

Therapeutic Efficacy of *Azadirachta indica* Leaves in Alloxan Monohydrate Induced Type-1 Diabetes in Albino Rats

Sanjeev Kumar^{1*} and Kumari Shachi²

¹Department of Zoology, B.M. College, Rahika (L.N. Mithila University Darbhanga), India

²Department of Zoology, K.S. College, Laheriasarai (L.N. Mithila University Darbhanga), India

*Corresponding Author: Sanjeev Kumar, Department of Zoology, B.M. College, Rahika (L.N. Mithila University Darbhanga), India.

Received: January 20, 2020; Published: January 28, 2020

Abstract

Present study was aimed to evaluate the anti-diabetic efficacy of *Azadirachta indica* in Alloxan monohydrate induced albino rats. Oral administration of fresh *Azadirachta indica* leaves (2 - 4 g/day) for 60 days shows significant blood glucose lowering effect in experimental alloxan induced diabetic rats. These diabetic rats blood glucose level became normal when fed with *Azadirachta indica* leaves. It is amply revealed that fresh *Azadirachta indica* leaves possessed anti-diabetic properties. The results suggest that statistically significant anti-diabetic potential in alloxan monohydrate induced diabetic rats. The *Azadirachta indica* leaves to be almost similar effect like insulin treatment in alloxan monohydrate administered animal model. From the present investigation it appeared that *Azadirachta indica* leaves might have some ingredients to increase the output of insulin by binding to the receptors of the Beta cells of the Langerhans located in the pancreas. Once they bind to the Sulphonyl urea receptors, the K⁺-ATP channels are probably closed and therefore the membrane is depolarized and insulin production is stimulated.

Keywords: Blood Glucose; Insulin; *Azadirachta indica*; Leaves; Diabetes

Introduction

Diabetes mellitus, increased blood sugar level, not only common disease, but creates several problems in humans body like retinopathy, angiopathy, nephropathy, neuropathy, cardiomyopathy etc [1]. Gradually increasing order of this disease affects the present society, for that medical sciences is busy to search some positive technology by which this abnormality can be easily removed. The current allopathic therapies till face difficulty on way to cure diabetes or minimize blood glucose levels due to severe side effects associated with the use of allopathic medicine.

Herbal therapies, an alternative system, with its champion power to reduced blood glucose levels. It has been matter of concern from time immemorial several plant extracts are know for their anti-diabetic properties and are being used for the traditional treatment of diabetes due to low cost, easily availability and lesser side effects [2].

Azadirachta indica is a member of Meliaceae family, which is indigenous to India. Generally, it is found in all over India. *Azadirachta indica* leaves are relished by Indian people for their anti-bacterial, anti-viral, anti-diabetic, anti-analgesic, enhance immunity, anti-inflammatory, anti-pyretic properties [3].

Aim of the Study

The aim of present study was to investigate the effect of *Azadirachta indica* leaves on blood glucose in normal and alloxan diabetic rats given after successful establishment of type-1 diabetes to examine its role as therapeutic efficacy and to see its influence, if any prevention of the type-1 diabetes.

Materials and Methods

1. Plant materials *Azadirachta indica* leaves were collected from ruler area of Darbhanga, India.
2. Albino rats (175 - 210g) were used as experimental animals. All animals are procured from local supplier of animals. The albino rats are acclimatized for 10 days. All animals were fed with rodent pellet diet. Water was allowed to ad-libitum under strict hygienic condition.
3. Induction of Diabetes: Fasting blood glucose was determined after depriving food for 12 hours. Diabetes was induced by single intra-peritoneal injection of (150 mg/kg body weight) alloxan monohydrate sterile saline. Alloxan is a toxic glucose analogue which selectively destroys insulin producing cells in pancreas. This causes insulin dependent diabetes mellitus called “alloxan diabetes” [4].

Experimental design

- Group A- Normal rats
- Group B- Diabetic control
- Group C- Insulin treatment group
- Group D- *Azadirachta indica* leaves treatment group

72 hours of alloxan monohydrate injection the diabetic rats (blood glucose levels greater than 270 mg/dl) were separated. Treatment was started except normal rats and diabetic control rats. During experimental period, animals in all groups were given to standard water and pellet diet. Blood glucose were monitored by digital glucometer.

Results and Discussion

Experimental Group	Fasting blood glucose (mg/dl)			
	15 th Day	30 th Day	45 th Day	60 th Day
Group A- Normal Rats	90.93 ± 1.56	88.02 ± 3.16	85.02 ± 3.16	82.02 ± 0.31
Group B- Diabetic Control	293 ± 1.41	290 ± 1.40	296 ± 1.40	293 ± 2.13
Group C- Insulin Treatment group	160 ± 5.30 P < 0.05	138.23 ± 5.14 P < 0.05	109 ± 2.8 p < 0.05	106 ± 2.6 p < 0.05
Group D- <i>Azadirachta indica</i> treatment group	159 ± 2.63 P < 0.05	150 ± 2.63 P < 0.05	112 ± 3.10 P < 0.05	109 ± 3.75 P < 0.05

Table 1: Effect of *Azadirachta indica* Leaves in Alloxan Induced diabetic rats and normal rats. Values are Mean ± SEM, n = 10, P < 0.05 Vs diabetic Control.

A marked rise in fasting blood glucose level were observed when compared to normal control rats. Anti- hyperglycemic activity was observed in *Azadirachta indica* leaves fed rats on 15th, 30th, 45th and 60th days post treatment. However anti- hyperglycemic effect of *Azadirachta indica* leaves was found less effective than that of insulin treatment group.

The results of the present study indicated that *Azadirachta indica* leaves do have the property to reduce the blood glucose. Alloxan monohydrate induce free radical production and causes tissue injury. The pancreas are susceptible to such damage. It appears that *Azadirachta indica* leaves have tissue protective function. However, stimulation of beta cells and subsequent release of insulin cannot ruled out in this regard. Estimation of insulin level, here might give insight into the mechanism.

Nevertheless, there is no doubt in the *Azadirachta indica* leaves have therapeutic effect on blood glucose level. To elucidate the mechanism of action and to project this Indian champion plant as an therapeutic target, further investigation are needed. Shailey and Basir [5] has reported that oral administration of aqueous leaves and bark extract of *Azadirachta indica* lead to marked lowering of blood glucose level in normal and alloxan induced diabetic rats.

Saleem., *et al.* [6] also demonstrated that ethanolic extract of *Azadirachta indica* leaves and seed possess hypoglycemic activity in alloxan induced diabetic rats. Present investigation suggested hypoglycemic effects of *Azadirachta indica* leaves.

Azadirachta indica leaves has been widely used for curing various ailments due to its tremendous potential. The present study will be helpful in establishing a scientific basis for therapeutic uses of the plant leaves of *Azadirachta indica*. However much more studies are still required to explore other potential of this plant leaves.

Conclusion

This research appears that *Azadirachta indica* leaves works as anti-diabetic agent. So, this plant leaves will be helpful in treating the diabetes in ruler India due to low cost, easily availability and lesser side effects associated with the use of this plant leaves.

Acknowledgement

The authors are thankful to Head, University Department of Zoology, L.N. Mithila University Darbhanga, India for the lab facilities provided. The authors are also thankful to Mr. Dinesh Munot Explicit Chemical Pvt. Ltd. Pune for providing free sample of Alloxan monohydrate for the present investigation.

Dr. N.K. Dubey, Retd. Prof. P.G Department of Zoology, L.N. Mithila University Darbhanga, India thankfully acknowledged for their kind cooperation during present investigation.

Bibliography

1. Hung THW., *et al.* "Anti-diabetic action of *Punica granatum* flower extract: Activation of PPAR-Y and identification of an active component". *Toxicology and Applied Pharmacology* 207.2 (2005): 160-169.
2. Sarvanan G and Leelavinothan P. "Effect of *Syzygium cumini* bark on blood glucose, plasma glucose and C-peptide in streptozotocin Induced diabetic rats". *International Journal of Endocrinology and Metabolism* 4 (2006): 96-105.
3. Satyanarayan K., *et al.* "Molecular approach to identify anti-diabetic potential of *Azadirachta indica*". *Journal of Ayurveda and Integrative Medicine* 6.3 (2015): 165-175.
4. Lenzen S. "The mechanism of Alloxan and streptozotocin induced diabetes". *Diabetologia* 51 (2008): 216-226.

5. Shailey S and Basir SF. "Strengthening of anti-oxidant defense by *Azadirachta indica* in alloxan diabetic rat tissue". *Journal of Ayurveda and Integrative Medicine* 3.3 (2012): 130-135.
6. Saleem T, *et al.* "Comparison of hypoglycemic Effects of *Azadirachta indica* Seeds and leaves on Alloxan Induced Diabetes in male Albino rats". *PJMS* 12.2 (2018): 753-756.

Volume 4 Issue 2 February 2020

©All rights reserved by Sanjeev Kumar and Kumari Shachi.