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ANTIASTHMATIC ACTIVITY OF MOMORDICA DIOICA ROXB. WILLD FRUIT SEED

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Pharmacy**ANTIASTHMATIC ACTIVITY OF MOMORDICA DIOICA ROXB.
WILLD FRUIT SEED**Maharudra S. Rakh^{1*}, Amol N. Khedkar², Sanjay R. Chaudhari

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**ABSTRACT**

In the present study *Momordica dioica* Roxb Willd (Cucurbitaceae) fruit seed was successively extracted with petroleum ether, ethyl acetate, methanol and maceration with water. All extracts were vacuum dried to yield the respective extracts. These various extracts of *Momordica dioica* fruit seed were evaluated for antiasthmatic activity. These various extracts also evaluated for dose dependent antiasthmatic activity. Methanol extract of this plant shows more significant antiasthmatic activity as compare to other extracts in all three models of Isolated goat tracheal, guinea pig ileum, guinea pig trachea were studied to know basic mechanism by which extract shows relaxant activity. All extracts significantly shows inhibition effect in dose dependent study against histamine induced contraction. The study showed that extracts are effective against histamine-induced contraction. Thus the antiasthmatic activity of *Momordica dioica* fruit seed may be due to polar constituents. Phytochemical analysis of the extract shows the presence of carbohydrates, saponins, triterpenoids and flavonoids. Thus these flavonoids present in the plant may be responsible for the antiasthmatic activity. The results of these studies indicated usefulness of methanol extract of *Momordica dioica* fruit seed in asthma.

KEYWORDS: Antiasthmatic, *Momordica dioica*, Bronchoconstriction

1. INTRODUCTION:

Use of plant products is increasing in many segment of the population.¹ At present, thousands of plant metabolites are being successfully used for the treatment of variety of diseases. According to an estimate, 80% of the world's population relied upon plants for their medication.² Folk medicinally *Momordica dioica* climbing creeper plant is used both in the prevention and cure of various diseases and in the food of humans like Cure vata, biliousness, asthma, leprosy, bronchitis, fever, tumors, tridosha, urinary discharges, excessive salivation, troubles of the heart, inflammation, errhine effect.³ Anti-allergic, bronchial asthma, antimalarial.⁴ The prevalence of asthma is increasing. Asthma, which in more than 50% of adults and in at least 80% of affected children is allergic, occurs in around 5–15% of the pediatric population. Asthma is estimated by the World Health Organization (WHO) to affect 150 million people worldwide, placing an enormous strain on health resources in many countries, and is a major cause of hospitalizations for chronic diseases in children in the western world.⁵ Although, there is no scientific proof of the efficacy of

plant extracts for antiasthmatic activity, the aim of this study was to evaluate antiasthmatic effect of *Momordica dioica* fruit seed.

2. MATERIALS AND METHODS

2.1 Plant Material

Fruit of *Momordica dioica* were collected from Therla, Ta. Patoda, Beed district of Maharashtra, India in September 2009 and authenticated by P.G. Diwakar, Botanical Survey of India, Pune, where a sample specimen (voucher number: RAMAM1) No. BSI/WRC/Tech/2009/593 has been deposited.

2.2 Extraction

Shade dried, cleaned from extraneous materials, mechanically grinded and coarsely powdered fruit seed of *Momordica dioica* was subjected to successive solvent extraction in Soxhlet extractor using petroleum ether, ethyl acetate, and methanol as solvent and the marc left was refluxed with water. All the extracts were vacuum dried to produce petroleum ether (12.67%), Ethyl acetate (5.2%), Methanol (19.2%) and Aqueous (4.7%) extracts respectively.

2.3 Animals

Guinea pigs housed in the laboratory animal facility for at least two weeks prior to the study were used. The animals maintained under standard husbandry conditions and had free access to diet and water. The animals were fasted overnight prior to the experiments. The ethical committee of the institute approved the protocol of the study.

2.4 Drugs and Chemicals

The following drugs and chemicals were used: Histamine (Research-Lab Fine Chem. Indus., India), petroleum ether (60-80°C) (RFCL Ltd, India), ethyl acetate (RFCL Ltd, India), methanol (MERCK Ltd, India) and DMSO (Research Lab Industries, India).

2.5 Isolated goat tracheal chain preparation⁶

Isolated adult goat tracheal tissue was obtained from slaughter house. Trachea was cut into individual rings and tied together in series to form a chain. Trachea was suspended in bath of Kreb's solution and was continuously aerated at $37\pm 0.5^\circ$. Dose response curves of histamine in plain Kreb's solution and in Kreb's solution containing 1.5 mg/ml of *Momordica dioica* fruit seed extracts were performed. Percent of maximum contractile responses were plotted to record dose response curves of histamine

in the absence and presence of plant extract.

2.6 Isolated guinea pig ileum preparation⁷

The guinea pigs (overnight fasted) were sacrificed and the ileum was mounted in an organ bath containing Tyrode solution, which was continuously aerated at $37\pm 0.5^\circ$. Dose response curve of histamine in plain Tyrode solution and in Tyrode solution containing 1.5 mg/ml of *Momordica dioica* fruit seed extracts were performed. Percentage maximum contractile response was plotted to generate dose response curve of histamine, in the absence and presence of the plant extract.

2.7 Isolated guinea pig trachea chain preparation⁸⁻⁹

Guinea pigs of either sex (250-500 g), starved overnight, but allowed free access to water were used. The animals were killed by a blow on the head and exsanguinated. The trachea was dissected and cut along its length on the dorsal surface. Incomplete transverse cuts were made between the segments of cartilage to produce a zig-zag strip.⁸ The isolated trachea was mounted in a 10 ml organ bath containing Tyrode solution maintained at 37°C and gassed with air.⁹ The tissue was left to equilibrate for 60 min during which the bath solution was replaced

every 10 min. At the end of the equilibration period, histamine (2.5 µg/ml) induced contractions as well as the effect of the extracts on the contractions produced by histamine were recorded. The tissues were bathed in the test substances for 5 min before the addition of histamine. A drug-tissue contact time of 90 s was observed.

2.8 Phytochemical screening of active extract¹⁰

Various phytochemical studies including test for carbohydrates, proteins, amino acids, steroid, alkaloids, glycosides and flavonoids compounds were carried out.

3. RESULTS AND DISCUSSION

The present study dealt with screening of antiasthmatic activity of various extract of fruit seed of *Momordica dioica*.

3.1 Isolated goat tracheal chain preparation

Evaluation of the effect of the extracts on histamine-induced contractions of the isolated goat tracheal showed that they exhibited a dose-dependent inhibition of contractions of the goat tracheal induced by histamine. The petroleum ether and methanol extracts caused 61.54% and 79.54% (at dose of 0.6 mg/ml extracts respectively) inhibition of maxima contraction produced by

histamine at a concentration of 2.5 µg/ml. So petroleum ether and methanol extracts as compare to other extracts of *Momordica dioica* fruit seed indicating antiasthmatic action ([Table 1](#)).

3.2 Isolated guinea pig ileum preparation

Evaluation of the effect of the extracts on histamine-induced contractions of the isolated guinea pig ileum showed that they exhibited a dose-dependent inhibition of contractions of the guinea pig ileum induced by histamine. The methanol extract caused 57.71% and 76.28% (at dose of 0.3 and 0.6 mg/ml extract respectively) inhibition of maximal contraction produced by histamine at a concentration of 2.5 µg/ml. So methanol extract as compare to other extracts of *Momordica dioica* fruit seed indicating antiasthmatic action ([Table 2](#)).

3.3 Isolated guinea pig trachea chain preparation

Evaluation of the effect of the extracts on histamine-induced contractions of the isolated guinea pig trachea showed that they exhibited a dose-dependent inhibition of contractions of the guinea pig trachea induced by histamine. The methanol extract caused 52.08% and 58.34% (at dose of 0.3 and 0.6 mg/ml extract respectively)

inhibition of maximal contraction produced by histamine at a concentration of 2.5 µg/ml. So methanol extract as compare to other extracts of *Momordica dioica* fruit seed indicating antiasthmatic action (Table 3).

Certain flavonoids are reported to exhibit anti-inflammatory, antioxidant and hepatoprotective activities.¹¹ Phytochemical analysis of the methanol extract shows the presence of carbohydrates, saponins, triterpenoids and flavonoids. Thus we can speculate that these constituents might be responsible for antiasthmatic activity. Literature shows that flavonoids¹¹ is having antianaphylactic and antiasthmatic activity. So antiasthmatic activity showed by *Momordica dioica* fruit seed might be because of these chemical moieties.

4. CONCLUSION

In conclusion, animal studies involved use of histamine induced bronchoconstriction in goat trachea and guinea pigs. The results of these studies indicated usefulness of methanol extract of *Momordica dioica* fruit seed in asthma. The flavonoids compounds in the fruit seed of *Momordica dioica* is likely responsible for the usefulness of the plant in the management of asthma in traditional medicine practice. As the present

study is based upon the in-vitro models, it becomes necessary to carry out the specific binding studies and estimations of the bronchoconstriction effect levels to understand the exact mechanism of action and extend these results further.

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Table 1. Effect of various extracts of *Momordica dioica* fruit seed on histamine-induced contraction on the isolated goat tracheal chain preparation

Groups	Extracts	%Maximum contraction (at dose of 0.3 mg/ml extract)	%Maximum contraction (at dose of 0.6 mg/ml extract)
I	Petroleum ether	41.08±0.01667**	61.54±0.02236**
II	Ethyl acetate	30.76±0.02236**	46.15±0.02236**
III	Methanol	69.23±0.04472**	79.54±0.02108**
IV	Aqueous	51.38±0.03073**	69.23±0.04472**

All values are expressed as mean±SEM of a sample size of n=6; level of significance chosen was **p<0.01. All treated groups were compared with control group (Histamine at dose 2.5 µg/ml). One way ANOVA followed by Dunnett's test.

Table 2. Effect of various extracts of *Momordica dioica* fruit seed on histamine-induced contraction on the isolated Guinea pig ileum preparation

Groups	Extracts	%Maximum contraction (at dose of 0.3 mg/ml extract)	%Maximum contraction (at dose of 0.6 mg/ml extract)
I	Petroleum ether	49.81±0.2108**	76.28±0.0730**
II	Ethyl acetate	20.95±0.1932	31.62±0.2765
III	Methanol	57.71±0.1520**	76.28±0.0365**
IV	Aqueous	56.52±0.1673**	65.77±0.0918**

All values are expressed as mean±SEM of a sample size of n=6; level of significance chosen was **p<0.01. All treated groups were compared with control group (Histamine at dose 2.5 µg/ml). One way ANOVA followed by Dunnett's test.

Table 3. Effect of various extracts of *Momordica dioica* fruit seed on histamine-induced contraction on the isolated Guinea pig tracheal chain preparation

Groups	Extracts	%Maximum contraction (at dose of 0.3 mg/ml extract)	%Maximum contraction (at dose of 0.6 mg/ml extract)
I	Petroleum ether	54.17±0.1789**	56.25±0.2012**
II	Ethyl acetate	54.17±0.1789**	56.25±0.2012**
III	Methanol	52.08±0.1565**	58.34±0.2236**
IV	Aqueous	52.08±0.1565**	54.17±0.1789**

All values are expressed as mean±SEM of a sample size of n=6; level of significance chosen was **p<0.01. All treated groups were compared with control group (Histamine at dose 2.5 µg/ml). One way ANOVA followed by Dunnett's test.