



**ORIGINAL RESEARCH PAPER**

**Pharmacy**

**COMPARISON BETWEEN HYPOLIPIDEMIC EFFECT OF *LAGENARIA SICERARIA* AND LOVASTATIN IN HYPERCHOLESTEROLEMIC RATS**

**KEY WORDS:** Hyperlipidemia, *Lagenaria siceraria*, lipoproteins, Lovastatin

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**ABSTRACT** Hyperlipidemia is acknowledged to be a major risk factor for atherosclerosis and cardiovascular diseases. The purpose of the study is to compare between the hypolipidemic effect of *Lagenaria siceraria* and Lovastatin in hypercholesterolemic rats. Hyperlipidemic rats were randomized into two groups (5 in each). Oral administration of the aqueous extract of *Lagenaria siceraria* (200 mg/kg b.wt/day) to Group I and Lovastatin (7.2 mg/kg b.wt/day) to Group II, once in a day for two weeks was done. Both the group has shown significant reduction in total cholesterol (TC), triglycerides (TG), low density lipoprotein (LDL) and very low density lipoprotein (VLDL), but Group II has shown higher reduction. Thus, the study concludes that besides the standard drug lovastatin, *Lagenaria siceraria* can also serve as a drug for treating hyperlipidemia.

**INTRODUCTION**

Cardiovascular disease with an incidence of approximately 50% is the main cause of death in most advanced countries<sup>1</sup>. The underlying primary cause of cardiovascular disease is believed to be atherosclerosis, a progressive multifactorial disease of the arterial wall .central to the pathogenesis of atherosclerosis is deposition of cholesterol in the arterial wall<sup>2,3</sup>.

In the past decade, there has been a great increase in the use of complementary treatments such as herbal remedies in the treatment of disease. Most lipid lowering drugs used in the treatment of hyperlipidemic patients and many traditional plants with therapeutic properties are claimed to be useful in the control of hyperlipidemia and associated pathologies<sup>4-7</sup>.

The deleterious effects of high blood cholesterol and the beneficial effects of lowering blood cholesterol in reducing morbidity and mortality from cardiovascular diseases are well established. Non pharmacological measures like dietary restriction and exercise may help in lowering blood cholesterol levels. When such therapy fails, and in patients with abnormally high blood cholesterol levels, drug therapy is indicated<sup>8</sup>. The available drugs like statins, fibrates and nicotinic acid, though very effective, have a spectrum of adverse effects and are costly. The reason for interest in *Lagenaria siceraria* was the low toxicity and the hope that it might be additive with other cholesterol lowering regimes.

Flavanoid have been shown to possess a variety of biochemical and pharmacological activities, including hypolipidemic effects cardioprotective and antioxidant properties<sup>9</sup>. *Lagenaria siceraria* contain Flavanoid and these Flavanoid may prevent oxidative damage<sup>10</sup>.

*Lagenaria siceraria* (Mol.) Standley fruit (Syn. *L.vulgaris* Ser., *Cucurbita lagenaria* Linn., family Cucurbitaceae) commonly known as bottle gourd is used as a vegetable in India. The fruit is traditionally used as a cardi tonic, aphrodisiac and general tonic<sup>11</sup>, liver tonic and against liver disorders and pain<sup>12</sup>, anti-inflammatory, expectorant and diuretic agent<sup>13</sup>. Further, antihepatotoxic activity of fruit pulp<sup>14</sup>, analgesic and anti-inflammatory activity of fruit<sup>15</sup>, and hypolipidemic activity of the fruit have also been evaluated<sup>16</sup>.

The purpose of study was to elucidate the effect of fruit aqueous extract of *Lagenaria siceraria* on cholesterol absorption and on lipoprotein profile in plasma in rats fed on high cholesterol diet.

**MATERIALS AND METHODS**

**CHEMICALS**

Cholesterol extra pure which was used for the induction of hyperlipidemia was obtained from (Loba chemicals, Mumbai). Lovastatin (standard drug) obtained from Dr. Reddy's pharmaceuticals, Mumbai. Cholesterol and triglycerides testing kit (for the measurement of lipid profile parameters.) were obtained from span diagnostic Pvt. Limited. Coconut oil (used as a vehicle for cholesterol feeding to animals) and all other chemicals used were of analytical grade.

**PROCUREMENT AND IDENTIFICATION OF PLANT MATERIAL**

Selected plant material was collected from the local market of Jhansi and procured for the further study. Fruit part of the chosen plant material was collected and kept at standard storage conditions for further investigations.

**ANIMALS**

Healthy male albino rats of Wistar strain, weighing 150-200 gm procured from DRDE Gwalior were used for the study. The animals were acclimatized and housed under hygienic and standard environmental conditions (temperature: 24 ± 1°C, light/dark cycle: 12/12 h). The animals were given standard pellet diet and water ad libitum. The experimental work was carried out in the Department of Pharmacology, Institute of Pharmacy, Bundelkhand University Jhansi, UP, India. The experiment protocol was approved by the Institutional animal ethics committee and also fulfil the guidelines of CPCSEA.

**PREPARATION OF *LAGENARIA SICERARIA* EXTRACT**

The unzipped fruit was isolated from the plant and was applied to grinder mill to get the uniform size of the fruit. About 5 kg material was subjected to extraction. The material was extracted out by simple electric juicer and was mixed with distilled water and allowed to stand for seven days (shaking occasionally). The filtrate was then dried at 40-60°C on water bath. The residue was then collected and kept in airtight container for further investigation. After some time the residue was evaluated for the presence of active phytoconstituents present in the extract. The *L.siceraria* fruit extract showed the presence of Carbohydrates, Saponins, Phenolic compound, Tannins, Proteins, Amino acids and Flavonoids<sup>17</sup>.

**INDUCTION OF HYPERLIPIDEMIA**

Hyperlipidemia was induced in experimental rats by administering cholesterol for 30 days at a dose of (400 mg/kg body weight).

**EXPERIMENTAL DESIGN**

Rats selected from colonies were randomized in to two groups, comprising of 5 rats each. During the study, cholesterol was given to rats for 30 days while the extract was suspended in distilled water and administered orally to the hyperlipidemic rats for two weeks.

The treatment schedule was as follows:

Group-I: Hyperlipidemic rats administered with *Lagenaria siceraria* aqueous extract (200 mg/kg b.wt/day)

Group-II: Hyperlipidemic rats administered with Lovastatin (7.2 mg/kg b.wt/day) Carboxy methyl cellulose 0.25% w/v was used as a vehicle to administer Lovastatin. After 30 days treatment, the animals were fasted for 12 hrs and then the blood samples were withdrawn with the help of micro capillary tubes from retro orbital sinus of the rats. The blood sample was centrifuged at 2500 rpm/10 min to get serum.

**BIOCHEMICAL ANALYSIS**

Total cholesterol (TC), triglycerides (TG), high density lipoprotein (HDL), low density lipoprotein (LDL) and very low density lipoprotein (VLDL) in serum were determined using various enzymatic kits (Span diagnostic Pvt. Limited) according to the manufacturer's instructions.

**STATISTICAL ANALYSIS:**

Un-paired t-test was performed. P value of less than 0.05 was taken as statically significant.

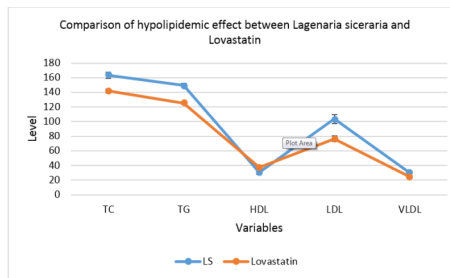
**RESULTS AND DISCUSSION**

The results of this study showed significant lowering of serum cholesterol, triglyceride, LDL, VLDL in *Lagenaria siceraria* treated animals. However the fall in biochemicals was less than that of the group treated with lovastatin. The effect of drug (*Lagenaria siceraria*) in hypercholesterolemic rats, also resulted in some increase in HDL level.

Hyperlipidemia leads to increase production of oxygen free radical<sup>18</sup> which exert their cytotoxic effect by causing lipid peroxidation. Elevated level of lipid peroxidation product may be responsible for some of the pathological effect in the hyperlipidemia. There are changes in the enzymatic and non-enzymatic antioxidant defense system suggesting reduced resistance to free radical mediated damage. Administration of different plant extract significantly decreased the level of elevated lipid peroxidation products in the hyperlipidemic rats.

In the present study, TC, TG, and LDL level decreased and serum HDL cholesterol level increased after administration of *L. Siceraria* aqueous extract. It is well known that increase in HDL is beneficial in hyperlipidemic conditions<sup>19</sup>. HDL exerts an atherogenic effect by counteracting LDL oxidation and facilitating the translocation of cholesterol from peripheral tissue like arterial walls to liver for catabolism. Thus, combined reduction of TC, TG, and LDL reduces the incidence of atherosclerosis.

The mechanism for the observed lipid lowering activity of *Lagenaria siceraria* was not estimated in the present study. But it could be due to the reason that presence of flavonoids may be responsible for its antioxidants as well as hypolipidemic actions per literature survey



**Graph 1 Shows The Change In Biochemical After Administration Of *Lagenaria Siceraria* And Lovastatin In Hyperlipidemic Rats**

**CONCLUSION**

The study concluded that *Lagenaria siceraria* can serve as a potential drug in the management of patients with hyperlipidemia. However, more effectiveness can be seen by altering the doses. The exact pathomechanism is also not known therefore, further studies are required to establish the efficacy of the *Lagenaria siceraria* extract as a hypolipidemic drug.

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**Table 1 Shows The Comparison Between The Biochemical Variables Of The Groups**

Variables	<i>Lagenaria siceraria</i> (LS) (Group I)	Lovastatin (Group II)	p-value
Total Cholesterol (TC)	163.40±4.24	141.98±2.59	0.0001
Triglycerides (TG)	149.22±2.66	125.50±1.81	0.0001
High Density Lipoprotein (HDL)	30.64±2.30	37.28±1.68	0.0008
Low Density Lipoprotein (LDL)	103.42±6.40	76.49±3.81	0.0001
Very Low Density Lipoprotein (VLDL)	30.11±0.93	24.64±0.61	0.0001