

HYPOGLYCEMIC EFFECT OF *TINOSPORA CORDIFOLIA* IN ALBINO RATS

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ABSTRACT

The present study is designed to investigate the hypoglycemic effect of *Tinospora cordifolia* in normal rats of the wistar strain. The rats weighing 180-300g were administered intraperitoneally with the alcoholic leaf extract of *Tinospora cordifolia* with a single dose of 0.5g/kg body weight from a period of Day 1 to 24 days. It produced significant decrease in the levels of blood glucose. The results showed that the extract of *Tinospora cordifolia* is antidiabetogenic and possess hypoglycemic effects.

INTRODUCTION

Diabetes is a chronic disease characterized by high blood glucose level due to absolute or relative deficiency of insulin. Diabetes mellitus has approached to the ever increasing share of National and International health care budget. The regions with greatest Diabetic potential are Asia and Africa. Diabetes mellitus is produced by inherited or acquired deficiency of insulin by the pancreas.

The onset of hyperglycemia in Diabetes is characterized by increased blood glucose level and the deficiency of circulating insulin in the blood. Though there are different types of oral hypoglycemic agents available for the treatment of Diabetes mellitus there is an increasing demand by patients to use the natural products with antidiabetic activity. Continuous use of synthetic drugs causes side effects as well as toxicity and insulin cannot be used orally. Herbal drugs are prescribed widely even when their biologically active compounds are unknown, because of their effectiveness, less side effects and relatively low cost. The hypoglycemic effect of *D. viscosa* was reported in rats (Aswal *et al.*, 1984). The seeds of fenugreek (*Trigonella foenum graecum*) showed depletion in blood glucose, glycosylated haemoglobin and increased serum insulin in the alloxan recovered sub-diabetic, moderately diabetic and severely diabetic rabbits (Moorthy *et al.*, 2010). The anti-diabetic activity of combined extracts from two continental plants *Azadirachta indica* and *Veronica amygdalina* was studied (Ebong *et al.*, 2008). The plant extract of *Gymnea sylvestre* in adrenaline induced hyperglycemic

rats showed antidiabetic activity (Gupta, 1961). Plant contents act on blood glucose through different mechanisms. Some of them may have insulin like substances (Bhinde and Asman, 1963). One such plant expected to have hypoglycemic activity is *Tinospora cordifolia*. It is a traditional plant used in medicine. It is widely used in Ayurvedic system of medicine for its general toxic anti-diabetic, antimalarial, anti-allergic and aphrodisiac properties (Kirtikar and Basu., 1991). Literature survey reveals that the plant *Tinospora cordifolia* belonging to family Menispermaceae is traditional in Indian system of medicine for treatment of Diabetes. The use of plant and plant extracts for medicinal purpose is observed since thousand years and in folk medicine, both ancient and modern therapy. It is reported that the plant extract has anti-diabetic activity (Stanley and Menon, 2001).

There are many herbal products which alter the carbohydrate metabolism and these products were known to exert hypoglycemic effects (Effects are observed on the animals and on humans also, which were presented in ancient literature of India) *Tinospora cordifolia* is one of the most valuable medicinal herb in India. In modern medicine it is well known for its hepatoprotective and immunomodulatory activities (Rege *et al.*, 1993). *Tinospora cordifolia* is widely used in Indian medicine for treating diabetes mellitus (Stanley and Menon, 2001). The plant extract decrease the blood sugar level in varying degree (Roman *et al.*, 1992; Chattopadhyay, 1999). The aim of present study is to investigate hypoglycemic effect of extract of the leaves of *Tinospora cordifolia* in normal rats of the wistar strain with a fixed dose of 0.5g/kg body weight

Table 1: Effect of *Tinospora cordifolia* extract on plasma glucose level in rats

S. No.	Duration of treatment	Blood glucose mg/100mL	
		Control	Experimental
1	'0' Day	120 ± 0.57	112 ± 1.00*
2	Day-1	105 ± 0.57	101 ± 1.73**
3	Day-2	100 ± 1.15	96 ± 1.73**
4	Day-3	100 ± 1.15	86 ± 0.57*
5	Day-5	103 ± 1.00	81 ± 0.57*
6	Day-15	102 ± 0.57	78 ± 1.99*
7	Day-24	105 ± 0.57	72 ± 1.11*

* = significant at $p < 0.05$, ** = NS

from day one to twenty four days.

MATERIALS AND METHODS

Collection of plant material and extraction

The plant material, *Tinospora cordifolia* was collected from naturally grown plants from forest areas of Nagpur region of Maharashtra, India and identified. It was washed with water in order to make it free of dirt and other impurities and was shed dried. The plant leaves were powdered with the help of a mixer grinder. The powdered material was kept in air tight container in refrigerator till its use. Alcoholic extract of *Tinospora cordifolia* was prepared according to the standard procedure.

Animals

Inbred wistar strain rats bred at Department of Biochemistry animal facility R.T.M. Nagpur University, Nagpur, were taken for the experiment. Healthy young rats weighting 180-300g irrespective of sex were used for the present experiment. They were maintained under a controlled light dark (12:12h) schedule at $23 \pm 1^\circ\text{C}$. The animals were fed on pellet diet and water ad libitum. The experiments were carried out in between 9 to 10 a.m. in order to avoid circadian rhythm changes. After a week of acclimatization to laboratory conditions the animals were used for different sets of experiments Approval of Institutional Ethical Committee (IACE No. 08/0004/02) was sought prior to the commencement of experiment.

Experimental groups

The experimental animals were divided into two groups.

Group I consisting of wistar strain albino rats as control animals. The control animals were injected with distilled water.

Group II consisting of normal wistar strain albino rats as experimental animals. They were treated with the alcoholic extract of *Tinospora cordifolia* with a dose of 0.5g/kg body weight by intraperitoneal administration. The blood samples were collected for determination of blood glucose by using dextrofix with glucometer and also with Nelson-somogyi's method (Somogyi, 1945).

RESULTS AND DISCUSSION

The result of experiments has been shown in Table 1, where the experimental animals were treated with extract of *Tinospora cordifolia* and their plasma glucose levels were determined. The plasma glucose levels were estimated on various days starting from day '0' up to 24th day. The control group revealed

blood glucose variations between 100 ± 1.15 and 120 ± 0.57 mg/100mL. While the experimental group indicated variations between 72 ± 1.11 to 112 ± 1.00 mg/100mL the blood concentrations. Comparative assessment was carried out using paired 't' test procedure. The result showed that there was a significant ($p < 0.05$) difference in the main values of blood glucose for all the days except Day-1 and Day-2 (Table 1). It is also evident from Table 1 that the blood glucose in the experimental rats showed a decreasing trend with gradual decline in respect to time, while during corresponding days the control group exhibited a fairly similar concentration.

The hypoglycemic effect of alcoholic extract of *Azadirachta indica* and *Abroma augusta* with a dose of 200 mg/kg body weight administered orally to the hyperglycemic rats once in a day for 8-weeks caused significant lowering of blood sugar in diabetic rats. (Halim, 2003). However there are various plants which show the antidiabetic property such as *Tinospora crispa* (Noor and Ashroff, 1989). *Momordica charantia*, *Eugenia jambolina*, *Tinospora cordifolia*, (Rathi et al., 2002). Different hypoglycemic medicinal plants studied from indigenous folk medicine, the experiments with different samples with a dose of 250 mg/kg once, twice or thrice daily, produced blood glucose lowering effect within 2 weeks have been confirmed in alloxan diabetic albino rats (Kar et al., 2003).

The present investigation confirmed antidiabetic activity of *Tinospora cordifolia* in normal rats as the extract produced significant decrease in blood sugar concentration with a dose of 0.5g/kg body weight of normal rats.

CONCLUSION

Histological studies of pancreas can further help in arriving at the clear conclusion. Presently at this stage, the only conclusion is that the possible use of these cheap and relatively non-hazardous natural remedies of plant origin for the treatment of diabetes mellitus may further be explored.

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