

Research Article



Effect of *Tinospora cordifolia* on Blood Glucose Level of Albino Wistar

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Accepted on: 01-06-2014; Finalized on: 30-09-2014.

ABSTRACT

Tinospora cordifolia belonging to family Menispermaceae is distributed throughout the tropical Indian subcontinent. This plant provide raw material for indigenous system of medicine in India viz. Ayurvedic, Unani and Siddha for its general tonic, anti-inflammatory, anti-arthritis, anti-allergic, anti-malarial, anti-diabetic and aphrodisiac properties. The leaves of this plant are used in the treatment of diabetes. The soxhlet extract (5 mg/ kg) was subjected to evaluation of hypoglycemic activity. Extract injected to rats and blood glucose level was determined after the treatment of 3 days, 7days and 15 days. After the treatment in experimental rats hypoglycemic changes were observed in blood glucose level compared to the control group rats. The treated animals with the leaf extract clearly indicate the hypoglycemic effect like insulin.

Keywords: *Tinospora cordifolia*, blood glucose, albino wistar.

INTRODUCTION

T*inospora cordifolia* (Wild) Miers ex Hook.F & Thems (Family: Menispermaceae) commonly known as Gudvel in marathi is a medicinal plant and has been used in folk and Ayurvedic preparations for the treatment of various ailments throughout the centuries. It is a large, glabrous, deciduous climbing shrub belonging to the family menispermaceae. It is distributed throughout tropical Indian subcontinent and China.

Almost all the parts of the plant are documented to be useful in ethno-botanical surveys conducted by ethno-botanists¹⁻². In folk and tribal medicine, whole plant, powdered root and stem bark, decoction of root and stem, juice of the root, juice or paste of the leaves, and stem of the *T. cordifolia* are being used to treat various ailments viz. fever, diabetes, jaundice, enlarged spleen³ diarrhoea, dysentery, indigestion, intestinal problem, malaria, eyes and syphilitic sores⁴ allergy, leprosy⁵⁻⁷ skin diseases, bronchitis, syphilis, urinary trouble⁸. The plant is known as Amrita and the term is attributed to its ability to impart youthfulness, vitality and longevity to the consumer⁹. There are several herbal preparations used in the indigenous system of medicines which can enhance the body's immune status. A variety of plant-derived materials polysaccharides, lectins, peptides, etc. have been reported to stimulate the immune system³. The notable medicinal properties reported are anti-periodic, anti microbial, anti-stress, anti-leprotic, ant-malarial and antineoplastic activities¹⁰⁻¹³.

Leaves of this plant are rich in protein and are fairly rich in calcium and phosphorus¹⁴⁻¹⁵. A variety of constituents have been isolated from *T. cordifolia* plant. They belong to different classes such as alkaloids, diterpenoid lactones, glycosides, steroids, sesquiterpenoid, phenolics,

aliphatic compounds and polysaccharides. Three major groups of compounds; protoberberine alkaloids, terpenoids and polysaccharides are considered as putative active constituents of *T. cordifolia*¹⁶⁻¹⁷.

The stem of *T. cordifolia* is one of the constituents of several Ayurvedic preparations used in general debility, dyspepsia, fever, and urinary diseases. The decoction of leaves is used in treatment of gout, also fresh leaves bruised in milk are used as liniment in erysipelas and with honey used as tonic¹⁸.

Tinospora extracts are widely used in the traditional system of medicine in the treatment of jaundice, rheumatism, urinary diseases, intermittent fevers, eye and liver ailment. It is also an important constituent of many ayurvedic formulations and is reported to possess adaptogenic and immunomodulatory activity in fighting infections¹⁹. *T. cordifolia*, is known to be beneficial for the treatment of disorders like peptic ulcer, hepatobiliary disorders, rheumatism, infectious diseases etc^{3, 20}. It has an immunostimulant activity²¹. It improves intelligence, power of retention and memory²². It enhances cognition in normal rats and successfully overcomes cyclosporine induced memory deficit²³. Gudvel has been extensively investigated for its immunomodulatory and antioxidant potential *in vitro* and *in vivo*. Immunomodulatory and hepatoprotective properties of aqueous extracts of *T. cordifolia* stem, in CCl₄ intoxicated Swiss albino mice, have been reported by²⁴. It was observed to modulate the immune system by activating the macrophages as evident by enhanced secretion of lysozyme in treated cultured macrophage cell line²⁵.

Although various literatures suggested that *T. cordifolia* has antidiabetic properties very few reporting was



observed regarding the effect of *T. cordifolia* in relation to experimental animal model response.

MATERIALS AND METHODS

The present study was carried out on albino rats weighting 200-250g of both the sexes. The animals were kept in polypropylene rearing cages. They were regularly fed standard diet and water. The waste food and animals waste were removed from the cages daily and proper care was taken, in order to avoid any infection to the animals. All healthy rats were used for the present experimental purpose. The rats were carefully observed in order to see any infection. The pregnancy period of each female rat was also observed by obtaining daily the vaginal smear. After a week of acclimatization to laboratory conditions, the animals were used for the different set of experiment.

Preparation of Plant extract

The plant *Tinospora cordifolia* was collected from P.G.T.D. Botany, R.T.M. Nagpur University premises. Plant leaves were used for the extract they were cut and dried at room temperature. Then the leaves were powdered and extracted with ethyl alcohol by using soxhlet apparatus. Powdered material was taken in a thimble of Whatman No. 1 filter paper and extracted with ethyl alcohol (80%) for 10-12 hrs. The alcohol extract was collected and stored in refrigerator and brought to room temperature before administration to the animals.

Handling of Animals

The animals were divided into two groups, one control and other experimental as group A & B.

The animals of experimental group were administered with *Tinospora cordifolia* extract. The duration of treatment 3 days, 7 days and 15 days respectively.

Dose

The dose of the drug was calculated as per the body weight of rat. The dose of drug calculated as per body weight. (5 mg/kg body wt.)

Experimental Set Up

Control animals (Group A) were injected with saline solution considered control and experimental (Group B) with *Tinospora cordifolia* extract for given time.

After treatment of the doses animals were anesthetized with chloroform and sacrificed for blood. The blood was drawn directly from the heart with the syringe and blood glucose variation was recorded.

i) Biochemical analysis

The blood-glucose concentration was determined by "Nelson-Somogyi" method²⁶, 100 ± 1.15 and 86 ± 0.57 mg / 100ml blood glucose was found in control and experimental group rats respectively, and a change in blood glucose level was observed in experimental group rats compare with the control, after the treatment of

extract of *Tinospora cordifolia* for 3 days. The percent change in blood glucose level was illustrated in Table No.1.

A change in blood glucose level in experimental group rats, after the treatment of extract for 7 days was found to be 81 ± 0.57 mg/100ml. The percent change was found to be 21.35 %. (Table No. I).

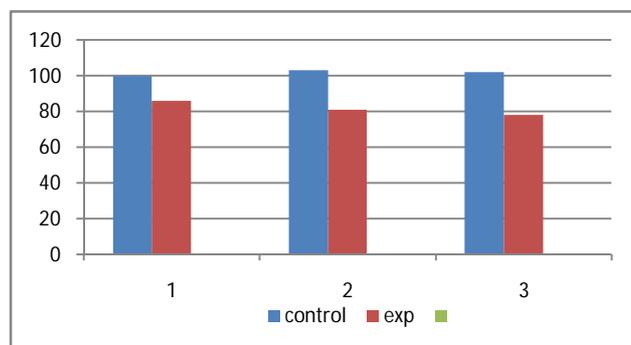
After the treatment of extract of *Tinospora cordifolia* for 15 days in albino rats the blood glucose level changed from 102 ± 0.57 to 78 ± 1.63 mg/100 ml. The change in blood glucose level was found to be 23.52 %. (Table No. 1).

Table 1: Effect of *Tinospora cordifolia* extract on Plasma Glucose level in rats

Duration of Treatment / No. of animals (3)	Blood Glucose Level (mg/100ml)	
	Control	Experimental
3 days (3)	100 ± 1.15	86 ± 0.57*
7 days (3)	103 ± 1.00	81 ± 0.57*
15 days (3)	102 ± 0.57	78 ± 1.99*

± All values are mean of standard error; * P < 0.05; * significant

Graphical representation of Plasma Glucose variation in rats



DISCUSSION

In the present study the *Tinospora cordifolia* extract was prepared with a dose of 5 mg/ kg body weight administered intramuscularly produced reduction in blood glucose level after the treatment of 3 days, 7 days, and 15 days, the plasma glucose level in extract treated rats was lowered than that of control animals, where there was the complete onset of hypoglycemia.

CONCLUSION

The therapeutic efficacy of *Tinospora cordifolia* makes it a primary novel drug for the treatment of diabetic patient.

Acknowledgement: The authors acknowledge the support extended by the Dr. V. B. Aglawe for carrying out the work. We also acknowledge Dr. (Mrs.) Alka Chaturvedi Prof. and Head PGTD Botany RTMN University,



Nagpur for providing pure saxhleted ethyl alcohol extract of *Tinospora cordifolia* leaves.

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Source of Support: Nil, Conflict of Interest: None.

