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EVALUATION OF ANALGESIC AND ANTI INFLAMMATORY ACTIVITIES OF MOMORDICA CHAIRANTIA

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ABSTRACT

The aim of the present study was to evaluate the Analgesic & anti inflammatory activities of the Momordica charantia extract. Momordica chirantia (MC) is a herbal medicine traditionally applied to treat so many diseases and disorders. In the evaluation of analgesic activity the model used was Eddy's hot plate method in which the animals treated with Momordica charantia and standard Pentazocin has significantly decreased the Hot plate-induced writhing and licking responses when compared with control group animals. The anti – inflammatory activity was screened by Carageenan induced paw edema model in which the animals treated with testing drug and standard Indomethacin has significantly reduced the inflammation when compared with carageenan induced inflammatory positive control group animals. So we can conclude that the extract of Momordica charantia has the analgesic and anti inflammatory activities.

Keywords: Analgesic, Anti-inflammatory, Pentazocin, Indomethacin and Momordica charantia

INTRODUCTION

Inflammation is the body's immediate defense response to damage tissues and cells by pathogens, noxious stimuli such as chemicals, or physical injury[1]. It is a protective attempt by the organism to remove the injurious stimuli as well as initiate the healing process for the tissue. An uncontrolled and persistent inflammation may act as an etiologic factor for many of these chronic illnesses. Although it is a defense mechanism, the complex events and mediators involved the inflammatory reaction can induce, maintain or aggravate many diseases. Inflammation can be classified as either acute or chronic it depends on the onset time. Acute inflammation is the primary response of the body to injurious stimuli and it involves the local vascular and immune response. On the other hand, chronic inflammation is a pathological condition characterized by progressive destruction and recovery of the injured tissue from the inflammatory response. Chronic use of anti-inflammatory drugs are associated with some severe side effects like gastric ulceration, Therefore, the development of potent anti-inflammatory drugs with fewer side effects is necessary. Although it is a defense mechanism, the complex events and mediators involved the inflammatory reaction can induce, maintain or aggravate many diseases. [2, 3, 4]

All of us have experienced *pain* at some point of time in our lives. Pain is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" [5]. Currently used anti-inflammatory drugs are associated with some severe side effects like gastric lesions caused by non-steroidal anti-Inflammatory Drugs (NSAID), development of tolerance due to use of opiates the use of these drugs is not useful in all cases [6,7]. So attention is needed to focus on traditional analgesic and anti-inflammatory plants, because they are cheap, easily available and having little side effects. Therefore, the development of potent anti-inflammatory drugs with fewer side

effects is necessary [4, 6, 8]. *Momordica chirantia*. (Synonyms: Kakara; Bitter Melon; Family: Cucurbitaceae). This tropical vine is a tender perennial. It grows in tropical areas, including different parts of East Africa, Asia, the Caribbean, and South America, where it is used as a food as well as a medicine. The leaves and fruit have both been used to make teas and beer, or to season soups in the Western world. Bitter Melon is being studied in the support treatment of diabetes and psoriasis [9].

MATERIALS & METHODS

Drugs and chemicals: Reference standards such as, pentazocine injections and indomethacin capsules procured from Ranbaxy laboratories. All Other chemicals used for this investigation were of analytical grade from S.D Fine chemicals, Mumbai, India.

Animals: Albino Wistar rats weighing 150 ± 25 g of either sex were used for the study in different models. The animals were procured from the National institute of Nutrition (Hyderabad) at least 2 weeks prior to the study, so that animals could acclimatize to the new environment. Animals kept in well-maintained room under standard hygienic conditions. Commercial pellet diet and water were made available *ad libitum*. They were housed in propylene cages (32 x 24 x 16 cm) with stainless steel grill top, bedded with rice husk

Selection of Doses and Preparation of Drug for Study: Since the lethal dose was found at*1,200 mg/kg*, the preceding dose i.e.250mg/kg, 500mg/kg body weight was taken as the test dose for this study and the doubling of the dose i.e. 1000mg/kg body weight also tested to find out was there any dose dependent pharmacological effect or not.

Extraction of the plant material and sample preparation: The areal parts of *Momordica charantia* dried under shade in room temperature for 3 days and powdered and the powder was used for preparation of ethanol extract. A 95% w/v ethanolic extract was prepared by extraction method. The dried powder was extracted with 95% methanol for 10 days using maceration process. The extract was dried by using dececator to obtain light brown residue. The yield obtained from above process was found to be 11%. The extract was dissolved in normal saline by using 0.1% tween-80.

Anti-inflammatory study:

Carrageenan induced paw edema in rats [10, 11]**:** Albino Wistar rats weighing between 150-200gms were divided into 5 groups of 6 rats each; three animals being housed in labeled cage each. Animals were given a period of time to adjust to the new environment provided with food & water ad libitum

Grouping:

Group I: Animals were administered 0.1ml saline p.o

Group II: Animals were administered 0.1ml saline p.o

Group III: Animals were administered standard (Indomethacin 10 mg/kg) p.o

Group IV: Animals were administered momordica charantia (500 mg/kg) p.o

Group V: Animals were administered momordica charantia (1000 mg/kg dose) p.o

In this acute inflammation was produced by subplantar injection of 0.1 ml of 1% suspension of carrageenan in normal saline, in the right hind paw of the rats 1h after the oral administration of test materials (except group-1). The paw volume was measured by mercury plethysmometer at 0, 30, 60, 120,180 minutes.

Hot Plate Induced writhing study [12, 13,14]

Eddy's hot plate method: *Grouping:* Albino Wistar rats weighing between 150-200gms were divided into 4 groups of 6 rats each; three animals being housed in a labeled cage each. Animals were given a period of time to adjust to the new environment provided with food & water ad libitum.

Group I------- Animals were administered 0.1ml saline p.o

Group II------ Animals were administered standard reference Pentazocin (10 mg/kg) i.p.

Group III------Animals were administered *Momordica charantia* (250 mg/kg) p.o

Group IV------Animals were administered *Momordica charantia* (500 mg/kg) p.o

Procedure: In this model prior to the experiment the hot plate was set for a temperature 550C and the animals were treated with respective drugs 30 mins., prior to the recording the response. The time for licking paws or jumping in hot plate was recorded as a response, prior and 0, 30, 60, 90 120 min after administration of the respective drugs.

Statistical Analysis : All the data's were analyzed using One-Way ANOVA method followed by Dunnet's / Tukey's test. All values were reported as mean SEM. $P \leq 0.05$ was considered to be statistically significant**.**

RESULTS

Anti – inflammatory activity (Carrageenan induced paw edema in rats): In carageenan induced paw

edema Momordica charantia significantly inhibited the edema in a dose dependent manner as shown in Table.1. The paw volume in normal control group rats on 2nd hr was found to be 0.25 ± 0.0058 ml. The paw volume in rats pretreated with lower dose of Momordica charantia (500 mg/kg/day), higher dose of Momordica charantia (1000 mg/kg/day) and indomethacin (10 mg/kg/day) at 2nd hr were found to be 0.30 ± 0.0058 ml, 0.25 ± 0.058** ml and 0.255 ± 0.0043** ml

Analgesic activity (Eddy's hot plate)*: Momordica charantia* showed maximum analgesic activity at 60, 90 min for 250 and 500mg/kg dose. The reaction time in normal control group at 60, 90 min was found to be 3.53±0.0.457, 4.10±0.163 sec. The reaction time (paw licking / jumping response) in rats pretreated with lower dose of *Momordica charantia* (250mg/kg), higher dose of *Momordica charantia* (500mg/kg/day) and Pentazocine (10 mg/kg) at 60, 90 min were found to be 9.28±0.855, 7.18 ± 0.195, 9.84 ± 0.896 and 8.62 ± 0.996, 9.14 ±0.374, 14.14±3.184 respectively when compared to control group rats. The duration of analgesic effect was more in 250 mg/kg compared to 500 mg/kg and reference drug pentazocine at 10 mg/kg dose significantly increased the reaction time at 90 minutes as shown in Table.2.

Statistical Analysis: Data were analyzed by one-way ANOVA followed by Dunnet's test and P values <0.05 were considered statistically significant.

DISCUSSION

The development of edema in the paw of the rat after injection of carageenan is a biphasic event. The initial phase of the edema has been attributed to the release of histamine and serotonin, the edema maintained during the plateau phase to kinin like substances and the second accelerating phase of swelling to the release of prostaglandin like substances. Inhibition of edema observed in various inflammatory models induced experimentally in the present study may, therefore be attributed to the ability of the *Momordica Charantia* to inhibit various chemical mediators of inflammation like histamine and 5-HT during the initial phase [11]. In the present study *Momordica Charantia* significantly increased the reaction time in hot-plate test suggesting its central analgesic activity; the probable mechanism could be by inhibition of prostaglandin synthesis. Prostaglandins play significant role in different phases of inflammatory reactions and elicit pain by direct stimulation of sensory nerve endings and also sensitize sensory nerve endings to other pain provoking stimuli.

CONCLUSION

The findings in this study suggest that the ***Momordica charantia*** possess analgesic & anti-inflammatory activities. The results have been obtained in carefully controlled experiments with laboratory animals where analgesic and anti inflammatory activities can presumably be ruled out. In all the tests the responses have been assessed by actual measurement and not by subjective comparisons which may be influenced by the observer. Therefore the statistical validity of the findings has been proved and they provide a scientific foundation for the use of the biologically active ingredients of ***Momordica charantia*** in pain and inflammatory conditions and explain the clinical effectiveness of the ***Momordica charantia.***

Table 1: Anti-inflammatory effect of Momordica charantia on carageenan induced paw edema in rats

Treatment	Paw volume in ml at different Hrs (Mean ± S.E.M.)				
	0 min	30 min	60 min	120 min	180 min
Normal Control	0.25± 0.0058	0.25± 0.0058	0.25± 0.0058	0.25± 0.0058	0.25± 0.0058
Inflammatory Control	0.3± 0.0058^{+++}	0.35 ± 0.0058^{+++}	0.4 ± 0.0058^{+++}	0.3±0.0058^{+++}	0.3± 0.0058^{+++}
Indomethacin 10mg/kg, p.o.	0.3 ± 0.0058	0.313 ± 0.0042**	0.3 ± 0.0058***	0.255 ± 0.0043***	0.26 ± 0.006**
Momardica charantia(500mg/kg)	0.3 ± 0.0058	0.35 ± 0.0058	0.25 ± 0.0058***	0.3 ± 0.0058	0.3 ± 0.0058
Momardica charantia(1000mg/kg)	0.25 ± 0.0058	0.3± 0.0058**	0.3 ± 0.0058***	0.25± 0.0058**	0.28 ± 0.0076

Values are expressed as (Mean±S.E.M) n=6; One way ANOVA followed by Dunnet's test.
*+++ P<0.001 Vs Normal control & ** P< 0.01 Vs Inflammatory Control*

Table 2: Effect *of* *Momordica charantia* on reaction time (sec) in Eddy's hot plate

Treatment	Reaction time in seconds				
	0 min	30 min	60 min	90 min	120 min
Control	3.53 ±0.279	3.82 ±0.345	3.53 ±0.457	4.10 ±0.163	3.95±0.069
Pentazocine (10mg/kg)	4.13 ±0.240	6.66 ±0.432**	9.84 ±0.896**	14.14±3.184**	9.43±0.652**
Momordica charantia (250mg/kg)	4.04 ±0.194	5.03 ±0.334	9.28 ±0.855**	8.62 ±0.996	6.32±0.263**
Momordica charantia (500mg/kg)	3.83 ±0.232	7.11 ±0.525**	7.18 ±0.195**	9.14 ±0.374	8.23±0.673**

Values are expressed as (Mean±S.E.M) n=6; One way ANOVA followed by Dunnet's test.
*** P< 0.001 Vs control, * P< 0.05 Vs control.*

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