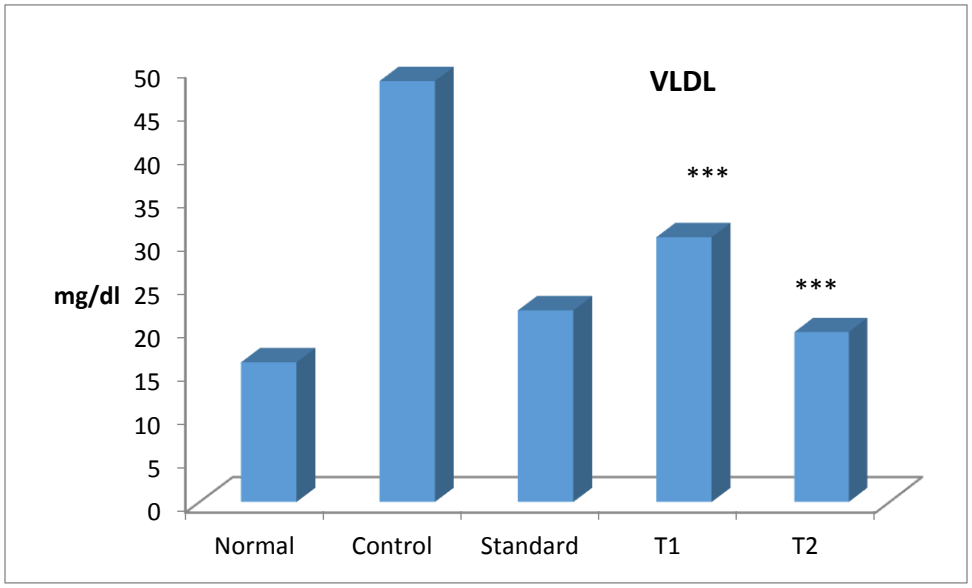
Histogram showing the effect of Ochna obtusata on Total protein of animals

N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



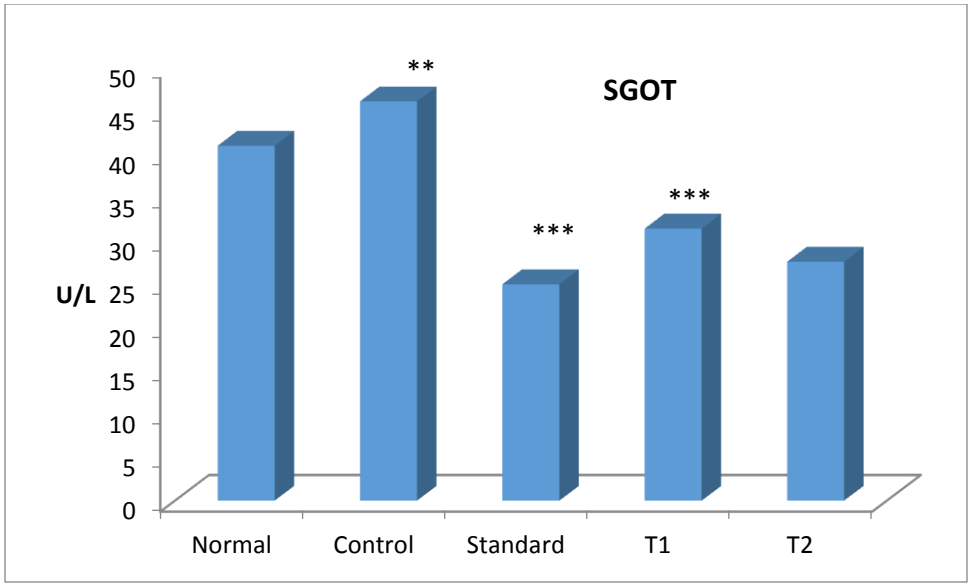
Histogram showing the effect of Ochna obtusata on LDL of animals

N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



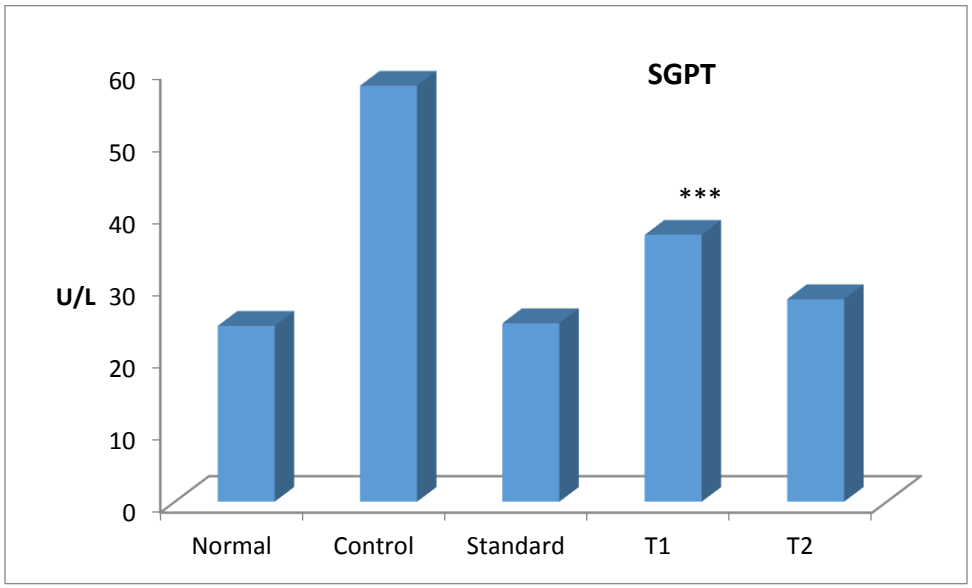
Histogram showing the effect of Ochna obtusata on VLDL of animals

N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



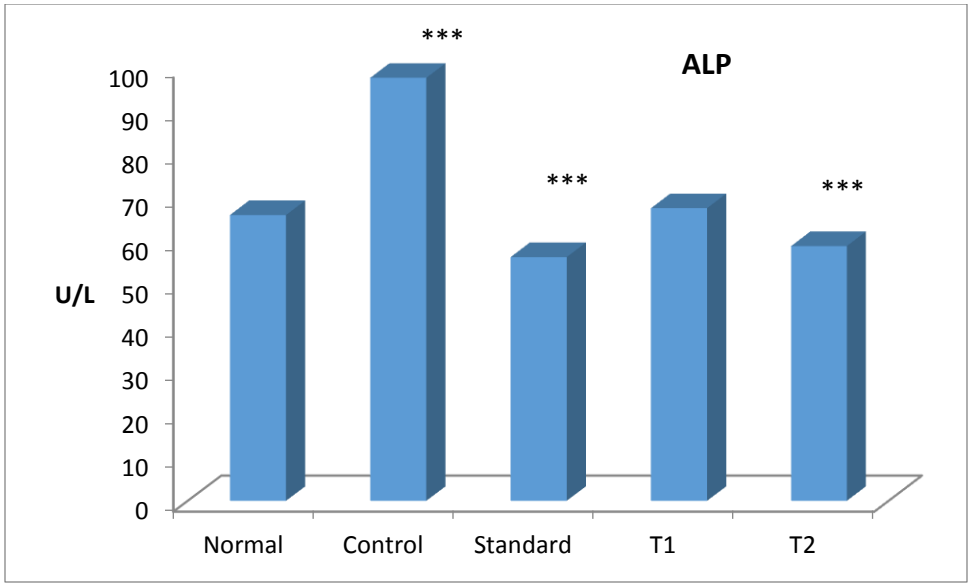
Histogram showing the effect of Ochna obtusata on SGOT of animals

N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control



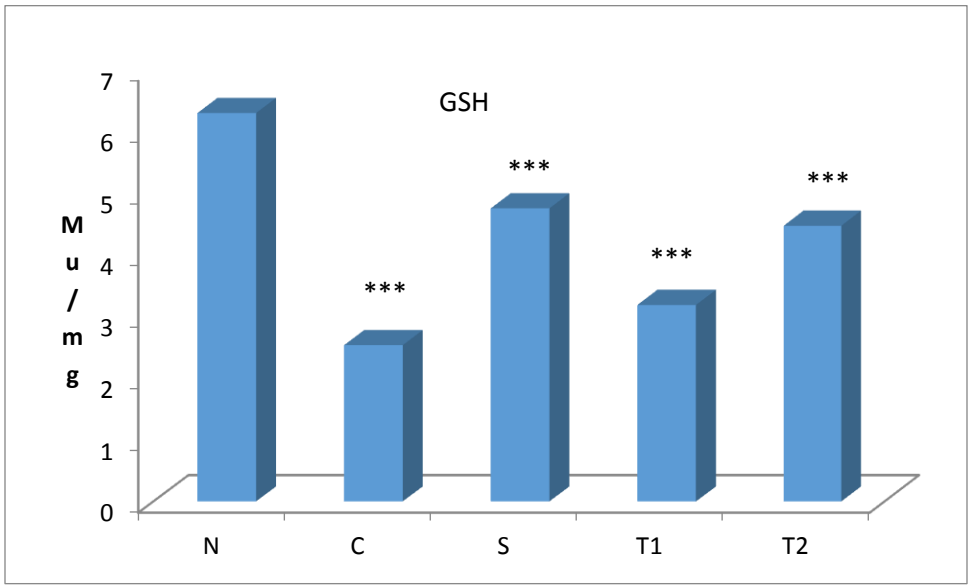
Histogram showing the effect of Ochna obtusata on SGPT of animals

N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control



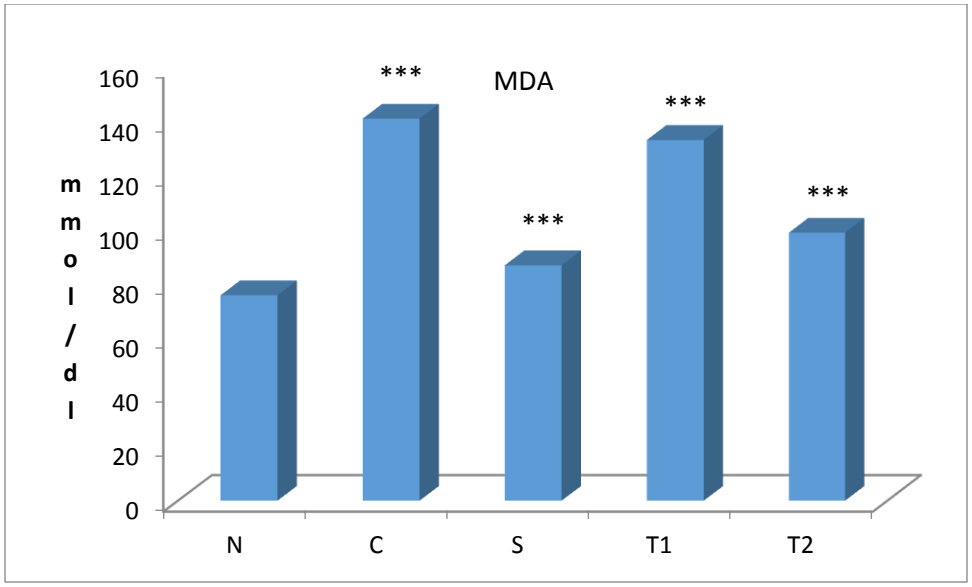
Histogram showing the effect of Ochna obtusata on ALP of animals

N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



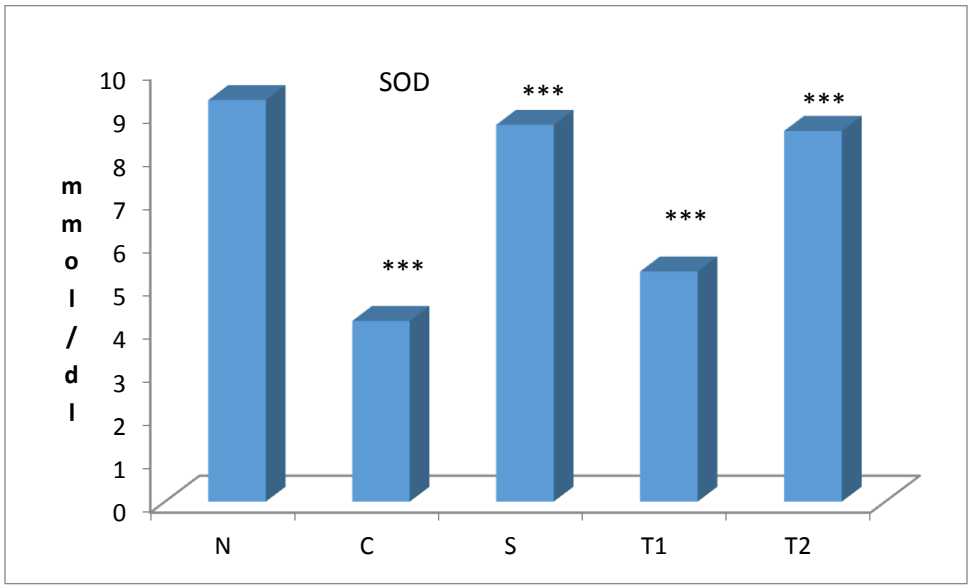
Histogram showing the effect of Ochna obtusata on GSH of animals

N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



Histogram showing the effect of Ochna obtusata on MDA of animals

N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



Histogram showing the effect of Ochna obtusata on SOD of animals

N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control

Preliminary phytochemical screening studies proves that the extract Ochna obtusata DC. Contains the Alkaloids, steroids, fixed oils, cardio tonic aglycones, flavonoids, saponins, carbohydrates, proteins, resins.

The presence of the steroids reduces the absorption of cholesterol and decreases the cholesterol concentration. Secondary metabolite like the flavonoids, saponins, reduces the cholesterol levels. Saponins will act as anti hyperlipidaemics by binding with the cholesterol and is readily absorbed by the bile acids causing the reduction in extra hepatic circulation and increases the metabolism of cholesterol to sterols through the fecal excretion. Saponins will as reported to increase the lipoprotein lipase activity and helps in the faster removal of free

fatty acids from circulation causes decrease in fatal cholesterol.

Elevated cholesterol levels will promotes the atherosclerosis. High cholesterol levels are associated with the increased incidence of coronary heart diseases. Reduction in the cholesterol and the HDL concentration significantly reduces the cholesterol levels.

Atorvastatin is a member of the drug class of statins, it is the first specific inhibitor used for lowering cholesterol (hypo-lipidemic agent) in those with hyper-cholesterolemia and so preventing cardio vascular disease. It is a naturally occuring drug found in food such as oyster mushrooms and red yeast rice. It reduces the levels of "bad" cholesterol (LDL) and Triglycerides in the blood, while increasing levels of "good" cholesterol (HDL). It is an inhibitor of 3-hydroxy-3 methyl glutaryl-CoA reductase (HMG-CoA reductase), an enzyme that catalyses the conversion of HMG-CoA to mevalonate. Mevalonate is a required building block for cholesterol biosynthesis and Atorvastatin interferes with its production by acting as a reversible competitive inhibitor foe HMG-CoA, which binds to the HMG-CoA reductase. It works by slowing the production of cholesterol in the body. Build up of cholesterol and fats along the walls of the blood vessels (A process known as Atherosclerosis) decreases blood flow and therefore, the oxygen supply to the heart, brain and other parts of the body. Lowering blood levels of cholesterol and fats may help to decrease the risk of heart disease, Angina (chest pain), strokes and Heart attacks. In addition to taking a cholesterol-lowering medication, making certain changes in our daily habits can also lower the blood cholesterol levels.

Effect of different extracts of *Ochna obtusata* on serum lipid profile

The serum level of triglycerides and cholesterol and it can be seen that the HFD group shows significant hyperlipidemia when compared with the normal control group. The extract treated groups and the standard treated group significantly decreased the serum levels of cholesterol and triglycerides when compared with the HFD control group ($p<0.05$). The effect of ethanol extract on serum lipid levels was as better that of the standard treated group, showing the hypolipidemic potential of the plant.

Effect of different extracts of *Ochna obtusata* on Total protein profile

The serum level of total protein and it can be seen that the HFD group shows significant decrease in total protein levels when compared with the normal control group. The extract treated groups and the standard treated group significantly increased the serum levels of total protein when compared with the HFD control group ($p<0.001$). The effect of ethanol extract on levels was better as that of the standard treated group, showing the hypolipidemic potential of the plant.

Effect of different extracts of *Ochna obtusata* on SGOT, SGPT and ALP levels

AST, ALT, SGOT, SGPT, and GGT and Alkaline Phosphatase are abbreviations for proteins called enzymes which help all the chemical activities within cells to take place. Injury to cells releases these enzymes into the blood. They are found in muscles, the liver and heart. Damage from alcohol and a number of diseases are reflected in high values. AST/SGOT, ALT/ SGPT are also liver and muscle enzymes. They may be elevated from liver problems, hepatitis, excess alcohol ingestion, muscle injury and recent heart attack. [17] An atherogenic diet has been reported to induce glomerulo sclerosis /nephropathy and mild tubular and hepatic damage experimental rats [18] In case of the effect of ethanol extract on enzymes (SGOT, SGPT and ALP), the extract shows significantly lower levels of SGOT, SGPT and ALP in comparison to the Atherogenic diet control group ($p<0.05$). Here the maximum reduction was observed for standard followed by ethanol extract.

Effect of different extracts of *Ochna obtusata* on GSH, MDA, SOD levels

The ability of the **Ochna *obtusata*** to protect against aortic, liver antioxidant enzyme depletion was also investigated. The results revealed a significant ($p < 0.001$) increase in the activity of superoxide dismutase (SOD), glutathione (GSH) and MDA levels of the diet-induced atherosclerogenic control group compared with the animals on a standard diet. The increase in MDA formation is consistent with observations reported. [19]. In case of the effect of ethanol extract on enzymes (GSH, SOD), the extract shows significantly increase levels of GSH, SOD in comparison to the Atherogenic diet control group

($p<0.001$). Here the maximum reduction was observed for standard followed by ethanol extract.

SUMMARY AND CONCLUSION

Phytochemical screening of the extract shows the presence of chemical constituents like Alkaloids, steroids, fixed oils, cardio tonic aglycones, flavonoids, saponins, carbohydrates, proteins, resins. Acute toxicity tests were performed according to the OECD guide line no.423, LD50 value was found to be 200mg/kg and 400mg/kg.

Anti atherosclerotic activity was performed by using the high fat diet induced method. In the present study an increase in plasma HDL-cholesterol with a concomitant percentage decrease from other lipid was observed. It can be concluded from the present data that the levels of total serum cholesterol, triglyceride and MDA which are actually raised in atherogenic diet, can be lowered significantly with Ochna ***obtusata*** Dc. And total proteins and antioxidant parameters SOD, GSH which are actually lowered in atherogenic diet can be raised significantly with **Ochna *obtusata*** Dc

From this we can conclude that the extract (***Ochna obtusata*** Dc.) Showed the anti atherosclerotic activity.

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