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In-Vivo Anti-diabetic activity of Leonotis nepetaefolia (L.) R.Br. Root in Alloxan induced Diabetic Model

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Abstract: In terms of the traditional healthcare system, almost 75% of Indians are dependent on this regional healthcare network. Given how many people use herbal medicines, it is critical to have scientific evidence supporting the effectiveness of long-used herbal products. Lamiaceae is the family in which *Leonotis nepetaefolia* (L) R.Br. is classified. It is indigenous to India and tropical Africa. The plant's blossoms are used medicinally to cure a variety of illnesses. The current study used an animal model to examine the hydro-alcohol extract of Leonotis nepetaefolia (L) R.Br. root's anti-diabetic properties.

Keywords: Diabetes, Anti-diabetic, Indigenous

1. Introduction

Diabetes is a long-term metabolic disease of the lipid, protein, and carbohydrate metabolism that is characterised by higher blood sugar and more frequent fasting. Diabetes is predicted to become more common worldwide in 2025, rising from 4% in 1995 to 5.4%. According to WHO predictions, developing nations will bear the brunt of the burden. Research carried out in India over the last ten years has demonstrated that not only is diabetes highly prevalent, but it is also rising quickly among the urban populace. In India, the number of adults with diabetes is thought to reach 33 million. By 2025, there will be 57.2 million of these.[1-2] Herbal medicine has advanced quickly in the last several years, and because of its natural origins and minimal negative effects, it is now widely used in both developed and developing nations. The majority of conventional medications are made from organic materials, minerals, and medicinal plants. Traditional Indian health care systems contain herbal medicines made from a variety of medicinal plants known as rasayana, which have been utilised for over a millennium. The majority of medical professionals in India write and administer their own.[3-5]
The Lamiaceae family includes the unidentified medicinal plant *Leonotis nepetaefolia* (L) R.Br. Barchibuti. It is virtually entirely found in India's warmer regions. Traditionally, all plant parts—especially the roots, leaves, and flowers—have been utilised to treat a variety of human ailments. Flower heads are also used to treat burns, ringworm, and other skin conditions.[6] the goal of this effort was to examine root extract's potential anti-diabetic properties.

2. Material and Methods

Collection of herbs and their authentication

The root of plant was collected in the month of Oct. 2022 and were identified by Dr. S. N. Dwivedi, Retd. Prof. and Head, Department of Botany, Janata PG College, A.P.S. University, Rewa, (M.P.) and was deposited in our Laboratory.

Preparation of Extract

250 gm of dried leaves were macerated using water to get the aqueous extract.[7]

Pharmacological screening

Procurement of experimental animals

The mice were used for acute toxicity study as per OECD guidelines 423. The animals were fed with standard pellet diet (Hindustan lever Ltd. Bangalore) and water *ad libitum*. All the animals were housed in polypropylene cages. The animals were kept under alternate cycle of 12 hours of darkness and light. The animals were acclimatized to the laboratory condition for 1 week before starting the experiment. The experimental protocols were approved by Institutional Animal Ethics Committee after scrutinization.[8]

Experimental animals

The Wister strains of male albino rats weighing between 100 and 150g were taken for the present study. The animals were housed in larger spacious cages and they were fed with commercial pelleted rat chow marketed by Hindustan Lever Ltd., Bangalore, India, under the trade name Gold Mohur Rat Feed and had free access to water ad labium. The animals were well acclimatized to standard environmental conditions of temperature and 12h light dark cycles throughout the experimental period. The animals used in the present study were approved by the Institutional Animal Ethical Committee.

Anti-diabetic activity[9-10]

Preparation of alloxan monohydrates

Alloxan was prepared by weighing 1 gm of alloxan and dissolving in 20ml of water for injection. Alloxan at this calculated dose is said to have a concentration of 50mg/ml.

Hypoglycemic Activity

Different groups of each six rats were used in the present investigation. The basal concentration of blood glucose level of all the animals was recorded and 6 animals were separated to serve as normal control. The remaining animals received a single injection of Alloxan monohydrate in water for injection at a dose of 150-mg/kg bodyweight given by intra-peritoneal route. After 4 days of Alloxan administration, the blood glucose was estimated and animals with blood glucose levels in the range 280 mg/dl and 380 mg/dl were selected and divided into groups.

Group 1:- Untreated control (Normal saline water)
Group 2:- Diabetic control (Alloxan 150 mg/kg)
Group 3:- Diabetic+ Glibenclaminde (10mg/kg)
Group 4:- Diabetic + AELNR (250 mg)
Group 5:- Diabetic + AELNR (500 mg)

Statistical analysis

Data were analyzed by comparing values for different treatment groups with the values for individual controls. The significant differences among values were analyzed using analysis of variance (one-way ANOVA) in latest computer software programme. All the obtained results are expressed as X (Mean) ±SEM, n=6. (One way ANOVA followed by Bonferroni multiple comparison test).

Results and Discussion

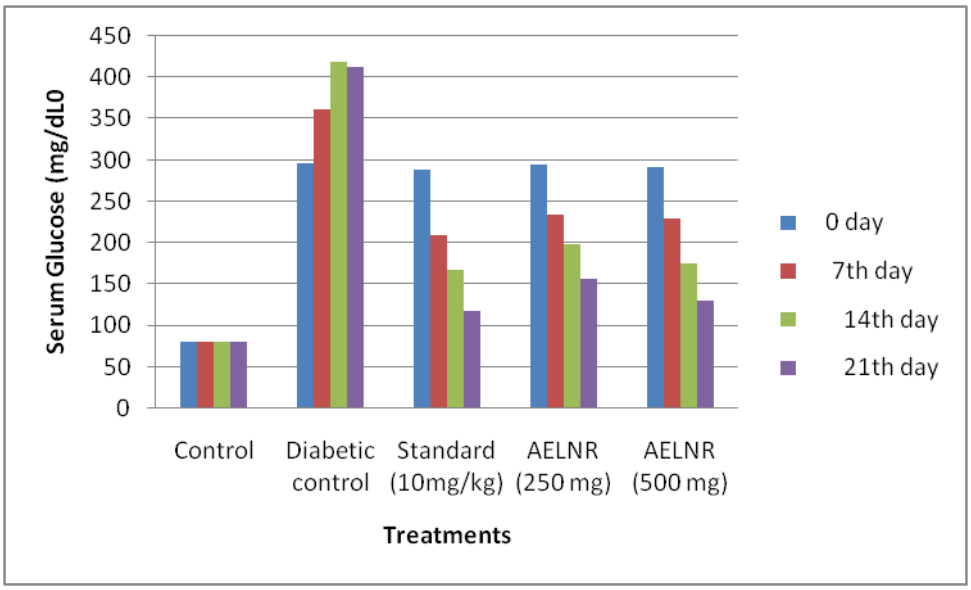
The AELNR were screened for acute toxicity study by OECD guideline no. 423 for determination of $LD_{50.}$ The results showed that at the dose of 5000 mg/kg bw, there were no any mortality, therefore it belongs to category-5(unclassified). Hence, doses of 250 mg and 500 mg were selected for present investigation. The serum glucose level was estimated and the results indicates that that significant lowering of sugar in hydro-alcoholic extract at the dose of 250 and 500 mg/kg bw. The anti-diabetic activity of the extract on the fasting blood sugar levels on diabetic rats is shown in table 1. The blood glucose levels are comparable with that of 10 mg/kg of Glibenclamide.

Table 1: Serum glucose in normal and diabetic rats of root extract of Leonotis nepetaefolia (L) R.Br.

Group	Serum glucose (mg/dL)			
	0 day	7th day	14th day	21th day
Control	80.03±0.31	81.11±0.19	81.13±0.22	81.2±0.02
Diabetic control	296.21±0.02	362.21±0.02##	418.21±0.32###	412.20±0.02###

Standard (10mg/kg)	289.10±0.03	210.12±1.02**	168.34±1.20***	118.41±1.11***
AELNR (250 mg)	294.11±0.06	234.30±0.17*	198.51±1.20***	156.39±1.02**
AELNR (500 mg)	292.18±0.07	230.21±1.11**	175.20±1.10***	130.48±1.06***

All values are expressed as mean ± S.E.M (n=6), ***P<0.001 as compared diabetic control (normal saline), **P<0.01 as compared diabetic control (normal saline), ###P<0.001 as compared to Control. One-way ANOVA followed by Bonferroni multiple comparison test.



Graph 1: Serum Glucose Level of Aqueous Root Extract of *Leonotis nepetaefolia* (L) R.Br.

3. Conclusion

From the results it was concluded that the aqueous extract at the dose of 500 mg/kg bw showed better efficacy in lowering the blood glucose levels in alloxan induced diabetic rats, when compared with standard drug.

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