

Antidiabetic Activity of combined Extracts of various *Momordica* Species

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Abstract: *Momordica charantia* is commonly known as bitter melon and *Momordica dioica* commonly known as bitter melon both are very commonly available plants of Andra Pradesh both fruits are proved to have anti-diabetic activity. The main objective of the present research work was to compare the anti-diabetic activity of the *Momordica charantia* and *Momordica dioica* fruit crude extracts obtained by various extraction methods. Ethanolic and Aqueous extracts of both *Momordica charantia* and *Momordica dioica* fruits were prepared by Maceration, Percolation and Soxhlation, and subjected to phytochemical screening and tested for anti-diabetic activity in alloxan induced diabetic rats. Phytochemical screening and showed positive tests for alkaloids, terpenoids, Saponins (aqueous), Glycosides & Carbohydrates in both fruit extracts. The macerated ethanolic extracts of *Momordica charantia* fruit and the Combination of Macerated extracts of both *Momordica charantia* and *Momordica dioica* showed significant anti-diabetic activity at a dose of 250mg/kg orally.

Key words: *Momordica charantia*, *Momordica dioica*, diabetes, Ethanolic extract, maceration and soxhlation.

INTRODUCTION

Plant derivatives with hypoglycemic properties have been used in folk medicine and traditional healing systems around the world from very ancient time. More than 100 medicinal plants are mentioned in the Indian system of medicines including folk medicines for the management of diabetes, which are effective either separately or in combinations [1]. Medicinal plants used to treat hypoglycemic and hyperglycemic conditions are of considerable interest to ethno botanical community as they are recognized to contain valuable medicinal properties in different parts of the plant [2].

Momordica charantia Linn. is a slender, climbing annual vine commonly known as 'bitter gourd' and 'Karela' grows in India and other tropical countries [3, 4]. The whole plant is used in the treatment

of diabetes, ophthalmia, anthelmintic, antipyretic, blood diseases and ulcers. It acts by various mechanisms when used as an anti-diabetic. *Momordica dioica* is a perennial, dioecious climber with tuberous roots found throughout India. The whole plant is used for the treatment of eye diseases, poisoning and fever. Fruits, leaves and tuberous roots used in India as a folk remedy for diabetes [5]. Phytochemical investigations have revealed the presence of alkaloids, glycosides and Saponins in both plants.

Momordica charantia is well known for its anti-diabetic activity. The fruit, seed and pulp are reported to show anti-diabetic activity here an attempt was made to develop method of extraction using complete fruit along with the seeds and pulp. The activity was determined and compared with activity of *Momordica dioica* extract. *Momordica dioica* is well

known for its antioxidant activity but there are only few reports on the anti-diabetic activity of the fruit. Extracts were prepared by using different methods like Maceration, Percolation and Soxhlation, and the resultant extracts were screened for the anti-diabetic activity to compare the activity of both fruits.

MATERIALS AND METHODS

Plant material: Fresh fruits of *Momordica charantia* and *Momordica dioica* were collected from local vegetable market Warangal and identified by Dr. V.S. Raju, Department of Botany, Kakatiya University, Warangal, and Andhra Pradesh.

Extraction and isolation: Matured fruits of *Momordica charantia* and *Momordica dioica* (6kgs) were washed to remove foreign matter and fruits were then chopped, sun dried and powdered. The powder was extracted with water by Maceration, Percolation and Soxhlation [3] and the yield was 22.20%, 5.50%, 5.08% respectively. The powder was also extracted with 90% ethanol and the yield was 7.5% and 7.96% for Maceration and Percolation for ethanolic extracts of *Momordica charantia*. 31.82%, 6.28% and 10.24% for Maceration, Percolation and Soxhlation respectively for aqueous extract and 3.70% and 10.24% for Maceration and Percolation respectively for ethanolic extracts of *Momordica dioica*, on weight basis.

Phytochemical investigation of organic extracts: Freshly prepared organic extracts were tested for the presence of alkaloids, glycosides, Saponins, carbohydrates, amino acids using standard procedure [6].

Animals: Wistar rats of either sex weighing 180-220gm were procured from Mahaveera Enterprises (Hyderabad, A.P., India). They were maintained in standard environmental conditions of temperature (25

$\pm 2^{\circ}\text{C}$), relative humidity ($55 \pm 10\%$) and 12h dark/light cycle were used. They were fed with standard diet and water *ad libitum* [7]. The experiments were planned after the approval of Institution Animal Ethical Committee (IAEC), Vaadagevi College of Pharmacy, Warangal (A.P), India.

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Anti-diabetic activity: Diabetes was induced by a single intra-peritoneal (i.p) injection of 120mg/kg of Alloxan monohydrate in sterile saline. After 5 days of alloxan injection, the diabetic rats (glucose level $>250\text{mg/dl}$) were separated and divided into six groups of six animals each [8].

Group I: Diabetic control was given CMC (1%).

Group II: The Standard drug Glibenclamide was given orally at a dose of 5mg/kg.

Group III: Treated with 250mg/kg Macerated Ethanolic Extract of *Momordica dioica*.

Group IV: Treated with 250mg/kg Soxhlated Ethanolic Extract of *Momordica dioica*.

Group V: Treated with 250mg/kg Macerated Ethanolic Extract of *Momordica charantia*.

Group VI: Treated with 250mg/kg Soxhlated Extract of *Momordica charantia*.

Group VII: Treated with Combination of Macerated Extracts at a dose of 250mg/kg.

Group VIII: Treated with Combination of Soxhlated Extracts at a dose of 250mg/kg.

The extracts were suspended in carboxy methylcellulose (0.25%). Blood samples were collected from retro-orbital vein at a time intervals of 2hrs after administration of extracts and standard. Plasma was separated and blood glucose levels were measured immediately by GOD-POD method. Mean and Standard Deviations were calculated and the results were compared with student t-test.

Table 1. Effect of various extracts on blood glucose levels in alloxan induced rats

Groups	0 hr (mg/dl)	2hr (mg/dl)	4hr (mg/dl)	6hr (mg/dl)
I	304.33 \pm 5.13	340.18 \pm 4.69	369.82 \pm 8.03	394.10 \pm 9.54
II	281 \pm 4.58	198.36 \pm 7.78	147.94 \pm 2.67	121.39 \pm 2.05
III	321 \pm 9.64**	285.85 \pm 4.76***	267.31 \pm 6.31***	227.49 \pm 10.55***
IV	274.67 \pm 4.51	241.54 \pm 4.20**	214.17 \pm 8.62***	206.57 \pm 5.44***
V	306 \pm 5.57**	231.05 \pm 5.84**	136.98 \pm 5.98	100.63 \pm 2.89**
VI	292 \pm 4.36*	241.09 \pm 6.75**	191.39 \pm 6.38**	148.95 \pm 3.49***
VII	256.67 \pm 6.51*	180.09 \pm 3.40*	161.05 \pm 2.79.*	153.78 \pm 4.21***
VIII	276.33 \pm 3.51	202.64 \pm 4.08	197.07 \pm 5.49***	199.97 \pm 4.04***

*Significant $p < 0.01$, **Very Significant $p < 0.001$, ***Extremely Significant $p < 0.0001$

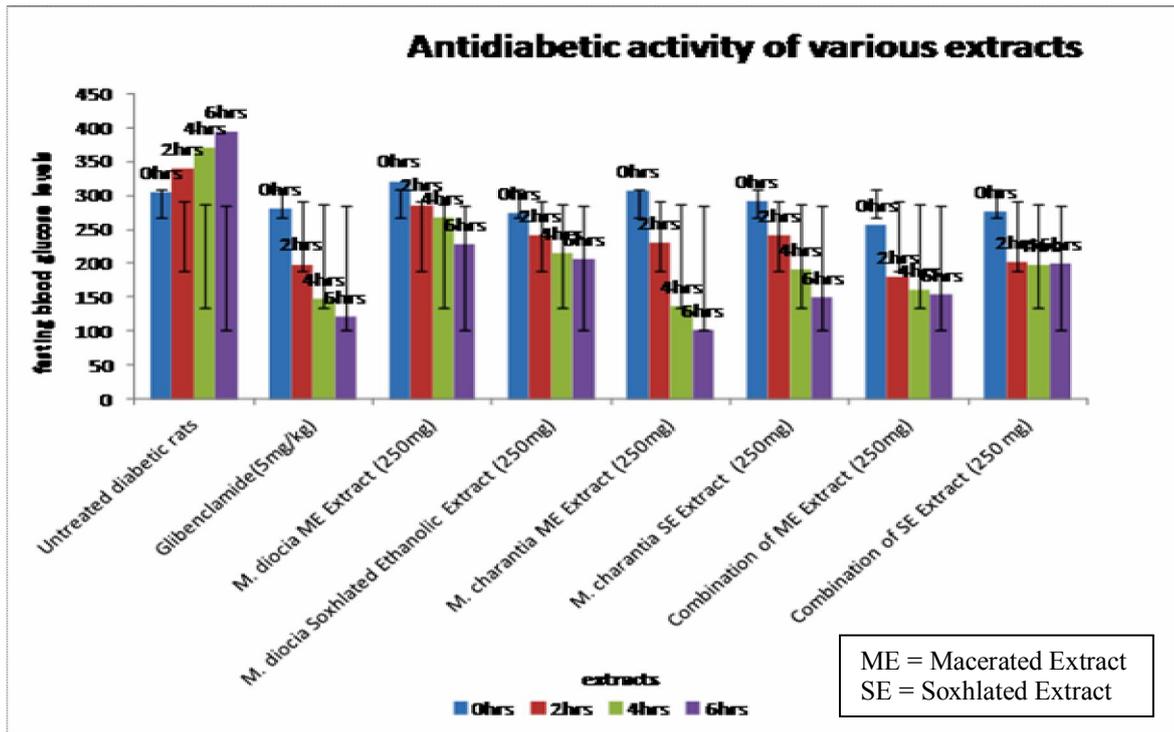


Fig 1. Antidiabetic activity of *Momordica charantia* & *Momordica dioica* Extracts

RESULTS AND DISCUSSION

Phytochemical screening gave positive tests for alkaloids, glycosides, carbohydrates (both aqueous and ethanolic) and Saponins (thanolic extract). The macerated ethanolic extract of *Momordica charantia* showed significant reduction in the blood glucose level when compared to standard at a dose of 250mg/kg, macerated ethanolic extract of *Momordica dioica* showed anti-diabetic effect but at a slow rate of reduction of the blood glucose level. The anti-diabetic activity of the *Momordica dioica* was enhanced when it was tested in combination with the macerated ethanolic extract of *Momordica charantia*. The *Momordica charantia* extract prone to develop hypoglycemia but as the *Momordica dioica* is slow acting and there is minimum chance of developing hypoglycemia, so the formulation of the combination of both extracts can show better results when compared to mono herbal formulation and in addition

the *Momordica dioica* is well known for its antioxidant activity which helps in overcoming oxidative stress in the treatment of diabetes. So the combination of these two formulations can give rise to better formulation with better results.

CONCLUSION

The combination extract containing *Momordica charantia* extract and *Momordica dioica* ethanolic macerated extracts showed better activity in terms of significant value and extract acts slowly so that there may not be a chance of hypoglycemia where in case of *Momordica charantia* extract hypoglycemia can be expected because it acts rapidly. Finally by performing all the tests the macerated extracts showed better activity when compared to the Soxhlated extracts and this may be due to the presence of more number of active constituents present in it.

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