MANAGEMENT OF HYPERLIPIDEMIA IN ANIMAL MODEL WITH MORINGA OLEIFERA

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ABSTRACT

Introduction:
Hyperlipidemia, characterized by elevated cholesterol and triglyceride levels, poses a significant health risk, necessitating effective interventions. This study explores the potential of Moringa oleifera, a natural plant product rich in nutrients, as a promising candidate for regulating lipid profiles. Moringa oleifera has gained recognition for its diverse health benefits, making it an intriguing subject for managing hyperlipidemia.

Methodology:
Conducted at the Pharmacology department, University of Karachi, the study involved eighteen male Wistar rats distributed into three groups: a control group, a hyperlipidemic group treated with Moringa oleifera, and a hyperlipidemic group treated with the standard drug, Atorvastatin. Hyperlipidemia was induced through subcutaneous Dexamethasone injection for seven days. Blood samples confirmed hyperlipidemia, and subsequent treatment with Moringa oleifera leaf extract (0.06 mg) and Atorvastatin (0.6 mg) was administered for 21 days. Statistical analysis using SPSS 20 assessed lipid levels**.**

Results:
Both Moringa oleifera and Atorvastatin demonstrated significant reductions in total cholesterol, triglycerides, and LDL-C levels. Additionally, positive trends were observed in HDL-C levels. Statistical analysis revealed noteworthy changes in lipid levels from Day 0 to Day 21 in both treatment groups.

Conclusion:
The research highlights that Moringa oleifera proves to be a healthy and cost effective natural substitute to Atorvastatin, a standard hypolipidemia

Keywords: Hyperlipidemia, Moringa Oleifera, Atorvastatin

INTRODUCTION

Hyperlipidemia (Hyper-LP) is a state labelled as an increment in total cholesterol, triglycerides, Low Density Lipoprotein-Cholesterol (LDL-C), and a decrement in High Density Lipoprotein-Cholesterol (HDL-C) 1. The primary treatment is improving dietary and daily routines, trailed by synthetic & natural hypolipidemic drugs 2.

Moringa oleifera is one of the natural plant product cultivated in subtropical and tropical regions around the world 3. Leaves are most consuming part containing a variety of healthy nutrients such as amino acids, beta-carotene, vitamins and minerals 4. This natural plant product is beneficial in multiple health issues like deranged lipid profile, diabetes mellitus, bleeding disorders, GI disturbances 5. Thus, Moringa oleifera acts as a functional food.
According to the Functional Food Science in Europe (FUFOSE), functional food is a food that has one or more beneficial effects in the body beyond basic nutrition that have an impact on health and reduce the risk of diseases 6.

The most prescribed alone or in combination synthetic hypolipidemic drugs are Statins. Atorvastatin is one of its example that effects the conversion of HMG-CoA to Mevalonic acid by impeding rate restraining cholesterol biosynthesis enzyme HMG-CoA reductase and lowers Low Density Lipoprotein-Cholesterol (LDL-C) 7.

METHOD

This research work was performed in the Pharmacology department, University of Karachi after the confirmation of ethical committee of ASRB (ASRB No/ 05848 /Pharm).
In this 3-week study, male healthy Wistar rats total eighteen in number were consumed. The rats were equally distributed into three research groups. Group-1 was Control (Non-Hyperlipidemic) group, Group-2 was Hyperlipidemic – Moringa oleifera treated group & Group-3 was Hyperlipidemic – Atorvastatin treated group.
Hyperlipidemia was produced in Group-2 and Group-3 Wistar rats by injecting Dexamethasone subcutaneously for seven days 8.

Afterwards hyperlipidemia was confirmed from blood samples gathered from each group. The Moringa oleifera's dose of 0.06 mg was given in Group-2 rats, and the Atorvastatin's dose of 0.6 mg was given in Group-3 rats orally per day in the morning for 21 days research work. Both the drugs were given after the confirmation of hyperlipidemia considering Day-0 till Day- 21 labelling last day of research.

The objective of this study was to determine the lipid lowering effects in induced Wistar rats by giving leaf extract of Moringa oleifera that seems to be an alternative source to regularize body's lipid profile,

The p-value lesser than 0.05 was considered noteworthy in all statistical analysis. The data feeding and analysis was done on SPSS 20.

RESULTS

The study work done on both Group – 2 and Group – 3 revealed that Moringa oleifera has comparable reduction effects on total cholesterol, triglyceride and LDL-C levels. Similarly, Moringa oleifera has matchable healthy effect on HDL-C level seen from Day – 0 to Day – 21 as exhibited in Tables-1, 2, 3 & 4.

TABLE-1: COMPARISON IN MEAN TOTAL CHOLESTEROL (mg/dL) LEVEL AMONG DIFFERENT EXPERIMENTAL GROUPS FROM DAY 0 - DAY 21

GROUPS	DAY – 0	DAY - 21	p-VALUE
Group – 1	158.50 ± 2.12	172.50 ± 3.70	0.0087*
Group – 2	208.50 ± 3.54	189.50 ± 7.33	0.02911*
Group – 3	212.00 ± 2.83	195.00 ± 2.16	0.0011*

TABLE-2: COMPARISON IN MEAN TRIGLYCERIDE (mg/dL) LEVEL AMONG DIFFERENT EXPERIMENTAL GROUPS FROM DAY 0 - DAY 21

GROUPS	DAY – 0	DAY – 21	p-VALUE
Group – 1	102.50 ± 10.61	102.00 ± 8.83	0.9535
Group – 2	137.50 ± 6.36	111.75 ± 1.71	0.0011*
Group – 3	140.00 ± 5.66	113.75 ± 1.71	0.0007*

TABLE-3: COMPARISON IN MEAN HDL-C (mg/dL) LEVEL AMONG DIFFERENT EXPERIMENTAL GROUPS FROM DAY 0 - DAY 21

GROUPS	DAY – 0	DAY – 21	p-VALUE
Group – 1	60.00 ± 2.83	59.50 ± 2.65	0.8407
Group – 2	50.00 ± 1.41	58.50 ± 1.29	0.0018*
Group – 3	49.00 ± 1.41	57.50 ± 1.29	0.0018*

TABLE-4: COMPARISON IN MEAN LDL-C (mg/dL) LEVEL AMONG DIFFERENT EXPERIMENTAL GROUPS FROM DAY 0 - DAY 21

GROUPS	DAY – 0	DAY - 21	p-VALUE
Group – 1	107.50 ± 3.54	113.25 ± 2.99	0.1014
Group – 2	143.50 ± 2.12	131.75 ± 2.75	0.0065*
Group – 3	151.00 ± 2.83	135.75 ± 2.22	0.0018*

Values are expressed in Mean ± S.D
S.D = Standard Deviation
* = Significant
GROUP 1: Control Group (Non-Diabetic, Non-Hyper-LP)
GROUP 2: Moringa oleifera treated Hyper-LP group
GROUP 3: Atorvastatin treated Hyper-LP group

DISCUSSION

Our research work led from Day-0 till Day-21 explored Moringa oleifera's healthy comparable effects on hyperlipidemia induced rats.

The research of Ghasi et al (2000), 9 represented the medicinal effect of MO in normalizing mean total cholesterol, triglyceride, HDL-C and LDL-C levels that in accord to our Moringa oleifera treated Group – 2 and suggestive of useful substitute of hyperlipidemia therapy

Atorvastatin treated Group – 3 showed that Atorvastatin was effective in the treatment of hyperlipidemia when taken from Day 0 to Day-21.

The research work performed by Lin, LY. et al (2014), 10 is consistent with our study showing Atorvastatin is a standard hypolipidemic drug that ameliorates hyperlipidemia in short-term study.

CONCLUSION

Moringa oleifera emerges as a promising, cost-effective, and natural alternative to Atorvastatin in regulating lipid profiles. The study provides valuable insights into the comparative efficacy of Moringa oleifera and Atorvastatin in a controlled experimental setting. These findings underscore the potential of Moringa oleifera as a dietary intervention for managing hyperlipidemia, encouraging further exploration of natural plant products as viable alternatives to synthetic drugs for lipid-related disorders.

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