Original Article

Effect of Aloe Vera Leaf Gel Extract on Lipid Profiles of Alloxan Induced Diabetic Rabbits

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Objective: The study was designed to investigate the effect of aloe vera leaf gel extract on lipid profile parameters like total cholesterol, triglycerides and low density lipoproteins in alloxan induced diabetic rabbits.

Material and Methods: The rabbits were made diabetic by injecting alloxan monohydrate and divided in two groups of eight each. Group A was treated with distilled water and Group B was treated with ethanolic extract of aloe vera leaf gel for 28 days. The pre-treatment and post-treatment level of lipid profile parameters were recorded and compared. Statistical analysis was done with help of independent t-test. The effects in two experimental groups were analyzed with help of paired t-test.

Results: After 28 days of treatment the mean cholesterol level reduced to 80.9 from 97.1, the mean triglycerides reduced to 149.9 from182.6 and mean LDL reduced to 30.8 from 35.6 mg/dl in the aloe vera group. The mean HDL levels increased to 28.2 from 24.5 mg/dl.

Conclusion: There was significant lowering of lipid profile parameters with aloe vera leaf gel extract in alloxan induced diabetic rabbits.

Key words: aloe vera, diabetes mellitus, lipid profile, rabbits.

Introduction

AType-2 diabetes has long been known as a risk factor for coronary heart disease. A conservative estimation is that it may increase the risk of fatal event by two folds. The risk is associated with increased serum levels of total cholesterol, triglycerides and low density lipoproteins.[1]

Multiple anti- hyperglycemic and anti-hyperlipidemic drugs with different mechanisms of action are of tenly required for effective treatment hyperlipidemia in type-2 diabetes patients.[2]

Conventional pharmacological agents used for such condition do exhibit adverse effects on long term use. Therefore, search for a harmless and clinically useful indigenous preparation which should decrease the LDL-cholesterol is warranted.[3]

Currently, there is a renewed interest in the plant based medicines and functional foods modulating physiological effects in the prevention and cure of type-2 diabetes and related complications. About 200 plants have been considered for their possible efficacy in the management of this condition.[4]

Aloe vera, with botanical nomenclature as aloe barbadesis miller, belongs to liliaceae family. The plant was shown to have wound healing, anti-inflamatory, anti-diabetes, antibacterial and anti-cancer properties.[5] Furthermore, aloe vera gel reduced total cholesterol, triglycerides and LDL levels in streptozotocin induced diabetic rats.[6] The present study was carried out to explore the effect of aloe vera leaf gel extract on lipid profile of alloxan induced diabetic rabbits.

Materials and Methods

The study was carried out in the department of pharmacology, SIMS/PGMI Lahore. Healthy male rabbits weighing 1000 to 1700 gm were purchased from the market. The animals were acclimatized to the animal house of PGMI Lahore for 7 days prior to induction of diabetes. Green fodder, grains, plentiful of water and cereals were fed to them. All the rabbits were then made diabetic by injecting allxan monohydrate into their ear veins.[7] The dose of alloxan was calculated according to Puri et al.[8] Eight day after induction of diabetes, 16 rabbits, of BSR levels > 250 mg/dl were taken in the study and divided in two groups (n=8).

Group-A, the control group, was treated with distilled water whereas, Group-, the test group, was treated with ethanolic extract of aloe vera leaf gel. The ethanolic extract of aloe vera leaf gel was prepared in Herbal Heritage centre Department of Plant Pathology Punjab University Lahore. The mucilaginous pulp of aloe vera leaves was homogenized and filtered. The filtrate was freeze

Dried and the end product was obtained in the form of grayish white powder. The powder was collected in colored bottles **(Fig-1)** and stored at room temperature.

Fig-1: Ethanolic extract of aloe vera leaf gel stored in colored bottles.

A baseline recording of lipid profile parameters including total cholesterol, triglycerides, LDL and HDL was done in both groups. After overnight fasting, 2 ml blood was collected from marginal ear veins of rabbits.[8] The serum was separated from the samples and various lipid profile parameters were estimated in biochemistry department of PGMI Lahore.

The diabetic rabbits were then treated with their respective protocols for twenty eight days. Group-A was treated with 10 ml of distilled water daily and Group-B was treated with aloe vera gel extract in a dose of 300 mg/kg dissolved in 10 ml of distilled water. The drugs were administered through an 8 Fr nasogastric tube as a single daily dose.[9] A second recording of biochemical parameters was done after 28 days of treatment. Pre-treatment and post-treatment values were compared in both groups. Statistical analysis was done with help of student-t test and effects in both experimental groups were analyzed with help of paired-t test.

Results:

Table-1 shows the pre-treatment and post-treatment levels of serum cholesterol, triglycerides, LDL and HDL in control group of alloxan induced diabetic rabbits treated with distilled water. In control group, there were no stastically significant changes in these parameters after 28 days.

Table-2 and figure-2 show the effect of aloe vera leaf gel extract on lipid profile parameters of alloxan induced diabetic rabbits after 28 days of treatment. The mean levels of total cholesterol reduced from 97.1 mg/dl to 91.0 mg/dl and the change was significant. Similarly, mean triglycerides and LDL levels reduced from 182.6 mg/dl and 35.6 mg/dl to 149.9 mg/dl and 30.8 mg/dl respectively. All these changes were statistically significant. The mean HDL levels increased from 24.5 mg/dl to 28.2 mg/dl which is also stastically significant change.

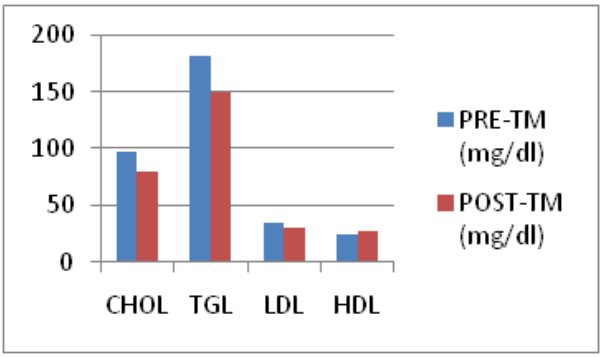

Fig-2: Bar diagram of lipid profile parameters in diabetic rabbits treated with aloe vera leaf gel extract showing a significant decrease in total cholesterol, triglycerides and LDL after 28 days. There is a beneficial increase in HDL levels.

Table-1: Lipid profile parameters in diabetic rabbits treated with distilled water.

Parameter	Pre-Tm Mean±SD	Post-Tm Mean±SD	P-Value
Cholesterol	93.1±7.5	91.04±7.6	0.411
Triglycerides	181.2±7.5	178±9.7	0.522
LDL	31.1±13.1	31.7±13.5	0.575
HDL	26.2±2.9	25.9±2.4	0.188

Table-2: Lipid profile parameters in diabetic rabbits treated with aloe vera gel extract.

Parameter	Pre-Tm Mean±SD	Post-Tm Mean±SD	P-Value
Cholesterol	97.1±7.2	80.9±6.0	0.003
Triglycerides	182.6±11.2	149.9±20.1	0.002
LDL	35.6±3.2	30.8±2.8	0.003
HDL	24.1±2.9	28.0±2.4	0.003

Discussion

Diabetes mellitus is perhaps the fastest growing metabolic disorder in the world. As the condition

exhibit a multi-factorial and heterogeneous nature, the need for search of more challenging and appropriate therapies is increasing. Traditional plant remedies have been used throughout the world for the range of diabetes complications.[10] Plant extract are considered to be less toxic than synthetic agents. In previous studies, aloe vera extracts have shown a hypoglycemic effect in experimental diabetic animals. Lipid profile was also shown to be altered in these experimental animals as a result of induced diabetes.[11] In the present study, aloe vera extract treatment significantly decreased total cholesterol, triglycerides and LDL levels whereas the HDL levels increased. All these results suggest that aloe vera could improve lipid metabolism disorders in type-2 diabetes mellitus.

Significant lowering of total cholesterol, triglycerides and LDL and an increase in HDL levels is very much desirable biochemical state for prevention of atherosclerosis and ischemic conditions. Various studies of medicinal plants have reported a similar lipid lowering activity. Few studies about the effects of aloe vera on lipid profile metabolism are cited in literature.[12] Furthermore, the bioactives and mechanisms involved in lipid lowering actions of aloe vera were not investigated. Few studies have been conducted on the isolation of bioactive compounds mediating the anti-hyperglycemic actions of aloe vera gel extracts. Trace elements and five phytosterols isolated from the gel were responsible for anti-hyperglycemic actions in STZ induced type-2 diabetic rat models.[13]

The bioactives and mechanisms underlying the lipid lowering effects of aloe vera gel have not been studied so far. Considering the results of the present study, further and larger clinical trials concerning the efficacy and safety of aloe vera gel extract in the treatment of patients with type-2 diabetes and associated hyperlipidemia as well as studies addressing the bioactives and mechanisms involved in anti-hyperlipidemic actions seem necessary.

Conclusion

There was significant lowering of lipid profile parameters with aloe vera leaf gel extract in alloxan induced diabetic rabbits.

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