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Antidiabetic Potential of *Tinospora cordifolia* (Guduchi) and *Momordica charantia* (Karela) in Alloxan Induced Rats

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Abstract

The present study was aimed to evaluate the anti-diabetic activity of herbal formulation containing extract of Tinospora cordifolia (Guduchi) and Momordica charantia (Karela), in alloxan induced diabetic rats. Diabetic wistar albino rats were treated with standard drug Glibenclamide and prepared drug formulation in two different doses 100 mg and 200 mg. Hypoglycemic effect was evaluated in these rats and the efficacy of the prepared drug formulation was administered for 21 days in alloxan induced diabetic rats. At the end of study period blood glucose level were statistically analyzed based on the results. Herbal formulation produced a significant reduction in blood glucose level when compared with non-treated diabetic rats. So the present research work was confirmed that the prepared herbal drug formulation possesses hypoglycemic effect significantly.

Keywords

Tinospora cardifolia, Momordica charantia, Antidiabetic, Alloxon.

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1. INTRODUCTION

Tinospora cordifolia, which is known by the common names heart-leaved moonseed, guduchi and giloy, is an herbaceous vine of the family Menispermaceae indigenous to the tropical areas of India, Myanmar and Sri Lanka It is a large, deciduous extensively spreading climbing shrub with several elongated twining branches. Leaves simple, alternate, estipulate, long petioles up to 15 cm long, roundish, pulvinate, both at the base and apex with the basal one longer and twisted partially and half way around. Lamina broadly ovate or ovate cordate, 10–20 cm long or 8– 15 cm broad, 7 nerved and deeply cordate at base, membranous, pubescent above, whitish tomentose with a prominent reticulum beneath. Flowers are unisexual, small on separate plants and appearing when plant is leafless, greenish yellow on axillary and terminal racemes. Male flowers clustered, female usually solitary. Sepals 6, free in two series of three each, the outer ones are smaller than the inner. Petals 6 free smaller than sepals, obovate and membranous. Fruits aggregate of 1-3, ovoid smooth drupelets on thick stalk with sub terminal style scars, scarlet or orange coloured.[1,2]
The biter principle present shows several medicinal applications viz. anti-inflammatory,

immunomodulatory or immunostimulatory, antitumor, antineoplastic, antihyperglycemia, antioxidant, antituberculosis, gastrointestinal and hepatoprotective, antiangiogenic, anti-malarial, anti-allergic and antipyretic properties.[3]

Momordica charantia (*M. charantia*), also known as bitter melon, karela, balsam pear, or bitter gourd, is a popular plant used for the treating of diabetes-related conditions amongst the indigenous populations of Asia, South America, India, the Caribbean and East Africa [4,5] Its fruit has a distinguishing bitter taste, which is more pronounced as it ripens, hence the name bitter melon or bitter gourd. Biochemical and animal model experiments have produced abundant data and hypotheses accounting for the anti-diabetic effects of *M. charantia*. In comparison, clinical studies with human subjects are sparse and low quality in design.

Diabetes mellitus is well known clinical entity with various late complications like retinopathy, neuropathy, nephropathy, *etc*. Natural products are known to play an important role in pharmaceutical biology[6,7]. Specific plant knowledge may provide insight for strategic consumption and sustainable use. The alternate medicine system is now gaining momentum with the knowledge of active principles identified from plant species[8]. *M. charantia* has significant antidiabetic as well as hypolipidemic activity so that it can be used as an adjuvant along with allopathic treatment of medicine to treat diabetes as well as to delay the late complications of diabetes. In the present review, we have elucidated the possible antidiabetic activity of *M. charantia* and its medicinal potency responsible for the hypoglycemic activity.[9, 10]

2. MATERIAL AND METHOD

2.1 Plant material

Tinospora cordifolia & Momordica charantia were selected & these were authenticated by the Botanical servey of India, Pune. Maharashtra. Aqueous extract of stem of Tinospora cordifolia & Momordica charantia were prepared by using cold maceration method.

2.2 Animal Model Used:

Albino rats (100-200 g body weight) were used for the study. The animals were kept under the standard condition maintained at 23^0C - 25^0C & given a standard pellet diet (Hindustan lever, Bangalore, India). The experimental protocol was approved by the Institutional Animal Ethical Committee (IAEC) & all the experiments were carried out by following the guidelines of CPCSEA.

2.3 Anti-diabetic activity

One gram of prepared formulations was separately triturated with polyvinyl pyrrolidone (PVP 0.2 g) and added water for injection in successive amount to make up the final volume to 100 ml (0.2%w/v). Adult albino rats of either sex (100-200 gm) were selected for the study and were divided in two groups of six in each group. Rats were acclimatized for a period of two-three days in the new environment and subsequently used for further study. Toxicological studies revealed that albino rats tolerated considerably high dose of prepared formulations (700µg/kg body weight, orally) without any toxic manifestation. Therefore, doses of 150 µg twice a day/kg-body weight of prepared formulation were administered orally to the alloxan induced diabetic albino rats. Animals were divided in four groups of six animals each. The diabetes was experimentally induced by i.v. administration of alloxan monohydrate 150 µg twice a day/kg of body weight. Alloxan is given by rapid intravenous injection, as its half-life in the body is only a few seconds. The diabetes is induced within 24 hours if the rats were fasted before the alloxan injection. Diabetes is checked by measuring blood glucose level using Glucometer. Haemo-gluco test 200-800R (HGT) method was utilized for the measurement of blood glucose level. Blood Sample collected by retro orbital puncture under light ether anesthesia. The blood glucose level was determined after fixed intervals of four days and the study was continued for a period of twenty-eight days.

Group I – Control Adult albino rats were feed with 0.1ml Poly vinyl pyrolidone (PVP) solution (0.2%W/V).

Group II – Glibenclamide treated Adult albino rats were orally administered with 100 µg twice a day /kg of body weight of Glibenclamide.

Group III – Formulation I treated Adult albino rats were orally administered with 200µg twice a day/ kg of body weight of formulation I.

Group IV - Formulation II treated Adult albino rats were orally administered with 200µg twice a day/ kg of body weight of formulation II.

3. RESULT AND DISCUSSION

In the present work, we evaluated the hypoglycemic activity of the prepared formulation in alloxan induced diabetic rats. As shown in the table the prepared formulation significantly reduced the blood glucose level in alloxan induced diabetic rats. The drugs were administered through oral route in a dose of 200µg twice a day/kg of body weight of rat with 0.2% polyvinyl pyrolidone solution. The hypoglycemic activity of formulation - 1 showed

67.33% anti-diabetic activity whereas formulation - 2 showed 68.94% activity. Both the formulations have shown potential in their role to reduce the blood glucose level. Formulation – II showed slight higher activity as compared to the Formulation – I. Formulation – II may possess a higher anti diabetic activity. A potent insight into these herbs may lead to development of more potent anti-diabetic formulations.

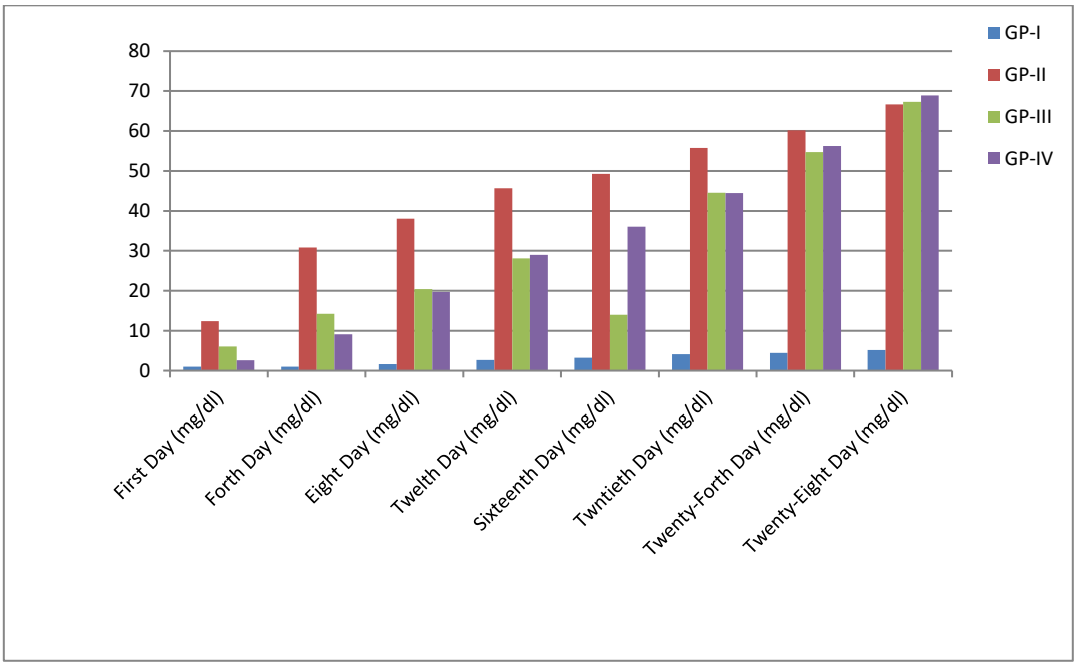
Table 1: Formulation

Sr. No	Ingredients	Common name (Hindi)	Part used	Quantity taken	
				Formulation-1 (100mg)	Formulation-2 (200mg)
1	Tinospora cordifolia	Guduchi	Stem	50	100
2	Momordica charantia	Karela	Stem	50	100

Table 3: Percentage reduction of Blood glucose level in Alloxan induced diabetic albino rats

Group	AIBGL Mg/dL	First Day (mg/dl)	Forth Day (mg/dl)	Eighth Day (mg/dl)	Twelfth Day (mg/dl)	Sixteenth Day (mg/dl)	Twentieth Day (mg/dl)	Twenty-Fourth Day (mg/dl)	Twenty-Eighth Day (mg/dl)
GP-I	0.98	0.97	1.63	2.71	3.25	4.16	4.43	5.15	0.98
GP-II	12.38	30.85	38.08	45.64	49.26	55.78	60.17	66.68	12.38
GP-III	6.06	14.21	20.44	28.12	14.00	44.57	54.72	67.33	6.06
GP-IV	2.58	9.12	19.67	28.98	36.04	44.48	56.22	68.94	2.58

Graph 1: Percentage reduction of blood glucose level in alloxan induced Diabetic albino rats



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