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Anti-diabetic activity of *Jasminum trichotomum* aerial parts methanolic extract in alloxan induced diabetic rats

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ABSTRACT

The aim of this study is to evaluate the anti-diabetic activity of the methanolic extract of *jasminum trichotomum* aerial parts in albino wistar rat models. The methanolic extract of *jasminum trichotomum* aerial parts was prepared by using methanol 48 hrs in Soxhlet's extraction process (continuous hot percolation). The extract was distilled by distillation process and concentrated. In oral dose 100 and 200 mg/kg of the extract was evaluated for anti-diabetic activity in alloxan induced diabetic rats. A blood glucose level of all animals was determined at the 0, 7, 14 and 21 day by using one touch Glucometer by single drop method. The blood parameters and histopathological studies were done. The dosage of 100 and 200 mg/kg of the extract significantly decrease the blood glucose level in diabetic rats. The histopathological study has shown regeneration of β cells at both dose of extract. The obtained results have shown that the *Jasminum trichotomum* aerial parts of methanolic extract shown that consist of the anti-diabetic activity present.

Keywords: *Jasminum trichotomum*, anti-diabetic activity, albino wistar rats, alloxan induced diabetic rats, Glibenclamide.

INTRODUCTION

Diabetic mellitus is a common metabolic disorder characterized by hyperglycemia, glycosuria, polyuria and polydipsia induced by insulin deficiency [1] and insulin resistance [2]. Dietary measures and traditional plant therapies as prescribed by Ayurvedic and other indigenous system of medicine were used commonly in India.

Jasminum trichotomum is a medium sized glabrous tree popularly known as Karanja in Hindi, Indian beech in English, and Kattumalligai in Tamil. Historically, *Jasminum trichotomum* has been used as folk medicinal plant, particularly in Ayurveda and siddha systems of Indian medicine [3]. All parts of the plant have been used as a crude drug for the treatment of tumours, piles, skin diseases, itches,

abscess, painful rheumatic joints wounds, ulcers, diarrhoea etc. The roots are bitter and are useful for external application in ringworm infections and are recommending for opthalmopathy [4].

In the present study, we investigated the anti-diabetic activity of aerial parts methanolic extract of *Jasminum trichotomum* in experiment animals of alloxan induced diabetic rats.

MATERIALS AND METHODS

Collection of Plant

The plant *Jasminum trichotomum* is widely found throughout India, especially in Tamil Nadu. For our work the leaf of the plant was collected from Bhavani in the month of January 2014 and authenticated by Prof. P.Jayaraman, Ph.D., Plant Research Centre Chennai, Tamil Nadu (Reg. No:PAR/2011/748). The voucher specimen was deposited at the department for future reference.

Drugs and Chemicals

Glibenclamide manufactured by Aventis Pharma Ltd. Goa, India, Alloxan monohydrate was provided by institution. Glibenclamide is an oral antidiabetic preparation [5] with an efficient hypoglycemic action.

Animals

The albino rats both sex, weighing 150-200g were used. The experimental protocols were approved by Institutional Animal Ethical Committee has been taken to carry out and complete this study.

Preparation of Extracts

The dried aerial parts were chopped into small pieces and reduced to powder. About 250g of air dried powder was taken in a Soxhlet apparatus and extracted with petroleum ether for 2 days. After drying the powder was again packed with chloroform, after that ethyl acetate and extracted by using methanol as solvent for 48 hrs. The temperature was maintained at 55˚C- 65˚C. After that the extracts was concentrated by distillation and solvent was recovered. The final solution was evaporated to dryness and dry residue was obtained [6].

ANTI-DIABETIC ACTIVITY

The adult albino-wistar rats (150 to 250gm) were overnight fasted and determine the fasting blood glucose level. The sequence blood glucose level of animals were selected and used to induce diabetes by single IP injection of 140mg/kg Alloxan monohydrate. Alloxan monohydrate was dissolved in normal saline (P^H 4.5). Animals were fed with 5% glucose solution in order to prevent hypoglycemic shock for 18 hrs. Hyperglycemia is to be confirmed the elevated blood glucose levels, determined at by one touch glucometer. The threshold value of fasting blood glucose level >200mg/DL was taken as diabetic animal and rats found with permanent diabetes were used for the anti-diabetic study.

Experimental Design

Experimental rats were divided into five groups of six animals each all the group of animals were induced diabetic except control and treated for 21 days as follows.

Group I: Normal control rats fed with vehicles only (Normal Saline and 1% CMC).

Group II: Diabetic controls rats.

Group III: Diabetes rats treated with methanolic extract of *Jasminum trichotomum* 100mg/kg, per oral, dissolved with normal saline in 1% carboxy methyl cellulose (CMC).

Group IV: Diabetes rats treated with methanolic extract of *Jasminum trichotomum* 200mg/kg, per oral, dissolved with normal saline in 1% carboxy methyl cellulose (CMC).

Group V: Diabetes rats treated with standard drug Glibenclamide 3mg/kg body weight.

In the continuous 21 days of drug treatment, a blood glucose level of all animals was determined at the 0, 7, 14 and 21 day by using one touch Glucometer single drop method.

Histopathological studies

The whole pancreas from each animal was removed after sacrificing the animal and was collected in 10% formalin solution, Sections of 6µm in thickness were prepared and stained with Haematoxylin and Eosin then examined under microscopy [7,8].

Statistical Analysis

All the values of body weight, fasting blood glucose level, and biochemical parameter estimations were expressed as mean ± standard error of mean (S.E.M) and was analyzed for significance by ANOVA and groups were compared by Tukey-Kramer.

RESULT AND DISCUSSION

Vehicles control animals were found to be stable in their body weight but significant reduction in diabetic control group during 21 days (Table. 9). Alloxan caused body weight reduction, which is slightly reversed by methanolic extract of *Jasminum trichotomum* treated (100mg/kg – 200mg/kg) groups after 21 days. While, significant ($p<0.01$, $p<0.001$) increase in body weight was observed in normal rats treated with methanolic extract of *Jasminum trichotomum*. Glibenclamide to the diabetic rats were slightly increased the body weight level and compared to standard group of Glibenclamide. Table no.1

A significant increase in the level of blood glucose was observed in diabetic control rats when compared to control rats. Administration of MEJT and Glibenclamide to diabetic rats significantly decreased the level of blood glucose to near control level. Table no. 2

A significant increase in the level of glycolated haemoglobin was observed in diabetic control rats when compared to control rats. Administration of MEJT and Glibenclamide to diabetic rats significantly decreased the level of glycolated haemoglobin to near control level. But low dose of MEJT not significantly reduced glycolated haemoglobin levels[9,10].

The serum lipid values of TC, TG those were treated with MEJT extract returned to values near to control group. The level of cholesterol and triglyceride increased in diabetic animals when compared to control animals. After MEJT treatment, the higher level of both cholesterol and triglyceride were decreased to near control. The showed that treatment with MEJT significantly (both 100mg/kg and 200mg/kg) $p<0.001$ improved the lipid profile in Alloxan induced diabetic rats.

The plasma lipid values of HDL, LDL and VLDL of those were treated with MEJT extract returned to values near to control group. The level of HDL in plasma of diabetic animals was decreased. These lower levels of HDL- cholesterol were restored significantly near to normal in MEJT treated diabetic groups. The level of LDL and VLDL increased in diabetic animals when compared to control animals. After MEJT treatment, the higher level of both LDL and VLDL were increased to near control. The showed that treatment with MEJT significantly (both 100mg/kg and 200mg/kg) $p<0.001$ improved the lipid profile in Alloxan induced diabetic rats. Table no.3

The plasma lipid values of SGOT and SGPT of those were treated with MEJT extract returned to values near to control group. The level of SGOT and SGPT in plasma of diabetic animals was increased. SGOT and SGPT were restored significantly near to normal in MEJT treated diabetic groups.

Plasma alkaline phosphatase (ALP) level was increased in diabetic control group but this level was decreased significantly ($p<0.01$) in methanolic extract of *Jasminum trichotomum* treated groups (100 and 200 mg/kg) and standard drug. Hence, the methanolic extract of *Jasminum trichotomum* possessed significant effect on serum alkaline phosphatase level. Table no. 4

CONCLUSION

In conclusion, in the present study on the methanolic extract of *Jasminum trichotomum* aerial parts have Anti-Diabetic activity more over reagent activity.

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Table no. 1 Body weight changes in methanolic extract of *Jasminum trichotomum* and Glibenclamide on control and experimental groups of rats

GROUP	TREATMENT	BODY WEIGHT (g)			
		DAY 0 Mean±SD	DAY 7 Mean±SD	DAY 14 Mean±SD	DAY 21 Mean±SD
I	Normal control rats (vehicles only)	185.5 ± 2.86	188.16 ± 2.77	190.83 ± 2.9	193.3 ± 2.71
II	Diabetic control rats	186 ± 3.07	183.5±2.90	180.16±2.91	177.33±2.8
III	Diabetic group + MEJT (100mg/kg)	185.6 ± 3.22	187.6 ± 3.09	191.5 ± 3.03	194.6 ± 3.53**
IV	Diabetic group + MEJT (200mg/kg)	184 ± 2.59	186.6 ± 2.48	191.6 ± 2.52	196.3 ± 2.26**
V	Diabetic group + Glibenclamide 3mg/kg	184.8 ± 2.89	188.3 ± 2.96	193.5 ± 3.19	198.9 ± 3.14***

Values are given as mean ± S.E.M for groups of six animals each. Values are statistically significant at * = p<0.05; ** = p<0.01; *** =p<0.0001.

Table no. 2 Effect of methanolic extract of *Jasminum trichotomum* and Glibenclamide on blood glucose level

GROUP	TREATMENT	BLOOD GLUCOSE LEVEL (mg/dL)			
		DAY 0 Mean±SD	DAY 7 Mean±SD	DAY 14 Mean±SD	DAY 21 Mean±SD
I	Normal control rats (vehicles only)	94 ± 3.48	89.1 ± 3.9	90.6 ± 4.47	88.3 ± 2.84
II	Diabetic control rats	409.3 ± 5.0***	418.3 ± 4.99***	429.1 ± 4.84	437.1 ± 4.54***
III	Diabetic group + MEJT (100mg/kg)	404.6 ± 4.69***	344.6 ± 4.29***	301.6 ± 4.63***	231.5 ± 3.74***
IV	Diabetic group + MEJT (200mg/kg)	404 ± 4.53***	314.6 ± 4.29***	244.3 ± 4.68***	148.5 ± 3.18***
V	Diabetic group + Glibenclamide 3mg/kg	409 ± 4.48***	315.5 ± 4.3***	216.6 ± 3.64***	143 ± 1.65***

Values are given as mean ± S.E.M for groups of six animals in each. Values are statistically significant at * = p<0.05; *** = p<0.01; *** = p<0.001.

Table No: 3 Effect of methanolic extract of *Jasminum trichotomum* and Glibenclamide on HbA1c, TC, TG, HDL, LDL and VLDL

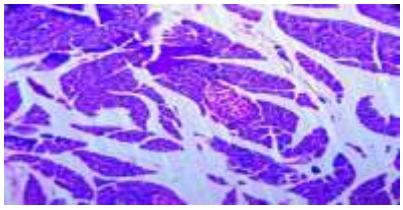
	I Normal control	II Diabetic control	III MEJT 100mg/kg	IV MEJT 200mg/kg	V Standard
HbA1c (%)	5.13±0.36	7.93±0.38***	6.81±0.10	5.66±0.20***	5.33±0.0***
TC (mg/dL)	86.56±1.09	180.41±2.89***	131.81±1.07***	112.89±4.38***	97.74±2.17***
TG (mg/dL)	85.79±0.42	108.57±0.49***	98.37±0.45***	94.87±0.69***	92.34±0.60***
HDL (mg/dL)	42.18±0.59	32.66±0.57***	40.54±0.43***	43.73±0.36***	45.53±0.64***
LDL (mg/dL)	73.4±0.54	108.08±0.47***	90.73±0.58***	83.65±0.85***	71.02±0.49***
VLDL(mg/dL)	18.48±0.54	34.79±0.44***	29.47±0.43***	26.05±0.43***	21.72±0.25***

Values are given as mean ± S.E.M for groups of six animals in each. Values are statistically significant at * = p<0.05; *** = p<0.01; *** = p<0.001.

Table No: 4 Effect of methanolic extract of *Jasminum trichotomum* and Glibenclamide on SGOT, SGPT and ALP

	I Normal control	II Diabetic control	III MEJT 100mg/kg	IV MEJT 200mg/kg	V Standard
SGOT (U/L)	38.95±0.77	80.82±0.52***	48.53±0.39***	44.85±0.73***	40.90±0.67***
SGPT (U/L)	55.79±0.60	89.75±0.52***	59.74±0.58***	58.92±0.58***	57.90±0.56***
ALP (U/L)	116.67±0.58	183.95±0.78***	131.71±0.58***	128.67±0.57***	120.71±0.67***

Values are given as mean ± S.E.M for groups of six animals in each. Values are statistically significant at * = $p<0.05$; *** = $p<0.01$; *** = $p<0.001$.



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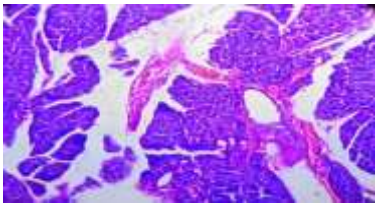

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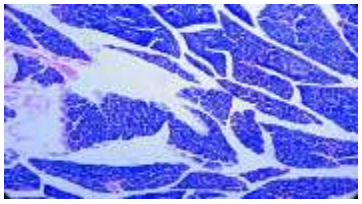

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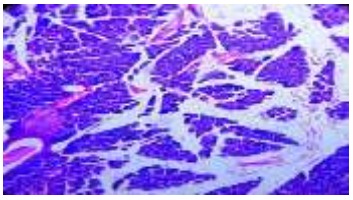

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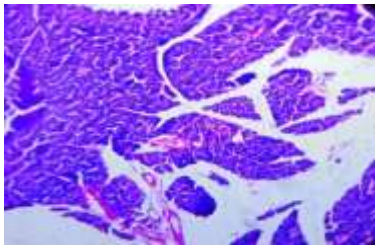

GROUP V

Figure No: 1 Histopathology of Pancreas

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