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### Anti-Hyperlipidemic Potential of ethanolic root extract of plant *Ficus Religiosa* linn in Rats

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#### ABSTRACT

Hyperlipidemia is considered one of the major risk factors for cardiovascular diseases (CVDs). It is believed that CVDs will turn out to be the main cause of death worldwide by the year 2020. Herbal medicines are gaining popularity because of their natural origin and less side effects. *Ficus religiosa* Linn is commonly known as peepal plant; can cure hyperlipidemia as mentioned in the literature survey of traditional Indian system of medicine. The aim of the present study is to determine the effect of *Ficus Religiosa* Linn on Triton-X 100 induced hyperlipidemia in rats. The animals were divided into four groups of six rats each. Group I: Normal control group received standard pellet diet and water with 5% carboxy methyl cellulose. Group II, III and IV were made hyperlipidemic by single intraperitoneal injection of Triton-X 100 at a dose of 100mg/kg. Group II marked as diseased group received vehicle only, Group III received ethanolic plant extract (200mg/kg) and was marked as treated group while group IV received standard drug Fenofibrate (65mg/kg) and marked as standard group. Triton-X 100 is a surfactant which increases the synthesis of hepatic cholesterol. Research suggested that various parameters like animal body weight, cholesterol, triglycerides, (VLDL) very low density lipoprotein, (LDL) low density lipoprotein were decreased & (HDL) high density lipoprotein was increased when compared with hyperlipidemic control group. Result showed that ethanolic extract having hypolipidemic activity; bioactive compounds present in ethanolic extract were responsible anti-hyperlipidemic effect.

**Keywords:** Hyperlipidemia, *Ficus religiosa* Linn, Triton-X 100, Fenofibrate.

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## INTRODUCTION

Hyperlipidemia is defined as an elevation of lipid levels in the blood.<sup>1</sup> It is characterized by elevated serum total cholesterol, low density lipoprotein, very low density lipoprotein and decreased high density lipoprotein levels.<sup>2</sup> According to American Heart Association, the Centre for Disease Control and Prevention, the National Institutes of Health and other government sources, cardiovascular disease is the leading global cause of death, accounting for more than 17.3 million deaths per year, a number that is expected to grow to more than 23.6 million by 2030.<sup>3</sup> Hyperlipidemia and associated lipid disorders are considered as the major causes of atherosclerotic cardiovascular diseases, ischemic heart disease, stroke, and cerebrovascular diseases.<sup>4</sup> A herbal approach for hypercholesterolemia is a wise choice with comparatively less adverse effects and is relatively inexpensive. They are also effective in reducing the lipid levels in the system.<sup>5</sup> Plant drugs are frequently considered to be less toxic and free from side effects than synthetic ones.<sup>6</sup> *Ficus religiosa* linn commonly known as peepal tree (belongs to the Moraceae, the fig or mulberry family), is a large perennial tree that grows throughout India and south-east Asia. Preliminary phytochemical screening of *Ficus religiosa* barks has shown the presence of tannins, saponins, flavonoids, steroids, terpenoids, cardiac glycosides, bergapten, bergaptol, lanosterol,  $\beta$ -sitosterol, stigmasterol, lupen-3-one,  $\beta$ -sitosterol-d-glucoside (phytosterolin), and vitamin K<sub>1</sub>.<sup>7</sup> *Ficus Religiosa* Linn is a perennial or deciduous tree, 20 m tall, irregularly-shaped, with wide-spreading branches and without aerial roots from the branches. The leaves are glossy, slim, and have 5-7 veins. The fragmented bark is white or brown in color. The

fruits are small, about ½ inches in diameter, and it looks like the pupil of the eye. It is compressed and round in shape. The leaves are dark green leaves, glossy, alternate, coriaceous (leathery), broadly ovate and spirally arranged by 7.5-10 cm, base -chordate, pink when young, stipulate and with unusual tail-like tips. Flowers are axillary sessile, unisexual. Figs are in pairs, rounded, flat-topped green to 1.5 cm across, smooth, sessile, axillary, basal bracts and ripening to purple with red dots. Petioles are slender and 7.5-10 cm long.<sup>8</sup> Peepal is used various systems of medicine like Ayurveda, Unani and Siddha in the form of various formulations. The entire parts of plant exhibit a wide spectrum of medicinal importance as an anticancer, antioxidant, antidiabetic, antimicrobial, anticonvulsant, anthelmintic, antiulcer, antiasthmatic, antiemetic, cough, sexual disorders, diarrhea, haematuria, earache, migraine, eye troubles, gastric problems and scabies.<sup>9</sup> The leaf decoction was used as in toothache. The stem bark was used in gonorrhoea, bleeding, paralysis, diabetes, diarrhea, bone fracture, as antiseptic, astringent and antidote.<sup>10</sup> Apart from these few preliminary studies the ethanolic root extract of plant *Ficus Religiosa* linn has not been widely studied for its hypolipidemic effects. The current study, therefore, was envisaged to investigate the hypolipidemic effects of *Ficus religiosa* linn in Triton-X 100 induced hyperlipidemic rat models in order to rationalize its medicinal use in hyperlipidemia.

## MATERIAL AND METHODS

### Plant Material

Plant part (root) were collected from local area of Alwar Pharmacy College, Alwar and authenticated by Research Director & Assistant Professor at R. R.

Government College, Alwar. Herbarium sample was also preserved at R. R. College, Alwar.

### Animals

Healthy Wistar albino male rats weighing between 150-200 gm were taken for the study. They were housed under controlled conditions of temperature ( $22 \pm 30^\circ\text{C}$ ), the relative humidity should be at least 30% but not exceed 70% (other than during room cleaning) It was  $55 \pm 5\%$ . Lighting was artificial it was 12 h light and 12 h dark cycles according to OECD Guideline 423. Standard pellet diet and water given to all animals. The present work was carried out with a prior permission by IAEC of Alwar Pharmacy College with CSPSEA registration number 963/c/06/ CPCSEA.

### Chemicals

All the reagents, chemicals and drugs are of standard quality and purchased by local market of Jaipur.

### Ethanollic extract preparation

Authenticated root of *Ficus Religiosa* Linn were washed with clean water before drying in oven at a temperature of  $40^\circ\text{C}$  until the moisture content was below 14%. This reduces the chances of fungus infection in samples. The dried root was grinded and stored in airtight container. Ethanollic extraction was carried out by soxhlet extraction. Quantity of powdered material used for ethanollic extraction was 150 gm. These powdered materials of plant root were defatted with Petroleum Ether for 72 hours in a Soxhlet apparatus. Then after 72 hours these defatted material is subjected to extraction with ethanol (99.99%) in a Soxhlet apparatus for 48 hours. Make the extract dry under reduced pressure and controlled temperature ( $40\text{-}50^\circ\text{C}$ ) using flash evaporator. The ethanollic extract obtained was concentrated under reduced pressure.<sup>11</sup>

### Preliminary phytochemical screening:

The ethanollic extract of *Piper attenuatum* B. Ham leaves was tested for the presence of various phytoconstituents such as carbohydrate, alkaloids, glycoside, phenolic compound, tannins, saponins, flavonoids, fixed oils and fat test. All phytochemical tests were done as per the procedure given in the standard book.<sup>12-16</sup>

### Hepatoprotective Activity

- a. Triton-X 100 induced hyperlipidemic rat model

### Procedure

Hyperlipidemia was induced in wistar albino rats by single intraperitoneal injection of freshly prepared solution of Triton X-100 (100 mg/kg) in physiological saline solution after overnight fasting for 18 hour's. The animals were divided into four groups of six rats each. The Group I was marked as Normal; received standard pellet diet, water orally administered with 5% carboxy methyl cellulose. Group II, III & IV were made Hyperlipidemic by Triton X-100 at a single dose of 100 mg/kg, intraperitoneally. After 72 hours of Triton-X 100 injection, these groups were received a daily dose of 5% carboxy methyl cellulose orally for 7 days. Group II was marked as diseased group while Group III was administering a daily dose of *Ficus religiosa* linn 200mg/kg/day orally for 7 days and Group IV was administering with the standard drug Fenofibrate (65mg/ kg body weight) orally for 7 days. On the 8<sup>th</sup> day the blood sample was collected by the Tail vein. Serum sample was analyzed for cholesterol, triglyceride, serum LDL, VLDL and HDL. The animals were weighted at the beginning and end of the experimental period.<sup>17</sup>

### Statistical Analysis

Results interpretation was done after subjecting the data obtained from various studies. Statistical analysis was performed using Graph pad Prism 9.0.2 version which included one way ANOVA followed by test like Dunnett and t-test. P<0.05 is considered as statistically significant.

**RESULT**

Ethanollic extract at a dose of 200mg/kg of *Ficus Religiosa* Linn show's significant Anti-hyperlipidemic activity in Triton-X 100 induced

hyperlipidemia in rats. Single dose of ethanolic extract showed significantly reduced body weight (P< .01), cholesterol ((P< .001)), Triglycerides ((P< .001)), Low Density Lipoproteins ((P< .01)), Very Low Density Lipoproteins ((P< .01)) and increase in High Density Lipoproteins ((P< .001)) when compared to hyperlipidemic control group. Fenofibrate (65mg/kg) was used as standard drug. (Table 1).

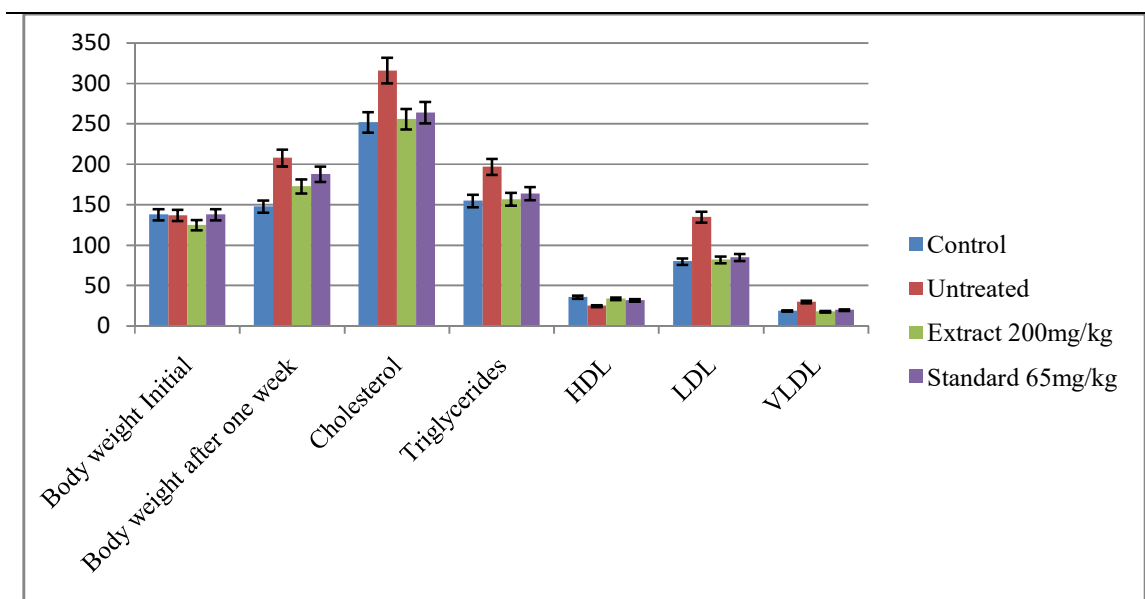
**Table 1: The effect of *Ficus Religiosa* linn ethanolic root extracts on Triton X-100 induced Hyperlipidemia in rats**

Sr. No.	Groups	Body Weight Initial	Body Weight after one week	Cholesterol (mg/dl)	Triglyceride (mg/dl)
I	Normal	138.8 ± 4.2	148.8 ± 4.2	252 ± 1.7	155.0 ± 1.4
II	Untreated	137.5 ± 6.2	208.8 ± 4.2	316 ± 1.6	197.0 ± 1.2
III	Extract 200mg/kg	125 ± 6.4	173.8 ± 2.3**	256.3 ± 1.4***	157.3 ± 1.2***
IV	Standard 65mg/kg	138.8 ± 4.2	188.8 ± 4.2***	264.5 ± 2.0***	164.0 ± 2.3***

Values are in mean ± SEM; Number of animals in each group n = 6, \* P < 0.05, \*\*P< .01, \*\*\*P<.001

**Table 2: Effect of *Ficus Religiosa* linn on biochemical parameters**

Groups	HDL (mg/ dl)	LDL (mg/ dl)	VLDL (mg/ dl)
Control	36.3±0.07	80.9±0.5	19.4±0.16
Untreated	25.3±0.06	135.2±0.13	30.6±0.05
Extract 200mg/kg	34.1±0.11***	82.9±0.15**	18.9±0.09**
Standard 65mg/kg	32.2±0.07***	85.0±0.25***	20.6±0.10***



**Figure 1: The effect of *Ficus Religiosa* linn ethanolic root extracts on Triton X-100 induced Hyperlipidemia in rats**

## DISCUSSION AND CONCLUSION

Triton X-100 has been widely used to block clearance of triglyceride-rich lipoproteins to induce acute hyperlipidemia in several animals. The large increase in plasma cholesterol and triglycerides due to Triton X-100 injection results mostly from an increase of VLDL secretion by the liver accompanied by a strong reduction of VLDL and LDL catabolism.<sup>18</sup> From the study it was concluded that ethanolic plant extract have various phytoconstituents like Carbohydrates, Proteins, Glycoside's, Alkaloid's, Tannins, Phenolic compounds and Flavonoids. Result shows that plant extract (200mg/kg) significantly decrease body weight, cholesterol, triglycerides, LDL and VLDL while increase in HDL level. The result suggests that cholesterol-lowering activity of the plant extract can be a result from the rapid catabolism of LDL. The results of the present study are encouraging and may

reveal the importance of *Ficus religiosa* linn as an economical antihyperlipidemic agent. But details of the complete mechanism have yet not been explored. Therefore, further experiments are required to elucidate the exact mechanism of action. Also, more specific and longer duration animal and human studies are required to further expand the existing therapeutic potential of *Ficus religiosa* linn and provide a convincing support to its future clinical use in modern medicine.

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