

**EVALUATION OF ANTIDIABETIC ACTIVITY OF SAPONIN OF
MOMORDICA DIOICA ROXB**

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Summary

In the present study we reported the anti-hyperglycemic effects saponin fraction of *Momordica dioica* fruits in allaxon induced hyperglycemic rats. saponin fraction of *Momordica dioica* was administered animals orally in suspension form at the dose of 55mg/day, for 21 days and serum glucose level were measured. Oral administration of saponin fraction of *Momordica dioica* reduced serum glucose level of allaxon induced hyperglycemic rats. The results suggest that the saponin fraction of *Momordica dioica* have shown significant anti hyperglycemic activity.

Key Words: Saponin, *Momordica dioica*, Anti-hyperglycemic, Alloxan

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Introduction

Diabetes mellitus is a metabolic disorder affecting around 250 million people world wide. It is characterized by hyperglycemia, altered metabolism of lipids, carbohydrates and proteins. It increases the risk of complication from vascular disease¹. Impairment in the glucose metabolism during diabetes mellitus causes glycation of body proteins that in turn leads to secondary complication affecting eyes, kidneys, nerves and arteries².

Momordica dioica belonging to family *Curcubitaceae* found in coastal Karnataka and Andhra Pradesh state. It has been reported that the plant contain aliphatic constituents (6-methyl tritriacont-50on-28-of and 8-methyl hentracont-3-ene) and sterol (pleuchiol) and pentacylic triterpene (momodicaursenol) an unknown isolated from the seeds, has been identified as urs-12, 18(19)-dien-3 beta-ol³.

The chloroform, ethyl acetate & ethanolic extract of *Momordica dioica roxb* fruit is previously reported to have the antidiabetic activity in alloxan induced experimental rats⁴, flavanoidal fraction from ethanolic extract of the fruit is reported to have hepatoprotective property⁵, hexane extract of the fruit is reported to have antifeedant property⁶, seed oil has shown insecticide property⁷, ethanolic and aqueous extract of the root is reported to have antifertility activity⁸. Further three triterpenes and two steroidal compounds were isolated from the dry root of *Momordica dioica* and have shown anticancer property⁹. In the present study an attempt has been made to elucidate the effect of saponin fraction of *Momordica dioica* on alloxan-induced diabetic rats.

Materials and Method

Plant Material

The fresh fruits of *Momordica dioica*, Roxb. were collected from local market of Bangalore, Karnataka, identified and authenticated by Dr. Gajendra Rao, Survey Officer, Regional Research Institute, Bangalore. A specimen sample of the same was preserved in the herbarium section at RRI, Bangalore, as RRCBI, Acc No.1693 for future reference. The fresh fruits of *Momordica dioica* were isolated, chopped into small pieces, dried under shade at room temperature for seven days and powdered.

Extraction and Isolation of Saponins

1.5 Kg of dry powder of fruits of *Momordica dioica* was extracted with methanol and concentrated to get the dried methanolic extract. The dried methanolic extract was dissolved in hot distilled water and partitioned between water saturated n-butanol. The organic layer (n-butanolic layer) is separated and evaporated to get of residue. This n-butanolic residue was dissolved in methanol and poured diethyl ether (Et₂O) to obtain flocculent precipitate. This precipitate was separated by means of filter paper and washed with excess of diethyl ether (Et₂O) and dried to yield of crude saponin extract¹⁰.

Experimental animals

Thirty male albino wistar rats weighing 100-120 g were purchased from (National Institute of Mental Health and Neuro Science) NIMHANS Bangalore. The animals were housed in polypropylene cages maintained in controlled temperature (27 ± 2°C) and light cycle (12h light and 12 h dark) and fed with standard rat pellet diet (Amrut rat and mice feed, India) and water *ad libitum*.. The animals were given a week's time to get acclimatized with the laboratory conditions. All the experimental procedures were performed prior approval from Institutional Animal Ethics Committee (Registration No. 367001/C/CPCACA) of the Department of Pharmaceutical Technology, Jadavpur University, Jadavpur, Kolkata.

Experimental design

A total of 24 rats (18 diabetic surviving rats, 6 control rats); the rats were divided into four groups of six mice each.

Group 1- Control

Group 2- Diabetic control

Group 3- Diabetic rats administered orally with standard drug (glibenclamide, 10 mg/kg per day p.o)

Group 4- Diabetic rats administered orally with saponin of *Momordica dioica* (55 mg/kg per day p.o).

Rats were made diabetic by a single intraperitoneal injection of alloxan monohydrate (Loba Chemie, Bombay); 150 mg/kg. Alloxan was first weighed individually for each animal according to the weight and then solubilized with 0.2 ml saline (154 mM NaCl) just prior to injection. Two days after alloxan injection, rats with plasma glucose levels of >140 mg/dl were included in the study. Treatment with plant extracts was started 48 h after alloxan injection. Blood samples were drawn at weekly intervals till the end of study (i.e. 3 weeks). Fasting blood glucose estimation and body weight measurement were done on day 1, 7, and 21 of the study.

On day 21, blood was collected by cardiac puncture under mild ether anesthesia from overnight fasted rats and fasting blood sugar was estimated¹¹.

Statistical analysis

All the values of body weight, fasting blood sugar, and biochemical estimations were expressed as mean±standard error of mean (S.E.M.) and analyzed for ANOVA and post hoc Dunnet’s *t*-test. Differences between groups were considered significant at *P*<0.05 levels.

Results and Conclusions

The effect of feeding of saponin fraction of *Momordica dioica* on serum glucose level in allaxon induced hyperglycemic animals were assessed on different days (Table 1).

Table No.1: Effect of saponin fraction of *Momordica dioica* on serum glucose level of Allaxon induced diabetic animals

Groups	Blood glucose level (mg/dl) ±SEM			
	Day 1	Day 7	Day 14	Day 21
Group I	107.5 ±1.72	105.83±2.02	105.16±3.96	106.33±1.78
Group II	215.33±3.66*	222±3.05*	234.16±5.23*	256.33±2.52*
Group III	221±6.86	185±1.87 [#]	169.83±2.45 [#]	153.50±2.26 [#]
Group IV	212.33±4.31	186.66±2.47 [#]	172.66±1.14 [#]	160.50±1.33 [#]

Values represents Mean ± SEM (n = 6); **P*<0.001, significant as compared to corresponding data of the control (GroupI) [#]*P*<0.001, significant as compared to corresponding data of the diabetic control (GroupII)

Administering saponin fraction of *Momordica dioica* at the dose of 55 mg/kg per day p.o significantly ($p < 0.001$) reduced the glucose level when compared with diabetic control. In past, *Momordica dioica roxb* fruit have been reported to possess hypoglycemic activity. Anti hyperglycemic effects observed in alloxan induced rats can be attributed to several mechanisms like glucose/insulin metabolism and /or by enhancing peripheral insulin sensitivity^{12, 13} or by enhancing insulin release by islets of langerhans^{14, 15}. As far as the mechanism of action is concerned, it has been speculated that antihyperglycemic activity of *Momordica dioica* fruits could be due to an enhancement of peripheral metabolism of glucose¹⁶. It has been reported that saponin of many plants posses antidiabetic activity. The saponin of *Momordica cymbalaria* roots may act by reversing the atrophy of the pancreatic islets of β -cells¹⁷. One of the main constituent of *Momordica charantia* is a steroidal saponins charantin, and is responsible for the fruit's anti-diabetic effects; it also contains Momordicine and insulin-like steroidal saponins¹⁸. Further work is in progress to identify the possible antidiabetic mechanisms of saponin fraction of *Momordica dioica*.

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