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Research Article

## Evaluation of Anti-Anaphylactic Activity of methanolic extract of *Momordica charantia* in Experimental Animals

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### ABSTRACT

Anaphylaxis is a syndrome that can be fatal, which is seen due to systemic release of inflammatory mediators. Antigen and Antibody reaction is usually a trigger in the body to go into anaphylactic shock. In this study, anaphylaxis induced by egg albumin in the rats. The efficiency of MC (*Momordica charantia*) against anaphylaxis was evaluated. The standard drug used was Dexamethasone. The MC extract is given in doses 100 and 200 mg/kg p.o.

Results: The MC extract was found to be effective ( $p < 0.01$ ) inhibitor of egg albumin induced anaphylactic reaction.

Conclusion: From this study, we can conclude that *Momordica charantia* fruits have good anti-anaphylactic activity.

**Keywords:** Anaphylaxis, *Momordica charantia*, Egg albumin, Passive paw anaphylaxis, Dexamethasone.

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### INTRODUCTION:

Anaphylaxis is a fatal syndrome, which can be caused by sudden influx of inflammatory mediators in systemic circulation. The inflammatory mediators involved are histamine, heparin, nitric oxide produced from the activity of IFN- $\gamma$  and TNF- $\alpha$ , etc<sup>1</sup>. The triggers for anaphylaxis can be a number of things, including foods like nuts, fish, wheat, etc and some drugs like Penicillin and even venom of some insects<sup>2</sup>.

Anaphylaxis can trigger or can be the cause of many disorders like asthma, inflammation, pain, rhinitis, etc. It is a type of Type I hypersensitivity and in the mechanism involved in this is, when an antigen binds to the complex of CD4 and Th2 cells specific to the antigen. This in turn stimulates the release of B cells which leads to production of IgE antibodies leading release of inflammatory mediators. Thus, the treatment of anaphylaxis is important to consider<sup>3</sup>.

*Momordica charantia*, also called bitter squash or Karela, is annual climber, from the family of Cucurbitaceae<sup>4</sup>. There have been claims since the ancient times for its medicinal value and as a vegetable for consumption and its therapeutic characteristics like, anti microbial,

antiinflammatory, anti diabetic, asthma, cough, etc<sup>5</sup>. It also is used for its activity as anti- pyretic, hepatoprotective, wound healing activity, etc<sup>6</sup>.

In this study, an effort was made to determine the anti anaphylactic activity of MC (*Momordica charantia*) in experimental rats.

### MATERIALS AND METHODS:

**1.1 Plant Materials:** *Momordica charantia* fruits were purchased from a market in Pune, Maharashtra. The fruits were then sliced thinly and dried. The slices were then grinded to form powder. The powder was then allowed to soak for three days in 80% methanol. The product, finally, was obtained by using Soxhlet apparatus<sup>7,8,9</sup>.

**1.2 Animals:** Animals were obtained from the Animal House of AISSMS College of Pharmacy, Pune. Wistar rats weighing 180-200 gm were chosen for the study. The animals were kept in a group of 5 and were provided with water and the standard feed ad libitum. They were housed in the 12-12 hour light-dark cycle and in the temperature of 24 + 1°C. These animals were selected in a randomized manner for this experiment. The

experiment was carried out under accordance with instructions and guidelines given by the CPCSEA (Committee for the Purpose of Control and Supervision on Experimentation on Animals) and after the approval by the IAEC (Institutional Animal Ethics Committee).

**1.3 Methodology:** Rats were separated according to weight into four groups; five in each group. Animals were given 3 doses of 100 µg of Egg albumin with aluminium hydroxide as adjuvant and prepared using saline. The doses of albumin were given on 1st, 3rd and 5th day and on the 10th day of sensitization, blood was collected from the animals, using retro orbital route and was allowed to clot. Then, the serum was separated from the blood by the help of centrifuge at the speed of 1500 rpm. The animals were then sensitized passively by giving 0.1 ml of undiluted serum to the left hind paw, and the right hind paw received only distilled water. After 24 hours following the sensitization, drug treatment was given according to the designated groups. Distilled water was given to the Control group, and the Standard received the standard drug, i.e., Dexamethasone 0.5 mg/kg i.p. The treatment groups (III and IV) were given the MC extract in doses 100 and 200 mg/kg p.o. After the drug treatment the animals were challenged with 10µg albumin in saline in the left paw of the rats and the increase in the paw edema volume was noted over 1, 2, 3 and 4 ours using Plethysmometer for measurement. The differences between the readings before and after

antigen challenge shows the edema volume and the percent inhibition of edema was calculated by the formula:

$$\% \text{ Inhibition} = [1 - (T/C)] \times 100$$

Where, T is the mean relative change in paw volume in Test group; C is the mean relative change in paw volume in Control Group<sup>3, 10, 11, 12</sup>.

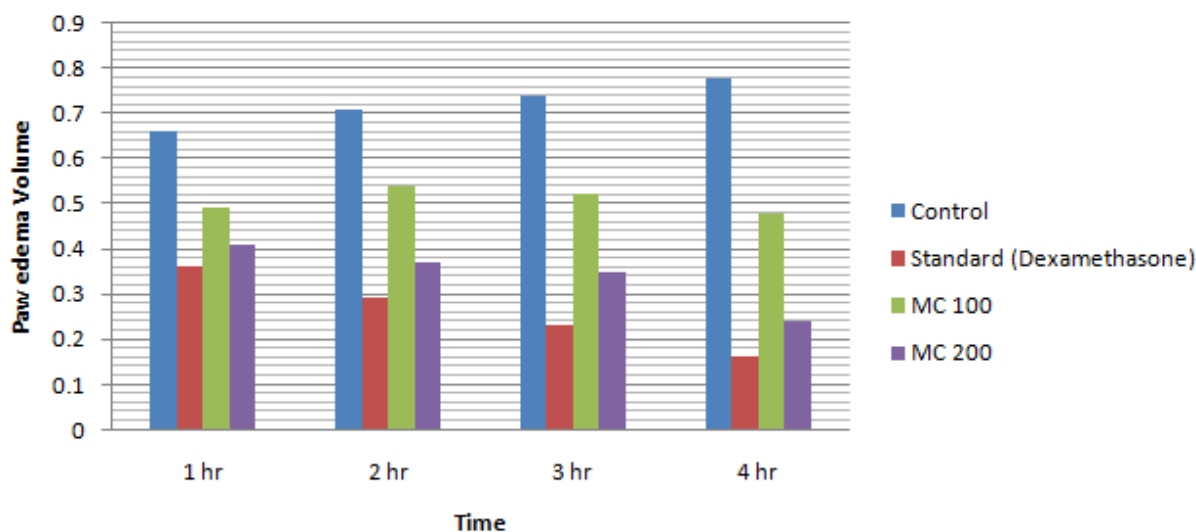
**1.4 Statistical Analysis:** Values and data are expressed in mean value ± SEM i.e., Standard Error of Mean; this was performed using Graph Pad Instat version 3. The tests which were used were one way ANOVA followed by Dunnett's test for various comparison points between control and treatment groups at  $p < 0.01$  and  $p < 0.05$ .

## RESULTS:

In this study, we induced anaphylaxis by introducing egg albumin raised antibodies in the animals. The readings were compared with control group which received only distilled water as treatment. The Standard group (treated with Dexamethasone) showed significant inhibition of paw edema ( $p < 0.01$ ) in the subsequent 4 hours after treatment. Group III also showed significant activity but at significance  $p < 0.05$  but Group IV showed significant edema inhibition at  $p < 0.01$  significance. Table 1 shows the results.

**Table 1:** Data are expressed as Mean ± S.E.M. Statistical analysis done by using ANOVA followed by Dunnett's test; \*\* $p < 0.01$ , \* $p < 0.05$  (Groups II, III, IV compared to Group I). MC = *Momordica charantia* extract.

Groups	Treatment	Dose (mg/kg)	Paw Volume (ml)			
			1 hr	2 hr	3 hr	4 hr
I	Control	-	0.66 ± 0.13	0.71 ± 0.09	0.74 ± 0.21	0.78 ± 0.15
II	Standard (Dexamethasone)	0.5	0.36 ± 0.26**	0.29 ± 0.17**	0.23 ± 0.07**	0.16 ± 0.11**
III	MC	100	0.49 ± 0.16*	0.54 ± 0.2*	0.52 ± 0.02*	0.48 ± 0.54*
IV	MC	200	0.41 ± 0.22**	0.37 ± 0.05**	0.35 ± 0.12**	0.24 ± 0.31**



**Figure 1:** The differences in the paw oedema volume of the rats over 4 hours.

**DISCUSSION:**

This study was carried out to assess the anti-anaphylactic potential of methanolic extract of *Momordica charantia* (MC).

This activity was evaluated by using the model Passive paw anaphylaxis. It is an IgE mediated hypersensitivity reaction<sup>13</sup>. Basically, the mechanism of anaphylaxis involves production and interaction of IgE with that of the receptors. Succeeding exposure to the allergens leads to IgE binding to these receptors and causing release of the inflammatory mediators<sup>14</sup>.

Allergen binds to CD4 and Th2 complex, where Th2 cells are specific to the allergen. This causes formation of B cells which in turn produce IgE cells. On the next exposure of the same allergen, these IgE antibodies will react to it, and cause a reaction leading to release of the inflammatory mediators. In diseases like asthma, chronic pain, inflammation, rhinitis, etc., this interaction can cause exacerbation of the condition or an attack or episode (e.g. asthma attack)<sup>2, 3, 15</sup>.

The results show significant inhibitory activity. The MC extract shows a marked protection against anaphylaxis. Further investigation is required to pinpoint the mechanism of MC in this role. But, here, we can conclude that 200 mg/kg dose of the MC extract shows great potential as anti-anaphylactic treatment.

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**REFERENCES:**

1. Patil UJ, Savali AS, Jirankali MC. Antianaphylactic and mast cell stabilization activity of *Strychnos potatorum* Linn. seed. *Pharmacognosy Res.* 2011; 3(3):208-213.
2. Girish, C., and Y. Narsimha Reddy. "Evaluation of Antianaphylactic Activity of Various Extracts of *Withania Somnifera* in Rats." *International Journal of Pharmaceutical Sciences and Research* 2017; 8(4):1717.
3. Suralkar AA, Kasture SB. Anti-allergic and anti-anaphylactic activities of *Dolichos biflorus*. *International Journal of Green Pharmacy (IJGP)*. 2013; 7(3).
4. Gupta, Madhu, et al. "Momordica charantia Linn.(Karela): Nature's silent healer." *International Journal of Pharmaceutical Sciences Review and Research* 2011; 11(1):32-37.
5. Kumar DS, Sharathnath KV, Yogeswaran P, Harani A, Sudhakar K, Sudha P, Banji D. A medicinal potency of *Momordica charantia*.
6. Ahamad, Javed, Saima Amin, and S. R. Mir. "Momordica charantia Linn.(Cucurbitaceae): Review on phytochemistry and pharmacology." *Phytochemistry* 2017; 11(2):53-65.
7. Nkambo, W., N. G. Anyama, and B. Onegi. "In vivo hypoglycemic effect of methanolic fruit extract of *Momordica charantia* L." *African health sciences* 2013; 13(4):933-939.
8. Juvekar, Archana Ramesh, et al. "In vitro and in vivo evaluation of immunomodulatory activity of methanol extract of *Momordica charantia* fruits." *Drug Invention Today* 2009; 1(2) 89-94.
9. Alam S, Asad M, Asdaq SM, Prasad VS. Antiulcer activity of methanolic extract of *Momordica charantia* L. in rats. *Journal of ethnopharmacology*. 2009 Jun 25; 123(3):464-9.
10. A.A. Suralkar, R.G. Kharade, V.R. Bora, Antiallergic, Antianaphylactic & mast cell stabilizing potential of *Vitis vinifera* in management of Asthma, *World J. Pharmaceutica. Res.* 2015; 4:1017-1028.
11. Kulkarni, P. A., et al. "Preclinical evaluation of co-administration bronchodilators and corticosteroids for the treatment of asthma." *Res J Pharm Biol Chem Sci* 2010; 4:789-800
12. Patil, S., and P. Ninave. "In-vivo and in-vitro screening models of asthma: an overview." *International Journal of Research and Development in Pharmacy and Life Sciences* 2016; 5(4):2209-2218.
13. Alakshmi V, Chandiran R, Velraj M, Hemalatha, Jayakumari. Anti-Anaphylactic and Anti-Inflammatory Activities of a Bioactive Alkaloid from the Root Bark of *Plumeria acutifolia* Poir. *Iran J Pharm Res.* 2011; 10(3):525-533.
14. Lee JK, Vadas P. Anaphylaxis: mechanisms and management. *Clin Exp Allergy.* 2011; 41(7):923-938.
15. Vijayalakshmi A, Ravichandiran V, Velraj M, Hemalatha S, Sudharani G, Jayakumari S. Anti-anaphylactic and anti-inflammatory activities of a bioactive alkaloid from the root bark of *Plumeria acutifolia* Poir. *Asian Pacific journal of tropical biomedicine.* 2011 Oct 1; 1(5):401-5.