



Antidiabetic activity of leaves of *Tephrosia villosa* Pers. in alloxan induced diabetic rats

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ABSTRACT

Antidiabetic activity of ethanolic extract of leaves of *Tephrosia villosa* Pers. was studied on alloxan induced diabetic rats as two different doses were studied. It showed significant reduction in the blood glucose level. Concurrent histopathological examination of pancreas of these animals showed comparable regeneration by ethanolic extracts (lower and higher dose) which were earlier, necroses by alloxan.

Key words: Antidiabetic activity, *Tephrosia villosa* Pers. Leaves, Alloxan induced diabetic, ethanolic extracts, Glibenclamide.

INTRODUCTION

Diabetes is a disorder of the chemical reaction that is necessary for proper utilization of carbohydrates, fats and protein from the diet, along with inadequate secretion or lack of insulin. Insulin is a hormone produced by the pancreas to regulate the amount of sugar in the blood.¹

Diabetes is the seventh leading cause in U.S. About 1-2% of the adult population has diabetes mellitus even though various types of diabetes may have different pathogenetic mechanism and metabolic characteristics, along term complication in blood vessels, kidneys, eyes and nerves occur in all types and are the major causes of morbidity and mortality in diabetes.²

Tephrosia villosa Pers. (*Fabaceae*) is a much branched, perennial herb, up to 90 cm, high densely clothed with white, silky hair found in Tamil Nadu, Rajasthan, Punjab, Gujarat, Madhya Pradesh, Bihar and West Bengal. It is well known as Punnikkai vetlali (Tamil), Nooguvempali (Telugu), Runchalisarpankho (Gujarat). Its leaves and roots are used as hypoglycemic agent and in dropsy.^{3,4} the plant contain Flavonoids.⁵

MATERIAL AND METHOD:

Plant material : The plant *Tephrosia villosa* Pers. is widely found throughout India. For my work the plant was collected from Salem district and authenticated by Dr. R. Marimuthu, M.Sc., Ph.D., Principal, Government Arts College, Attur, Tamil Nadu.

The leaves of the plant were dried under shade and then coarsely powdered with help of mechanical grinder. The powder was passed through sieve no. 40 and stored in an airtight container for further studies. Extraction was carried out by continuous soxhlet extraction process for 72 hr.

Animals : Swiss albino mice (20-25g) and wistar rats (150-200g) of either sex and of approximate same age used in the present study was procured listed supplier Sri Venkateshwara Enterprises, Bangalore, India. The animals were fed with standard pellet diet (Hindustan Lever Ltd., Bangalore) and water *ad libitum*. All the animals were kept under alternate cycle of 12 hrs 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 (IAEC no pcog/4/2006) after scrutinization. Mice were used to determine the LD₅₀ value (3000 mg/kg).

Sample collection: The blood samples were collected for the measurement of blood glucose level from the tail vein⁶ and estimated using electronic glucometer (on-call now) and glucostix.

EXPERIMENTAL DESIGN:

Alloxan monohydrate (BDH) 150 mg/kg body weights were dissolved in normal saline and injected intra peritoneally after 18 hrs. Fasting to induce hyperglycemic group.⁷

After one hour of alloxan administration the animals were fed on standard pellets and water *ad libitum*. The experimental animals were fasted for 18 hr. before alloxan injection. The blood glucose level (BGL) was monitored after alloxanization in blood sample collected by tail tipping method using a glucometer.⁶ After 72 hr. the rats having BGL above 150 mg/dl of blood were selected for the study and the animals were divided into five group and each group contained 6 rats.

Group - I served as normal and received normal saline solu-



tion. Group-II received alloxan monohydrates (150 mg/kg). Group III received alloxan and standard antidiabetic drug i.e. Glibenclamide (5 mg/kg P.O). Group IV and V received alloxan and ethanolic extracts of leaves of *Tephrosia villosa* Pers. (i.e.300 and 600 mg/kg P.O.) The blood glucose levels were monitored after initial 3,6 and 12 hr. of administration of a single dose of the ethanolic extract and at the end of initial 3,6 and 12 days for prolonged treatment. On the 12th day all the animals were sacrificed by over dose of ether anesthesia.

The whole pancreas from each animal was removed after sacrificing the animal & collected in 10% formalin solution and immediately processed by the paraffin technique sec-

tion of 5 micron thickness were cut and stained by haematoxylin and eosin (H and E) for histological examination. The photomicrographs of histological studies are presented in fig.-1

Statistical Analysis: Dunnett's multiple comparison test, was carried out and * P < 0.5 was considered as significant. Groups were compared with control group.

Results : The hypoglycemic effect of ethanolic extracts of leaves of *Tephrosia villosa* Pers. was investigated in alloxan induced diabetic rats and the results are expressed in **Table no. 1** and **Table no. 2**. The BGL of fasted rats were measured at initial 3rd, 6th and 12th hours and initial 3rd, 6th and 12th day after treatment with Glibenclamide and ethanolic extracts when compared with standard drug Glibenclamide.

Table .1. Effect of ethanolic extract of leaves of *Tephrosia villosa* Pers. On Blood glucose level in alloxan induced diabetic rats

Groups	Treatment	Change of BGL of alloxan induced diabetic rats after single treatment (mg/dl)			
		Initial	3 hr	6 hr	12 hr
Normal	D/W 10ml/kg P.O.	87.500 ± 1.64**	83.333 ± 2.628**	88.667 ± 1.856**	88.667 ± 1.909**
Diabetic control	D/W 10ml/kg P.O.	410.17 ± 1.138**	413.08 ± 0.7746**	416.50 ± 0.9916**	416.33 ± 3.323**
Positive control	Glibenclamide 5mg/kg P.O.	391.50 ± 1.727**	381.67 ± 1.585**	376.00 ± 2.955**	353.33 ± 1.706**
Lower dose of ethanolic extract	300 mg/kg P.O.	404.83 ± 1.014**	401.83 ± 1.014*	398.67 ± 1.145**	392.67 ± 1.145**
Higher dose of ethanolic extract	600 mg/kg P.O.	396.33 ± 0.8819**	390.17 ± 0.7923**	373.83 ± 9.786*	376.33 ± 3.947**

Values are expressed as mean ± SEM when compared with control. (one - way ANOVA followed by Dunnett's multiple comparison test)

CONCLUSION:

Based on the literature survey and information obtained about its medicinal use in folkore medicine. This plant was selected. The phytochemical and pharmacological studies were done on the ethanolic extracts of leaves of *Tephrosia villosa* Pers. The leaves of the plant were separated, dried and powdered and extracted by continuous soxhlet apparatus. In these extract the phytochemical constituents were iden-

tified by chemical test and these test showed the presence of many active component like tannins, saponins, phenolic compound sterol, flavonoid, glycoside and phytosterols.

Since ethanolic extract of leaves of *Tephrosia villosa* Pers. showed the presence of many phytoconstituents, it was selected for the pharmacological study.

The antidiabetic activity was evaluated by using alloxan induced diabetic rats. Since the ethanolic extract of leaves of *Tephrosia villosa* Pers. Showed significant antidiabetic

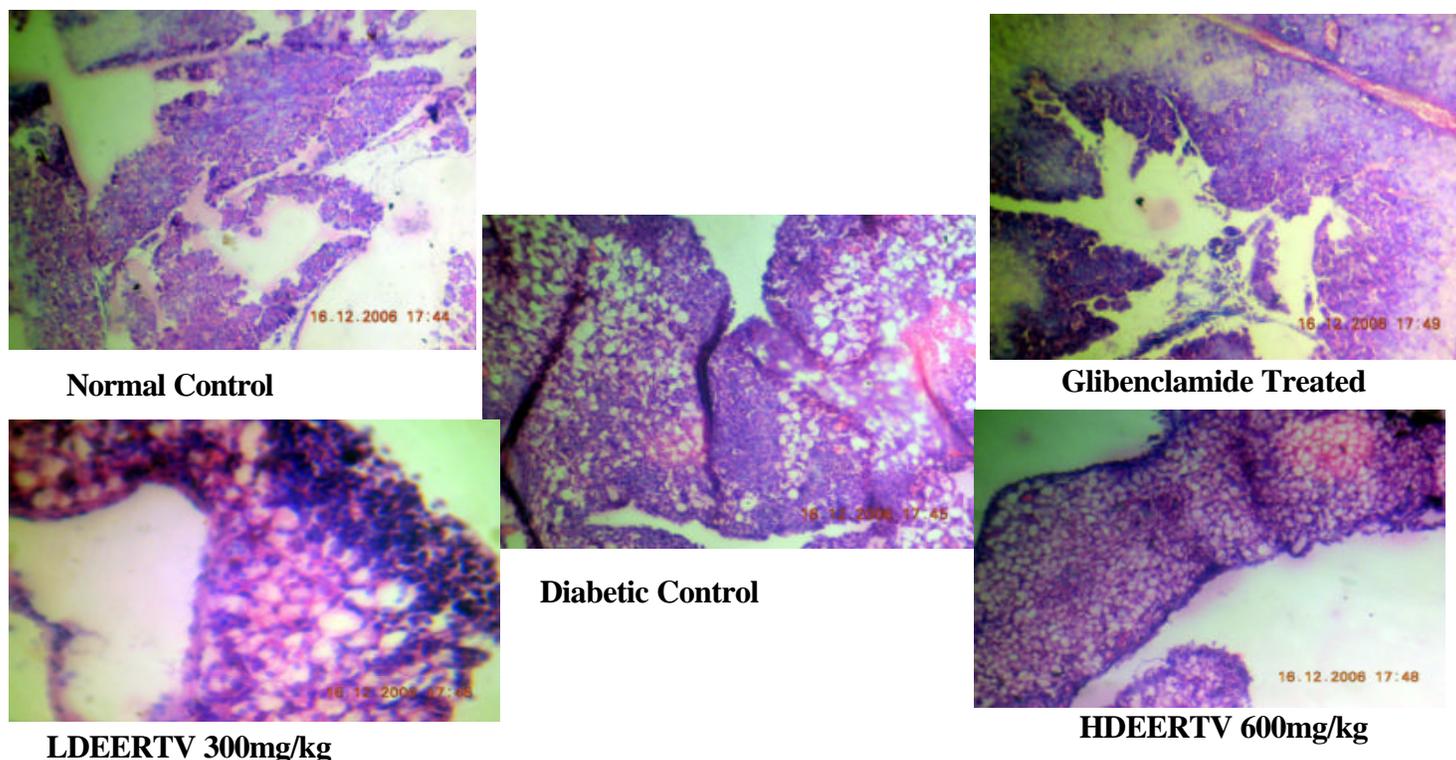


Table. 2.Effect of ethanolic extract of leaves of *Tephrosia villosa* Pers. On blood glucose level of alloxan induced diabetic rats after 12 days of treatment in mg/dl

Groups	Treatment	Change of BGL of all oxan induced diabetic rats after			
		Initial	3 rd	6 th	12 th
Normal	D/W 10ml/kg P.O.	87.500 ± 1.648**	88.333 ± 1.520**	89.667 ± 1.994**	89.883 ± 1.302**
Diabetic control	D/W 10ml/kg P.O.	410.17 ± 1.38**	450.17 ± 1.138**	466.83 ± 2.52**	505.83 ± 1.078**
Positive control	Glibenclamide 5mg /kg P.O.	391.50 ± 1.727**	319.17 ± 1.249**	258.33 ± 2.17**	128.50 ± 1.478**
Lower dose of ethanolic extract	300 mg/kg P.O.	404.83 ± 1.014*	359.00 ± 1.713*	314.00 ± 1.713**	194.67 ± 0.918**
Higher dose of ethanolic extract	600mg/kg P.O.	396.33 ± 0.8819*	338.3 ± 0.988**	276.67 ± 1.520**	157.17 ± 1.352**

n = 6, *P < 0.5, **P = P < 0.01 Vs control, Values are expressed as mean ± SEM when compared with control., (One- way ANOVA followed by Dunnett's a multiple comparison test)

Fig. 1 Histopathology of pancreas





activity, thus it can be suggested that formation of insulin should have been increased by the ethanolic extract.

Since the present study revealed that the leaves of *Tephrosia villosa* Pers. was found to possess significant antidiabetic activity when compared to standard drug. These factors support the use of the plant in traditional folklore medicine.

REFERENCE:

(1) Savitri Ramaiah, diabetes, an essential and informative guide to diabetes, reprint 2004, New Delhi-110 020 Page No. 1-22

(2) Prakash Ghadi, Pathophysiology for pharmacy, second edition, 2001, Career publication, Nashik, P-258-259

(3) Y.R., the wealth of India, Vol. sp-w, publication New Delhi, 1976, P-154.

(4) Kirtikar K.R. and Basu B.D., Indian medicinal Plant, Vol. II, P. 725

(5) P. Pula Rac and G. Srimannarayana, phytochemistry, Vol. 19, Issue 06, 1980, P. 1267-1273

(6) World Health Organisation Expert Committee on diabetes mellitus. Tech Rep. series 1980.

(7) Yanarday R. Colak H. Effect of Churd (*Beta vulgaris* L *Vas cicla*) on BGL in normal & alloxan induced diabetic rabbits. Pharm Pharmacol comno 1998; 4:309-11

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