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**Original Article**

# Anti-Hyperlipidemic activity of *murraya koenigii* leaves extract against fructose induced hyperlipidemia

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## ABSTRACT

Hyperlipidemia is the greatest risk factor of coronary heart disease. Currently available hypolipidemic drugs have been associated with number of side effects. Herbal treatment for hyperlipidemia has no side effects and is relatively cheap and locally available. A literature claimsthat flavonoids can able to reduce the hyperlipidemia. The literature available on *Murraya koenigii* Leaves suggested for the presence of flavonoid content, therefore the leaves of *Murraya koenigii* were selected and the present study was designed to investigate theanti-hyperlipidemicactivity of extract of *Murraya koenigii* fructose induced Hyperlipidemia. *Murraya koenigii* was administered at a dose of 100mg/kg and 200mg/kg per day, (p.o) to fructose induced Hyperlipidemic rats. Atorvastatin was used as reference standard.The statistical analysis was carried out using one way ANOVA followed by Tukey test. *Murraya koenigii* showed a significant decrease in the levels of serum cholesterol, triglycerides, LDL, VLDL and a gradual increase in the level of serum HDL at the dose of 200mg/kg/day (p.o) against fructose induced hyperlipidemia. Therefore the study concluded that the extract of leaves of *Murraya koenigii* effectively suppressed the hyperlipidemia in rats, suggesting the potential protective role in Coronary heart disease.

**Key words:** *Murraya koenigii*, Hyperlipidemia, Triglycerides, lipoprotein, fructose

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## INTRODUCTION

Cardio vascular diseases are leading cause of death in both industrialized and developing nations. Disorders of lipid metabolism, following oxidative stress are the prime risk factors for initiation and progression of these diseases1. Coronary heart disease, stroke, atherosclerosis and hyperlipidemia are the primary cause of death2. Hyperlipidemia is characterized by elevated serum total cholesterol, low density lipoprotein, very low density lipoprotein and decreased high density lipoprotein levels. Hyperlipidemia associated lipid disorders are considered to cause atherosclerotic cardiovascular disease3. Among these hypercholesterolemia and hypertriglyceridemia are closely related to ischemic heart disease4. The main aim of treatment in patients with hyperlipidemia is to reduce the risk of developing ischemic heart disease or the occurrence of further cardiovascular or cerebrovascular disease5. Currently available hypolipidemic drugs have been associated with a number of side effects. The investigation on plant drugs will be a useful strategy in the discovery of new lead molecules eliciting improved activity by regulating the different mechanisms maintaining the lipid metabolism and thus can be used in treating hyperlipidemia of varied etiology. Traditional system of medicine like Ayurveda, Unani and Chinese prescribe numerous herbal drugs for cardio vascular disorders. Recently herbal hypolipidemics have gained importance to fill the lacunae created by the allopathic drugs.

*Murraya koenigii* is a tropical and sub-tropical plant, belongs to the family Rutaceae popularly known as "Curry tree. The plant is native to India and found in all regions. This plant is commonly used in many dishes in india and neighboring countries often used in curries, the leaves were generally called as curry leaves. *Murraya koenigii* have shown various pharmacological activities. Moreover, this plant increases the resistance of rodent against a variety of stress and also shows antihelminthic and analgesic activity. The ethanol extract of *M. koenigii* showed tonic, stomachic, and carminative activity. The leaves of *Murraya koenigii*is used in dysentery and vomiting. Based on high flavonoid content in herbal, *Murraya koenigii* was selected and the present study was designed to investigate the antihyperlipidemic activity of ethanolic extract of *Murraya koenigii* fructose induced Hyperlipidemia.

## MATERIAL AND METHODS

**Plant collection, identification and authentication:** The specimen was collected from local region of Nanded and identified on the basis of morphological features as *Murraya koenigii* belonging to the family Rutaceae, and herbarium of the plant specimen has been given for authentication to Dr. S. S. Bodke, HOD, Dept. of Botany, Yeshwant Mahavidyalaya, Nanded.

**Preparation of plant extract:** *Murraya koenigii Leaves* were shade dried, leaned and pulverized by hands made to obtain coarse powder of mesh size #40. Coarse powder (1000 g) of MKL was exhaustively defatted using petroleum ether (60-80 ºC) (MKL-PE) and extracted successively with chloroform (MKL-CH), Ethyl Acetate (MKL-EA) and ethanol (MKL-ET) using Soxhlet apparatus. All the extracts were collected, filtered through whatman filter paper, concentrated and stored in tight desiccator and percentage yield was calculated.

**Preliminary phytochemical qualitative screening of MKL Extracts:** All the extracts werescreened for presence of phytoconstituents *viz.* alkaloids, flavonoids, tannins, steroids, saponins, triterpenoids, fixed oil and sugars as per standard procedure as given under (Trease& Evans, 1997).

**Drugs and Chemicals used:** Fructose is used as inducer of hyperlipidemic agent and Atorvastatin as standard drug and other chemicals were obtained commercially and were of analytical grade.

**Animals used for the study:** Adult Wister rats (150-250 gms) were used for the study and Animals were divided randomly into twelve groups; each group consisting of three rats and were housed in separate cages under controlled conditions of temperature (22 ± 2°c) and humidity (30-70). All animals were given standard diet and water ad libitum. Experiments were carried out as per the rules and regulations of CPCSEA.

**Acute toxicity study:** Acute oral toxicity studies were performed as per OECD guidelines 423, dosed each animal at the dose of 2000mg/kg b.w.p.o. The animal was observed continuously for 2hrs for gross behavioral changes and intermittently once every 2hrs and finally at 24 and 72hrs to note any signs of toxicity including death.

## ANTIHYPERLIPIDEMIC ACTIVITY

Hyperlipidemia in rats is induced by following model, the highly effective models were considered for my studies is -Fructose induced hyperlipidemic model.

### Fructose induced hyperlipidemic model

***Animal Grouping:*** Rats were divided into seven groups (n = 6 for each group). Animals were divided randomly into three groups; each group consisting of three rats and were housed in separate

cages under controlled conditions of temperature (22 ± 2°c) and humidity (30-70). All animals were given standard diet and water ad libitum.

***Control***: DMSO

***Standard***: Atorvastatin (10 mg/kg)

1. Group A (Negative Control) receive vehicle
2. Group B (Positive Control) receive Fructose solution (10%) and vehicle
3. Group C receive standard drug (Atorvastatin 10 mg/kg)
4. Group D Test group (MKL-EA extract, dose 100 mg/kg)
5. Group E Test group (MKL-EA extract, dose 200 mg/kg)
6. Group F Test group (MKL-ET extract, dose 100 mg/kg)
7. Group G Test group (MKL-ET extract, dose 200 mg/kg)

***Procedure:*** Animals were weighed before the experiment, after fourteen days of fructose administration and after the drug treatment. Group A rats received water as an vehicle and Group B to O received 10% fructose solution throughout the 21 days study period. Treatment (Atrovastatin and plant extracts) was started at 15$^{th}$ day for next seven days.

**Blood and tissue collection:** On 21st day, after 1hr of administration of the last dose, blood samples were collected from overnight fasted rats by retro-orbital puncture. Blood parameters were measured by semi-autoanalyser using commercially available assay kits.

**Biochemical Evaluation:** Evaluation was carried out over lipid profile parameters as Serum Triglyceride, Serum Total Cholesterol, Serum LDL, Serum HDL, VLDL, etc. by using enzymatic kit procured from Ambika Diagnostics, Parbhani over semi-auto analyzer and morphological parameter viz., body weight.

**Statistical Analysis:** Data were expressed as the mean ± SEM. The results of the study were subjected to analysis of variance (ANOVA) using graph pad prism followed by Tukey test for multiple comparisons and P <0.05 was considered as statistical significant.

## RESULTS

In present study the effect of MKL-EA and MKL-ET, was studied for itsantihyperlipidemic activity using fructose induced hyperlipidemia where rats were administered with 10% fructose during the treatment for 21 days and the drug treatment was continued after 14$^{th}$ day of fructose treatment up to 21$^{st}$ day. Rats were evaluated over change in body weight and over lipid profile parameters as Serum Triglyceride, Serum Total Cholesterol, Serum LDL, Serum HDL,VLDL. Change in body weight was measured on day 14 and 21. Normal control shown body weight change 3.17 gm on day 21 while Positive control shown body weight change 31.33 gm, Atrovastatin (1.11), MKL-EA 100 (19.98), MKL EA 200 (17.77), MKL-ET 100 (11.43), MKL-ET 200 (4.43), shown (p<0.001) significant change in body weight on day 21.

## CONCLUSION

The results obtained from the pharmacological screening have led to the conclusions that, ethanolic extract of leaves of *Murraya koenigii* has significant antihyperlipidemic activity. Hence it can be exploited as an anti-hyperlipidemic therapeutic agent or adjuvant in existing therapy for the treatment of hyperlipidemia.

**Table No. 1: Effect of *M. koenigii* on body weight in fructose induced hyperlipidemia rats.**

| Groups | Change in Body Weight (gm) | |
|---|---|---|
| | **Day 14** | **Day 21** |
| Control | 02.54±1.88 | 03.17±0.73 |
| Positive Control | 25.44±3.17 | 31.33±0.72 |
| Atorvastatin | 23.13±3.03 | 1.11±0.53** |
| MKL-EA 100 | 24.54±3.33 | 19.98±0.37** |
| MKL-EA 200 | 23.95±3.44 | 17.77±0.45** |
| MKL-ET 100 | 24.88±3.55 | 11.43±0.78** |
| MKL-ET 200 | 24.63±3.47 | 4.43±0.33** |
| Values are expressed as Mean±SEM. (n=6), ANOVA followed by Tukey test. *p<0.05 significant difference, **p<0.001 highly significant difference when compared with Positive-control. #p>0.05 non-significant difference when compared with standard; **MKL-*Murraya koenigii leaves*** extract, **EA-** ethyl acetate, **ET**- ethanol. | | |

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**Table No.2 Effect of *M. koenigii* on lipid profile in fructose induced hyperlipidemia rats.**

| Groups | Serum Triglycerides (mg/dl) | Serum Total Cholesterol (mg/dl) | Serum LDL Cholesterol (mg/dl) | Serum HDL Cholesterol (mg/dl) | Serum VLDL Cholesterol (mg/dl) |
|---|---|---|---|---|---|
| Control | 62.51±0.49 | 79.93±0.62 | 07.51±0.17 | 59.93±3.65 | 12.5±0.98 |
| Positive Control | 185.83±0.32 | 184.84±3.73 | 113.14±3.43 | 34.53±3.48 | 37.16±0.88 |
| Atorvastatin | 121.31±0.43** | 126.23±3.33** | 35.44±3.29** | 66.54±3.58** | 24.26±0.61** |
| MKL-EA100 | 183.55±0.37 | 180.71±3.33 | 105.64±3.88 | 38.85±3.44 | 36.26±0.53 |
| MKL-EA200 | 172.31±0.53* | 170.43±3.52 | 93.64±3.76* | 42.34±3.53 | 34.46±0.58* |
| MKL-ET100 | 165.55±0.55** | 167.8±3.82 | 84.23±3.86** | 50.56±3.61 | 33.13±0.41** |
| MKL-ET200 | 137.53±0.38** | 140.61±3.38**# | 52.74±3.53**# | 60.47±3.43**# | 27.53±0.31** |

Values are expressed as Mean±SEM. (n=6), ANOVA followed by Tukey test. *p<0.05 significant difference, **p<0.001 highly significant difference when compared with Positive-control. #p>0.05 non-significant difference when compared with standard; **MKL-*Murraya koenigii leaves*** extract **EA-** ethyl acetate, **ET**- ethanol.

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