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# Evaluation of Antihyperlipidemic activity of *Mimusops elengi* L. in Triton WR- 1339 induced hyperlipidaemia in rats

**Ghaisas M. M*, Kadam A. H, Kshirsagar B. D, Dhote V. V, Deshpande A. D.**

Department of Pharmacology, Pad. Dr. D. Y. Patil Institute of Pharmaceutical Sciences and Research, Pimpri, Pune - 411 018. India

**Abstract**

Objective: The present study was undertaken to explore antihyperlipidemic effect of ethanolic extract of *Mimusops elengi* L. (ME) in Triton WR-1339 induced hyperlipidemia in rats. Materials and methods: The wistar rats were divided in to Normal control (NC), Hyperlipidemic group (HG), Fenofibrate group (FG), *Mimusops elengi* L. (ME) treated groups (100, 300, 600 mg/kg, p.o.). Hyperlipidemia in all groups was induced by single i.p. injection of Triton WR-1339 at a dose of 200 mg/kg except normal control. Result: The groups treated with *Mimusops elengi* L. showed significant reduction ($p<0.01$) in levels of triglyceride and total cholesterol as compared to HG after 7 and 24 h of induction. Even after 48 h the groups treated with *Mimusops elengi* L. showed significant decrease ($p<0.01$) in level of triglyceride in groups ME 300, ME 600 and significant decrease ($p<0.05$) in level of total cholesterol in groups ME 300, ME 600 respectively as compared to HG. Moreover HDL level was significantly elevated ($p<0.01$) in the groups ME 300, ME 600 after 7 and 24 h, however it was significantly elevated ($p<0.01$) only in ME 600 after 48 h of the treatment. Conclusion: Hence it can be concluded that *Mimusops elengi* L. has significant antihyperlipidemic effect owing to its ability to reduce the levels of total cholesterol, triglyceride and increasing the level of HDL.

**Key words:** Hyperlipidemia, *Mimusops elengi* L., Triton WR- 1339

## 1. Introduction

Cardiovascular disorders are most common cause of mortality world wide [1]. It is well established that hyperlipidemia represents major risk factor for development of atherosclerosis and cardiovascular complications [2]. The ideal approach to prevent or to treat atherosclerosis and CVS complications is to target the lipid profile of hyperlipidemic patients using lipid lowering drugs or improving the diet. Traditional systems of medicine like Ayurveda, Unani, and Chinese prescribe numerous herbal drugs for cardiovascular disorders. However numbers of herbal drugs are still to be evaluated pharmacologically.

* Corresponding author
Email: ghaisasmm@yahoo.com

*Mimusops elengi* L. (Family: Sapotaceae) is an evergreen tree found all over India. It is also cultivated in garden as an ornamental tree. *Mimusops elengi* L. is traditionally being used as cardiotonic [3] and reported for its hypotensive [4], antiulcer [5], spasmolytic [6] and antibacterial activity [7]. It is also documented for the presence of flavonoids, steroids, saponins, alkloids, triterpiens, glycosides [8, 9, 10, 16]. However there is no report available for antihyperlipidemic activity of *Mimusops elengi*. Hence the present study was designed to investigate the antihyperlipidemic activity of *Mimusops elengi* L. on Triton WR- 1339 induced hyperlipidemia in rats.

## 2. Materials and methods

### *2.1. Collection and extraction*

The fresh bark of *Mimusops elengi* L. was collected in September 2006 from mature tree growing near Mokal-ohal District Ahmednagar, Maharashtra, India. Its botanical identification was confirmed by Botanical Survey of India, Pune (voucher specimen number BSI/WC/Tech/2006/664). The plant material (bark) was dried, powdered and defatted using petroleum ether. It was air dried and extracted exhaustively with 70% alcohol. Total extract was evaporated in vacuum to yield 25.2% (w/w) brown solid.

### *2.2. Drugs*

Fenofibrate (Zydus Cadila), Triton WR-1339 (isooctyl-polyoxyethylene phenol) (Sigma Aldrich, USA), Carboxy Methyl Cellulose (CMC) and all other chemicals used were of analytical grade.

Fenofibrate administered orally in saline solution, bark extract was administered as an aqueous suspension in 1% CMC and Triton WR- 1339 was injected i.p. in saline solution.

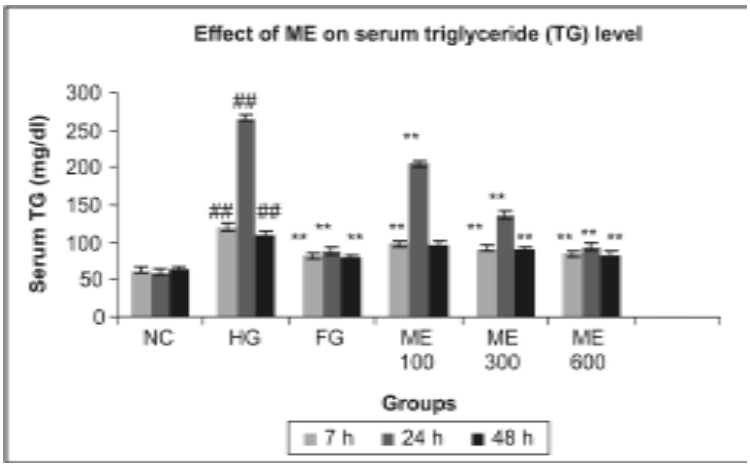


Fig. 1. Effect of *Mimusops elengi* L. on serum triglyceride level in Triton WR- 1339 induced hyperlipidemic rats. Values are Mean ± S.E.M
NC: Normal control:1% CMC (1 ml/kg, p.o.)
HG: Hyperlipidemic group (Triton 200 mg/kg, i.p.)
FG: Fenofibrate group (65 mg/kg, p.o.)
ME 100: *Mimusops elengi* L. (100 mg/kg, p.o.)
ME 300: *Mimusops elengi* L. (300 mg/kg, p.o.)
ME 600: *Mimusops elengi* L. (600 mg/kg, p.o.)
n=5, # #p<0.01 Vs NC, ** p<0.01 Vs HG.

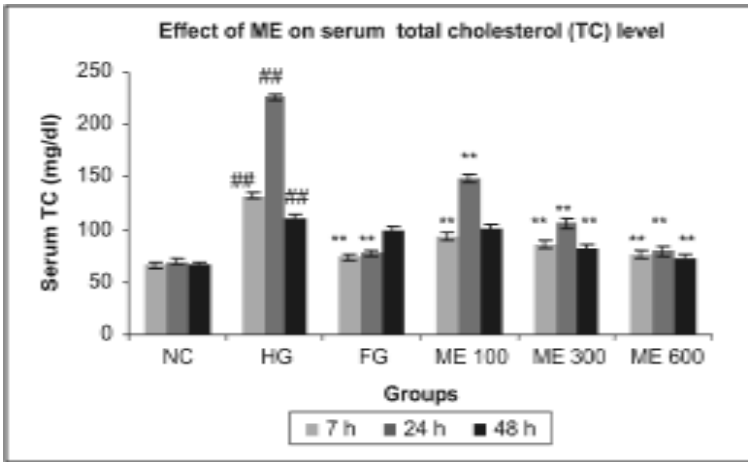


Fig. 2. Effect of *Mimusops elengi* L. on serum total cholesterol level in Triton WR-1339 induced hyperlipidemic rats. Values are Mean ± S.E.M
NC: Normal control: 1% CMC (1 ml/kg, p.o.)
HG: Hyperlipidemic group (Triton 200 mg/kg, i.p.)
FG: Fenofibrate group (65 mg/kg, p.o.)
ME 100: *Mimusops elengi* L. (100 mg/kg, p.o.)
ME 300: *Mimusops elengi* L. (300 mg/kg, p.o.)
ME 600: *Mimusops elengi* L. (600 mg/kg, p.o.)
n=5, # # p<0.01 Vs NC, * * p<0.01 Vs HG

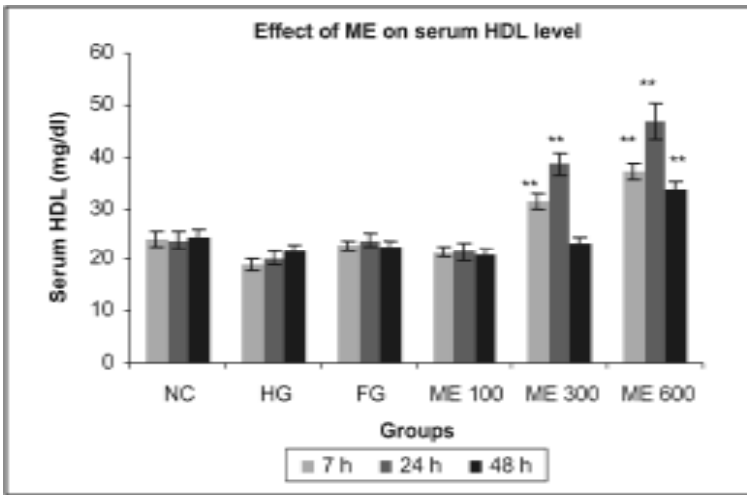


Fig. 3. Effect of *Mimusops elengi* L. on serum HDL level in TritonWR-1339 induced hyperlipidemic rats. Values are Mean ± S.E.M
NC: Normal control: 1% CMC (1 ml/kg, p.o.)
HG: Hyperlipidemic group (Triton 200 mg/kg, i.p.)
FG: Fenofibrate group (65 mg/kg, p.o.)
ME 100: *Mimusops elengi* L. (100 mg/kg, p.o.)
ME 300: *Mimusops elengi* L. (300 mg/kg, p.o.)
ME 600: *Mimusops elengi* L. (600 mg/kg, p.o.)
n=5, ** p<0.01 Vs HG.

**Table 1.** Percent reduction in level of total cholesterol and triglyceride in Triton WR- 1339 induced hyperlipidemic rats.

| | After 7h | | After 24 h | | After 48 h | |
|---|---|---|---|---|---|---|
| Groups | TC (%) | TG (%) | TC (%) | TG (%) | TC (%) | TG (%) |
| FG | 44.35 ± 1.27 | 20.50 ± 2.26 | 65.35 ± 3.20 | 68.74 ± 2.02 | 2.89 ± 2.99 | 16.24 ± 1.95 |
| ME 100 | 17.42 ± 2.86 | 6.5 ± 1.99 | 10.66 ± 3.10 | 20.66 ± 2.94 | 2.44 ± 1.98 | 2.80 ± 1.54 |
| ME 300 | 31.22 ± 3.10 | 11.78 ± 2.46 | 53.27 ± 2.99 | 48.66 ± 3.42 | 7.71 ± 2.01 | 9.98 ± 2.95 |
| ME 600 | 42.30 ± 2.10 | 18.74 ± 2.83 | 64.33 ± 3.29 | 64.79 ± 2.74 | 11.78 ± 1.75 | 17.20 ± 1.68 |

Values are Mean ± S.E.M
TC: Total Cholesterol, TG: Triglyceride
FG: Fenofibrate group (65 mg/kg, p.o.)
ME 100: *Mimusops elengi* L. (100 mg/kg, p.o.)
ME 300: *Mimusops elengi* L. (300 mg/kg, p.o.)
ME 600: *Mimusops elengi* L. (600 mg/kg, p.o.)

### *2.3. Animals*

Adult male Wistar rats (180-220g) obtained from National Toxicological Center, Pune. Animals were housed with 12 h light and dark cycle at room temperature 22-23°C and fed with standard chow diet and water. The study protocol was approved by Institutional Animal Ethics Committee.

### *2.4. Experimental animal protocol*

Experimental rats, straved for 18 h, were provided water *ad libitum*. The rats were divided in 6 groups containing 5 animals each *viz*. Normal control (NC), Hyperlipidemic group (HG), Fenofibrate group (FG), *Mimusops elengi* L. (ME) treated groups (100, 300, 600 mg/kg, p.o.). All the groups received a single i.p. injection of Triton WR-1339 at a dose of 200 mg/kg, simultaneously with HG, FG and ME treated groups except normal control. The FG received Fenofibrate (65 mg/kg, p.o.) and ME treated groups received the *Mimusops elengi* L. extract 100, 300, 600 mg /kg p.o. immediately after injection of Triton WR-1339. In the following period of the study (48 h) animals had access only to water.

### *2.5. Biochemical estimation*

Blood samples were collected after 7, 24, 48 h of triton injection by retroorbital puncture. Blood was immediately centrifuged (2500 rpm for 10 min) and serum was analyzed for total cholesterol, triglyceride and HDL level using biochemical kits.

### *2.6. Stastical analysis*

Data analysed by unpaired'*t*' test and ANOVA followed by Dunnett's test. Values were expressed in mean ± SEM and p values $<0.05$ were considered significant.

## 3 Results

### *3.1. Induction of hyperlipidemia with Triton WR 1339*

The level of serum total cholesterol, triglyceride, HDL in groups NC, HG, ME 100, ME 300, ME 600 after 7, 24, 48 h from treatment are reported in Figure 1, 2 and 3 respectively. In HG group significant increase ($p<0.0001$) in the level of total cholesterol and triglyceride was observed 7, 24 and 48 h after induction as compared to NC. Increased level of serum total cholesterol and triglyceride after 7 h were observed 67% and 99.50% respectively. After 24 h further

elevation in the levels of total cholesterol and triglyceride were found to be 227.91% and 343.10% respectively. Whereas after 48 h level of cholesterol and triglycerides were found to be 56.54%, 57.54 % respectively. No significant change was observed in level of HDL after 7, 24 and 48 h.

*3.2. Effect of Mimusops elengi L. on lipid profile in hyperlipidemic rats*

*3.2.1 Effect on serum level of triglycerides*

The groups treated with *Mimusops elengi* L. showed significant decrease ($p<0.01$) in the level of triglycerides at all doses after 7 and 24 h, where as significant decrease ($p<0.01$) in the level of triglycerides was observed in groups ME 300, ME 600 after 48h. (Figure 1)

*3.2.2. Effect on serum level of total cholesterol*

The groups treated with *Mimusops elengi* L. showed significant decrease ($p<0.01$) in the level of total cholesterol at the all doses after 7 and 24 h, where as significant decrease ( $p<0.05$, $p<0.01$) in level of total cholesterol was observed in groups ME 300, ME 600 respectively after 48 h. (Figure 2)

*3.2.3. Effect on serum level of HDL*

The level of HDL significantly increased ($p<0.01$) in *Mimusops elengi* L. treated groups ME 300, ME 600 after 7 and 24 h. But it was significantly increased ($p<0.01$) only in group ME 600 after 48 h. (Figure 3)

*3.3. Effect of Fenofibrate on lipid profile*

Fenofibrate (65 mg/kg, p.o.) group showed significant decrease ($p<0.01$) in the level of triglycerides and total cholesterol after 7, 24 h. But no significant change was observed in the level of HDL after 7, 24, 48 h of treatment. The percent reduction in the level of serum total cholesterol and triglycerides after 7, 24 and 48 h in Fenofibrate and *Mimusops elengi* L. treated groups is shown in Table 1.

## 4. Discussion

Systemic administration of Triton WR 1339 in fasted rat induced hyperlipidemia. The maximum plasma triglyceride and total cholesterol were reached at 20 h followed by decline to normal values [11]. The plant constituents like steroids, flavonoids, saponins are reported to possess lipid lowering activity. The plant steroids reduce the absorption of cholesterol and thus increase feacal excretion of cholesterol [12]. Flavonoids augment the activity of lecithin acyl transferase (LCAT) which regulates blood lipids. LCAT plays role in the incorporation of cholesterol into HDL (this may increase the level of HDL). Several studies have showed that increase in HDL is associated with decrease in cardiovascular diseases [13, 15]. Saponins also act as antihyperlipidemic by binding with cholesterol in intestinal lumen, so that cholesterol is less readily absorbed and besides increasing lipoprotein lipase activity which helps in removal of VLDL and chylomicrons from circulation [14].

In present study, there was decrease in triglyceride and cholesterol in extract treated group. *Mimusops elengi* L. may act by inhibiting cholesterol synthesis and increase excretion of cholesterol, which may probably be due to presence of steroids and saponins. *Mimusops elengi* L. extract also increased the level of HDL which may be probably due to presence of flavonoids in extract [8, 9, 10, 16].

Hence it can be concluded that *Mimusops elengi* L. has significant antihyperlipidemic effect owing to its ability to reduce level of total cholesterol, triglyceride and increasing HDL level. Further experimentation needs to be done with regard to fractionation of extract, isolation, purification and characterization to explore active constituents responsible for antihyperlipidemic activity and to elucidate the possible biochemical mechanism.

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