International Journal of Current Trends in Pharmaceutical Research

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Research Article Open Access

Antihyperlipedemic Activity of Methanolic Extract of Mucuna Pruriens Seeds

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A B S T R A C T

Antihyperlipidemic activity of methanolic extract of Mucuna pruriens L. (Fabaceae) seeds were evaluated in male Wister albino rats. After induced hyperlipedaemia by high fat diet, the methanolic extract of Mucuna pruriens L.2000mg/kg (MEMP) & standard drug atorvastatin were administered orally to different groups of rats for two times at an interval of 12 hours & continued for 30 days. After termination of the study, all group animals were sacrificed & lipid profile such as Total Cholesterol (TC), Triglycerides (TG), Low Density Lipoproteins (LDL) & High Density Lipoproteins (HDL) were estimated. High fat diet showed significant increase in LDL, TG, TC &a significant decrease in HDL in serum. The methanolic extract of Mucuna pruriens L. and atorvastatin treated groups showed significantly increased HDL levels & decreased TC, TG & HDL-LDL ratio. The methanolic extract of Mucuna pruriens L. has showed significant antihyperlipidemic activity.

Keywords: Hyperlipedaemia, Mucuna pruriens L., Lipid profile.

A R T I C L E I N F O

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Article History: Received 21 July 2015, **Accepted** 31August 2015, **Available Online** 15 September 2015

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Manuscript ID: IJCTPR2664

PAPER-QR CODE

Citation: C. Madhavi Latha. Antihyperlipedemic Activity of Methanolic Extract of Mucuna Pruriens Seeds. *Int. J. Curnt. Tren. Pharm, Res.*, 2015, 3(5): 1049-1053.

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1. Introduction

Mucuna prurient L. a member of the family Fabaceae. It is one of the popular and important medicinal plants indigenous to tropical countries like India is a constituent of more than 200 indigenous drug formulations. *Mucuna* finds

traditional use in a number of diseases. Roots are used in the treatment of nephropathy, strangury, dysmenorrhoea, amenorrhoea, elephantiasis, dropsy, neuropathy, ulcers, and fever and as febrifuge and tonic. Leaves are aphrodisiac, tonic, and are useful in ulcers, inflammation, helminthiasis, cephalalgia and general debility. Seeds are used in snakebite, sexual debility, cough, tuberculosis, impotence, rheumatic disorders, muscular pain, gonorrhea, sterility, gout, delirium, dysmenorrhea, diabetes, and cancer. It has long been used in traditional Ayurvedic Indian medicine for diseases including Parkinson's disease. Hence in this study *Mucuna pruriens L. seeds were evaluated for its effects on hyperlipidemia.*

2. Materials and Methods

Plant Collection

The seeds of *Mucuna pruriens* (Linn.) were collected from Thirunelveli, South India in the month of May 2009 and authenticated by Dr. Sasikala Ethirajulu, Research officer, pharmacognosy, Central Research institute for Siddha, Chennai-106**.**

Preparation of Plant Extract

The seeds of *Mucuna pruriens* were dried under shade and pulverized using a standard pulveriser. A weighed quantity of Powered seeds was subjected to continuous hot extraction in soxhlet apparatus with methanol at 60-80 °C. The filtered extract was evaporated under reduced pressure using rotatory vaccum evaporator until all solvent was removed to give a dark colored molten extract of 30.4% w/w. The methanolic extract *Mucuna pruriens* (Linn.) and the standard drugs atorvastatin were suspended in 1% sodium carboxy methyl cellulose and used for the study.

Experimental Animals

Adult Wister rats of either sex weighing 180-250 Gms were used in pharmacological and toxicological studies. The inbred animals were procured from the animal house of C.L.Baid Metha College of Pharmacy, Thoraipakkam, Chennai-97. The animals were maintained in a well ventilated room with at 12:12 hr light, dark cycle in polypropylene cages and maintained at 22±1˚C with humidity at 55±5%. Animals were fed with pellet chow, except during experimentation and water *ad libitum* throughout the experimental period. The experimental protocol was approved by the Institutional Animal Ethics Committee (IAEC).

The Acute Oral Toxicity Studies:

The acute oral toxicity study was done according to the OECD guidelines 423 (Acute toxic class method). A single administration of starting dose of 2000 mg/kg b.w /p.o of the MEMP was administered to 3 rats and observed for 3 days. There was no considerable change in body weight before and after treatment and no sign of toxicity were observed.

High Fat Diet Induced Hyperlipidemia

The chronic experimental hyperlipidemia was produced by feeding high fat diet. Cholesterol 1.5gm was suspended in 8ml of coconut oil and was mixed with 100gms of rodent chow along with other ingredients of the high fat diet. Pellets were made shade dried and used as high fat diet to induce hyperlipidemia every day till 30 days.

Experimental Design

Thirty male Wister rats weighing 180 to 250 gm were randomly divided into five groups of six each and kept in polypropylene cages for 5 days prior dosing for acclimatization to the laboratory conditions. The drugs were administered in constant volume of 0.2ml /100gm body weight .The control group animals received the vehicle in the same volume p.o.

Group 1:

Administered vehicle 1% sodium carboxy methyl cellulose. Fed with basal rodent chow and served as normal control or positive control.

Group 2:

Administered vehicle 1% sodium carboxy methyl cellulose. Fed with high fat diet and served as HFD negative control group.

Group 3:

Administered lower dose of MEMP (200mg/kg) which was suspended in 1% sodium carboxy methyl cellulose, p.o., and fed with high fat diet served as lower dose group (LD).

Group 4: Administered higher dose of MEMP (400mg/kg) which was suspended in 1% sodium carboxy methyl cellulose, p.o., and fed with high fat diet served as higher dose group (HD).

Group 5: Administered Atorvastatin 10mg/kg, which was suspended in 1% sodium carboxy methyl cellulose, p.o., and fed with high fat diet.

On day 30, animals were anaesthetized with anesthetic ether and blood was collected by retro orbital puncture. The blood was subjected to centrifugation to obtain serum. Serum was analyzed for serum TGs, serum TC, serum HDL-C, serum LDL-C.

Biochemical estimation

The biochemical parameters like triglycerides (TG), low density lipoprotein (LDL), high density lipoprotein (HDL), & total cholesterol (TC), were estimated on 30th day.

Statistical Analysis

The results are expressed as standard error mean ± SEM. Comparison between the groups were performed by one-way analysis of variance (ANOVA) followed by Dunnet's't' test.

3. Results and Discussion

Hyperlipidemia is associated with heart disease, which is the leading cause of death in the world. The currently used hyperlipidemic drugs lag behind the desired properties such as efficacy & safety on long term use, cost & simplicity of administration. These factors fulfill conditions for patient complication. Herbs are mines of medicinal agents & needs for researchers are let to find efficacious, cheap & safe hyperlipidemic agents from among the natural products. The rats fed with high fat diet for seven days exhibited significant increase in TC, TG, LDL,& significant decrease in HDL as compared to normal animals. Rats were treated with atorvastatin (10mg/kg) shown significant decrease in elevated TC, TG, LDL with significant increase in HDL as compared to high fat diet control. Whereas rats treated with methanolic extract of Mucuna pruriens L. shown significant decrease in elevated TC, TG, & LDL with significant increase in HDL as compared to high fat diet control.

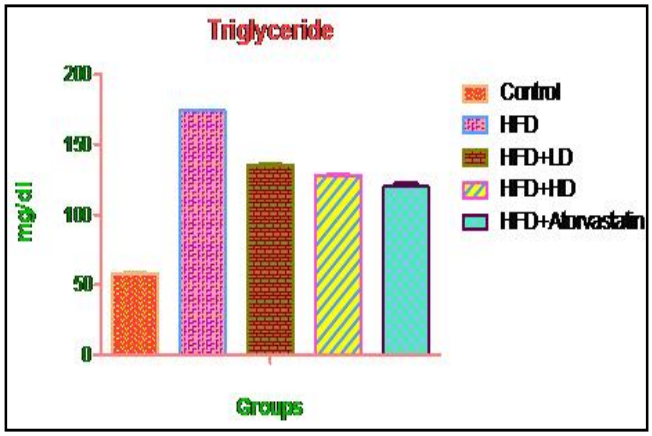

Figure 1: Effect of MEMP on Serum Triglyceride Level

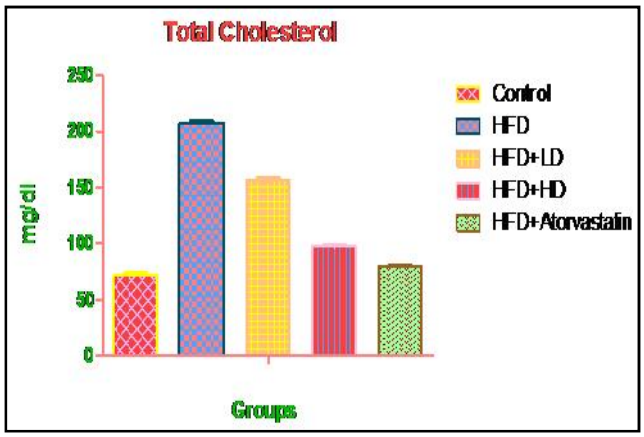

Figure 2: Effect of MEMP on Serum Total Cholesterol Level

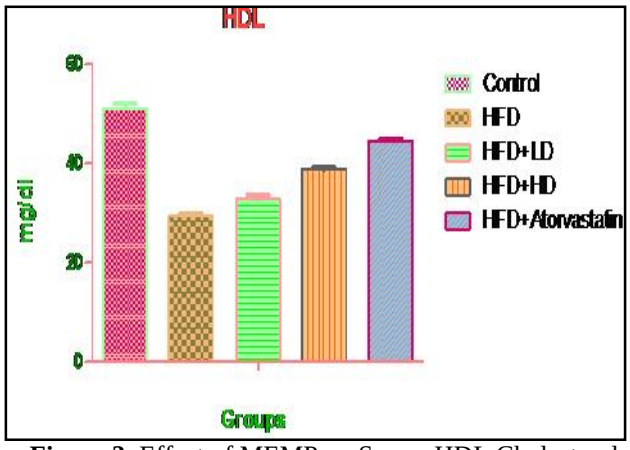

Figure 3: Effect of MEMP on Serum HDL Cholesterol Level

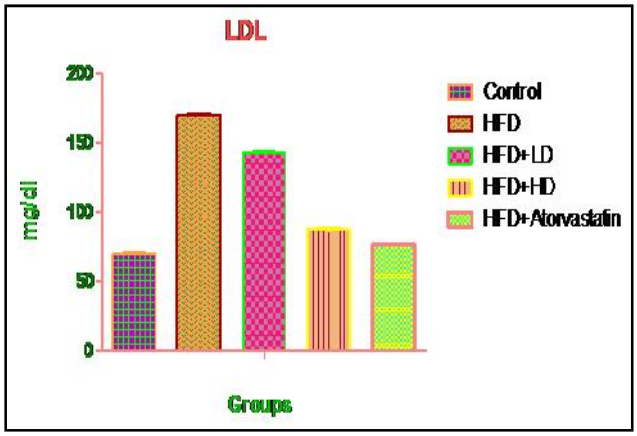

Figure 4: Effect of MEMP on Serum LDL Cholesterol Level

4. Conclusion

Cholesterol is one of the vital, basic building materials of the mammalian body, but high levels of cholesterol can lead to CVD and, in some cases, to death. Present study includes recent research that has been done on cholesterol's health benefits and risks, the absorption pathway of cholesterol, cholesterol lowering drugs, and plant sterols, the natural alternative to cholesterol reducing drugs. Plant sterols (also called phytosterols) are sterols synthesized only in plants and which mammals must obtain via their diets. The inclusion of plant sterols in so-called "functional foods" that aid in reducing one's cholesterol level is a well-developed industry. Nonetheless, work continues on understanding the mechanism by which phytosterols lower serum cholesterol levels. In conclusion, the findings of the study suggest that MEMP showed a potent anti hypercholesterolemic, anti hypertriglyceridemic effect by lowering total cholesterol, triglycerides, LDL, VLDL, Apo B, Apo B/AI ratio and by increasing HDL, Apo AI, and HDL/LDL ratio levels in the high fat diet fed rats. The mechanism has point towards inhibiting cholesterol and triglyceride synthesis.

5. Acknowledgement

I give my immense thanks to express my sincere thanks & deep sense of gratitude & regards to my respected guide Mrs. C. Madhavi Latha M. pharm., (Ph.D). Department of Pharmacology, Assistant Professor of Jagan's College of Pharmacy for her guidance and encouragements at all stages of my work.

Table 1: Effect of MEMP on Serum Triglyceride Level

Groups	Normal Control I	HFD Control II	HFD+LD III	HFD+HD IV	HFD + Atorvastatin V
Serum Triglyceride mg/dl	58.20±0.54	174.32 ±0.61 a**	135.40±0.54 b*	128.33 ± 0.49 b**	120.2 ± 0.34 b**

- *Comparisons were between: a- Group I vs. II, b- Group II vs.III, IV, and V.*
- *Values are expressed as mean ± SEM of 6 animals.*
- *Symbols represent statistical significance: *P < 0.05, **P < 0.01, ***P < 0.001.*

- *Statistical Significance test for comparison was done by one way ANOVA followed by Dunnet's test.*

Table 2: Effect of MEMP on Serum Total Cholesterol Level

Groups	Normal Control I	HFD Control II	HFD+LD III	HFD+HD IV	HFD + Atorvastatin V
Serum Total cholesterol mg/dl	72.31±1.25	207.12 ±2.45 a***	156.32±1.64 b***	97.30 ± 0.49 b***	79.24 ± 1.80 b***

- *Comparisons were between: a- Group I vs. II, b- Group II vs.III, IV, and V.*
- *Values are expressed as mean ±SEM of 6 animals.*
- *Symbols represent statistical significance: *P < 0.05, **P < 0.01, ***P < 0.001.*
- *Statistical Significance test for comparison was done by one way ANOVA followed by Dunnet's't' test.*

Table 3: Effect of MEMP on Serum HDL Cholesterol Level

Groups	Normal Control I	HFD Control II	HFD+LD III	HFD+HD IV	HFD + Atorvastatin V
Serum HDL mg/dl	51.08±0.84	29.36 ±0.56 a***	32.89±0.67 b**	38.69 ± 0.49 b**	44.58 ± 2.13 b***

- *Comparisons were between: a- Group I vs. II, b- Group II vs.III, IV, and V.*
- *Values are expressed as mean ±SEM of 6 animals.*
- *Symbols represent statistical significance: *P < 0.05, **P < 0.01, ***P < 0.001.*
- *Statistical Significance test for comparison was done by one way ANOVA followed by Dunnet's't' test.*

Table 4: Effect of MEMP on Serum LDL Cholesterol Level

Groups	Normal Control I	HFD Control II	HFD+LD III	HFD+HD IV	HFD + Atorvastatin V
Serum LDL mg/dl	70.28±0.65	170.12 ±0.56 a***	142.63±0.98 b*	87.72 ± 1.14 b***	76.32 ± 0.47 b***

- *Comparisons were between: a- Group I vs. II, b- Group II vs.III, IV, and V.*
- *Values are expressed as mean ±SEM of 6 animals.*
- *Symbols represent statistical significance: *P < 0.05, **P < 0.01, ***P < 0.001.*
- *Statistical Significance test for comparison was done by one way ANOVA followed by Dunnet's't' test.*

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