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Research Article

EVALUATION OF ANTI INFLAMMATORY ACTIVITY OF *MUSA PARADISIACA* (Linn.) LEAVES EXTRACT IN RATS

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ABSTRACT

Inflammation is a localized reaction that produces redness, warmth, swelling, and pain as a result of infection, irritation, or injury. Inflammation can be external or internal. In traditional system of medicine *Musa Paradisiaca(Linn.)* leaves The fruits are sweet, astringent, emollient, Cooling, anthelmintic, aphrodisiac, antiscorbutic, demulcent and tonic. The leaves are good for scabies and inflammations. Hence, the present study was aimed to explore the possible anti -inflammatory activity of leaves extract of *Musa Paradisiaca(Linn.)* in experimental animal models. For assessing of anti -inflammatory activity carrageenan induced paw edema model was used. Diclofenac was used as a standard reference for this model. Shade dried leaves of *Musa Paradisiaca(Linn.)* were powdered and subjected to Soxhlet extraction using alcohol and water. Hydroalcoholic extract was administered to the animals as suspension using 2% gum acacia for experimental purpose. Preliminary photochemical investigation of the hydroalcoholic extract of *Musa Paradisiaca(Linn.)* leaves reveals the presence of carbohydrates, flavonoids, Alkaloids, phytosterols, fats and oils. Hydroalcoholic extract of *Musa Paradisiaca(Linn.)* leaves either up to the dose level of 2000 mg/kg did not produce any sort of mortality. However, the physical activity of the animals was reduced. In the treatment of carrageenan induced paw edema in rats, there was highly significant decreased paw volume when treated with Diclofenac and high dose of *Musa Paradisiaca* leaves extract. This activity may be due to presence of flavonoids, phytosterols and tannins in extract.

Keywords: *Musa Paradisiaca*, Carrageenan, paw edema, anti -inflammatory.

INTRODUCTION

Inflammation (**Latin** *īnflammō*, "I ignite, set alight") A localized reaction that produces redness, warmth, swelling, and pain as a result of infection, irritation, or injury. Inflammation can be external or internal.[1] Edema formation, leukocyte infiltration and Granuloma formation represent such components of inflammation.[2] There are now more than 50 different Non-steroidal Anti-inflammatory Drugs (NSAIDs) on the global market, some of the important examples are

Aspirin, Celecoxib, Diclofenac, Ibuprofen, Indomethacin, aceclofenac etc.[3]

The classic signs and symptoms of acute inflammation[1]

English	Latin
Redness	*Rubor**
Swelling	*Tumor**
Heat	*Calor**
Pain	*Dolor**
Loss of function	*Functio laesa***

Currently used Anti- inflammatory drugs are associated with some severe side effects like Gastric irritation, Anorexia, Diarrhea, Leucotrins, Rashes, Stomach ulcers, GIT bleeding, Kidney damage, Liver damage, Hypertension etc.[4] Hence, there is an increasing demand for the alternative therapies, particularly herbal therapies that are believed to be effective, safe and economical.

Musa Paradisiaca (Linn.) The fruits are sweet, astringent, emollient, Cooling, anthelmintic, aphrodisiac, antiscorbutic, demulcent and tonic.
However, there is no authentic scientific data reported regarding anti-inflammatory activity of **Musa Paradisiaca (Linn.)**. In this context, in the present study an attempt is proposed to evaluate the anti-inflammatory activity of **Musa Paradisiaca (Linn.)** *Linn* leaves extract in rats.

OBJECTIVES

The main objective of the work is to evaluate the effect of ***Musa Paradisiaca (Linn.)*** leaves extract on anti-inflammatory activity in rats. The whole study is divided as follows:

Phase-I

- Identification and authentication of the plant ***Musa Paradisiaca (Linn.)***
- Collection and shade drying of ***Musa Paradisiaca (Linn.)*** leaves.
- Powdering of shade dried leaves for extraction
- Preparation of hydro alcoholic extract of leaves of ***Musa Paradisiaca (Linn.)*** using Soxhlet apparatus.
- To carry out preliminary phytochemical investigation of the extract.
- To carry out toxicity studies and determine the LD_{50}-dose selection for the study (i.e. selection of two doses 1/20 and 1/5 from the LD_{50} value) those considered as low and high doses respectively.

Phase-II

- To study the effect of hydro alcoholic extract of ***Musa Paradisiaca (Linn.)*** *leaves* in rats.
- **Carrageenan induced paw edema method**

MATERIALS AND METHODS

Preparation of hydro alcoholic extract[5]

The powder of *Musa Paradisiaca (Linn.)* leaves was charged in to the thimble of a Soxhlet apparatus and extracted using 70% ethanol and 30% water for 18 hrs. Appearance of colorless solvent in the siphon tube was the indication of exhaustive extraction and based on that, further extraction was terminated. The extract was then transferred into the previously weighed empty beaker and evaporated to a thick paste on the water bath, maintained at 50°C to get alcoholic extract. The extract was finally air dried thoroughly to remove all traces of the solvent and the percentage yield was calculated. The perfectly dried extract was then stored in an air tight container till used.

Acute oral toxicity study by using OECD 425 guidelines

This test procedure is used here because to minimize the number of animals required estimating the acute oral toxicity of chemicals, drugs and also in estimating a median lethal dose. The median lethal dose allows for comparison with historical data. In addition to the observation of mortality, it allows the observation of signs of toxicity.
The latter is useful for classification purposes and in the planning of additional toxicity tests.[6]

Evaluation of Anti-inflammatory activity

Carrageenan induced Hind paw edema in Albino Wistar rats

Experimental animals

Albino Wistar rats of either sex weighing 150–200 g were maintained in animal house and they were divided in to 4 groups of 6 animals each. Prior to the experimentation they were acclimatized to housing conditions for at least one week period of time to adjust to the new environment providing with food and water and *ad libitum*. In order to avoid the influence of diurnal variation, all the experiments were carried out at same time of the day i.e. between 9 a.m. to 5

p.m. Institutional animal Ethical Committee approval was obtained before carrying out this experiment.

Grouping and treatment

Group I------- Control, animals were treated with 10% Tween-80 *p.o*

Group II------- Standard group, animals were treated with 10mg/kg Diclofenac sodium.

Group III-----Animals were treated with 30mg/kg b wt. *p.o* of hydro alcoholic extract of *Musa Paradisiaca (Linn.)* leaves.

Group IV----- Animals were treated with 60mg/kg b wt. *p.o* of hydro alcoholic extract of *Musa paradisiaca (Linn.) leaves.*

Procedure

After 60 minutes of the respective treatments, Carrageenan (0.1ml of 1% w/v) was injected into sub plantar region of right hind paw. Paw volume was measured every hourly interval for a maximum of six hours by using mercury plethysmograph. Reduction in the paw volume was compared with the vehicle control.[7]

RESULTS

Table 1 : Phytochemical constituents present in *Musa paradisiaca* (Linn.) leaves extract

S. No.	Test	Hydro alcoholic extract
1	**Carbohydrates**	
	Benedicts test	**+**
	Fehling's test	**+**
2	**Proteins**	
	Biuret test	_
	Millons test	_
3	**Amino acids**	
	Ninhydrin test	_
	Tyrosine test	_
4	**Alkaloids**	
	Mayers test	+
	Dragendroffs test	+
5	**Glycosides**	
	Borntragers test	_
6	**Flavonoids**	
	Lead acetate test	+
7	**Phytosterols**	
	Salkowski test	+
8	**Fats and oils**	
	Solubility test	+
	Stain test	+
9	**Phenolics and tannins**	
	Lead acetate test	_
	Acetic acid test	_
10	**Volatile oils**	
	Solubility test	_

(+) Indicates positive result, (–) Indicates negative result.

Acute Oral Toxicity Study

For the LD_{50} dose determination, hydro alcoholic extract of *Musa paradisiaca* (Linn.) leaves was administered up to dose 2000 mg/kg body weight and extract did not produce any mortality, thus $1/5^{th}$, $1/10^{th}$, $1/20^{th}$ of maximum dose tested were selected for the present study .

LD_{50} of Hydro alcoholic extract of *Musa paradisiaca* (Linn.) leaves was found to be –2000 mg/kg.

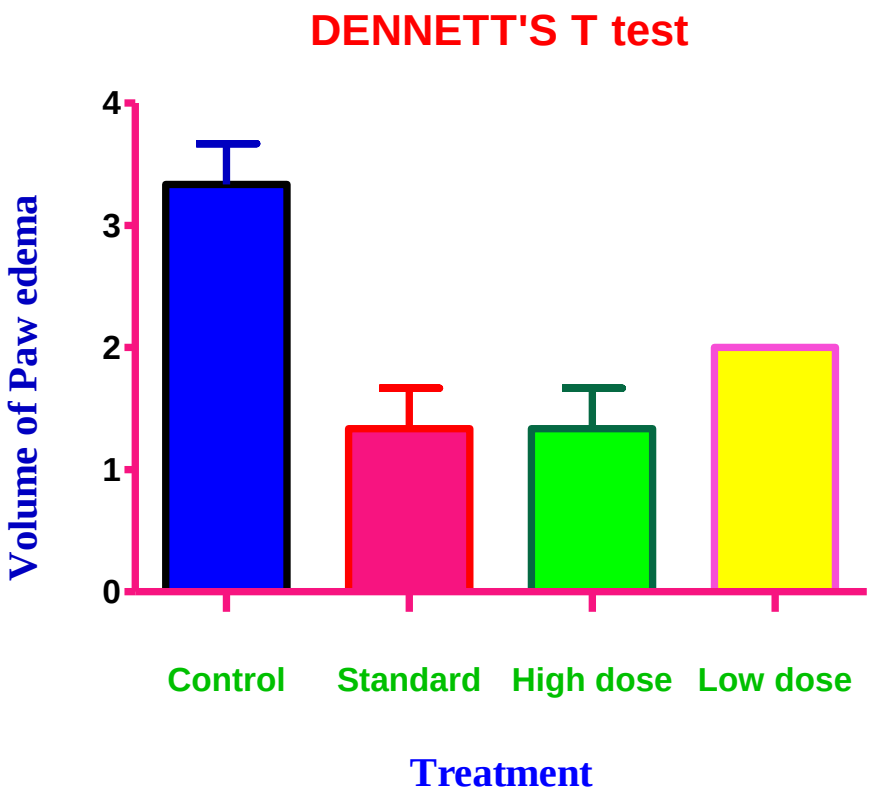
Table 2: EFFECT OF HYDRO ALCOHOLIC EXTRACT OF *MUSA PARADISIACA* ON CARRAGENAN INDUCED PAW OEDEMA IN RATS AT 0 min, 30min, 1hr, 2 hrs and 4 hrs

Group	Animal	0 min	30 min	1 hr	2 hrs	4 hrs
Control	Head	4 mm	4 mm	4 mm	4 mm	4mm
	Body	3 mm	3mm	4 mm	4 mm	3 mm
	Tail	3 mm	4 mm	4 mm	4 mm	3 mm
Standard	Head	4 mm	4 mm	3 mm	2 mm	2 mm
	Body	4 mm	3 mm	3 mm	2 mm	1 mm
	Tail	3 mm	4 mm	3 mm	2 mm	1 mm
High dose 400mg/kg	Head	3 mm	4 mm	4 mm	3 mm	1 mm
	Body	4 mm	4 mm	4 mm	2 mm	1 mm
	Tail	3 mm	4 mm	3 mm	2 mm	2 mm
Low dose 100mg/kg	Head	4 mm	3 mm	3 mm	2 mm	2 mm
	Body	3 mm	3 mm	4 mm	3 mm	2 mm
	Tail	4 mm	3 mm	3 mm	2 mm	2 mm

Table 3: EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF *MUSA PARADIASIACA* IN RATS AT 4 HOURS

S. No.	Treatment	Paw Edema Volume(mm)	Mean ± SEM
1	Control	4	3.333 ± 0.333
		3	
		3	
2	Diclofenac (10mg/kg)	2	1.333 ± 0.333**
		1	
		1	
3	M.P.H (400mg/kg)	1	1.333 ± 0.333**
		1	
		2	
4	M.P.L (100mg/kg)	2	2 ± 0*
		2	
		2	

Values are Mean ± SEM (n=3), statistical analysis followed by Dennett's T test.
Where, * represents significant at p<0.05,
** represents very significant at p< 0.01 when compared to Control group.
R.S.H (400 mg/kg) and R.S.L (100 mg/kg) are the high and low doses of Musa paradisiaca Linn.



DISCUSSION

There are a number of synthetic non steroidal anti inflammatory drugs (NSAIDs) currently available for use in the management, control and treatment of inflammation. However, most of the synthetic drugs are not only inaccessible and unaffordable, but also posses many toxic adverse effects therefore, there is a great need for the development of cheap, effective and safe NSAIDs from plants and other sources.

In folklore medicine Raphanus sativus is used in the treatment of inflammation. Based on its folklore application, the anti inflammatory activity of Musa paradisiaca hydro alcoholic extract was

studied in carrageenan induced paw edema in rats.

The inhibition of Carrageenan- induced inflammation in rats is an established model to screen compounds for potential anti-inflammatory activity. It is well known that Carrageenan induced paw edema is characterized by biphasic event with involvement of different inflammatory mediators. In the first phase (during the first 2 h after Carrageenan injection), chemical mediators such as histamine and serotonin play role, while in second phase (3 – 4 h after Carrageenan injection). Kinin and prostaglandins are involved. Our results revealed that administration of Hydro alcoholic extract of root *Musa paradisiaca Linn.* Inhibited the paw volume after third hour and during all phases of inflammation, which is probably inhibition of different aspects and chemical mediators of inflammation.

Animals treated with standard drug like Diclofenac (10mg/kg) produces highly significant paw edema volume when compared to control animals. Whereas, high dose of 400 mg/kg Musa paradisiaca hydro alcoholic extract produces highly significant decreased paw edema volume which is similar to the response of Diclofenac treatment. When compared to control animals.

In case of low dose 200 mg/kg Musa paradisiaca hydro alcoholic extract produces significant decreased paw edema volume when compare to control animals.

The hydro alcoholic extract of Musa paradisiaca showed potent anti-inflammatory activity may be due to the presence of flavonoids, phytosterols and tannins and also due to inhibition main inflammatory mediators like Histamine, serotonin, Prostaglandins, Bradykinin, Angiotensin, Trachykinin, platelet activating factor and substance-p

Hence it is concluded at the Musa paradisiaca possesses significant anti-inflammatory activity against carrageenan induced paw edema in rats.

CONCLUSION

The present study was carried out to find out the evaluation of anti-inflammatory activity of Musa paradisiaca leavess in rats.

From the results we concluded that the Musa paradisiaca leaves extract at high and low doses produces highly significant and significant decreased in carrageenan induced paw edema in rats. This activity may be due to presence of flavonoids, phytosterols and tannins in extract. However, long term studies in different animals and inflammation subjects may further substantial our study result.

REFERENCES

1. http://en.wikipedia.org/wiki/Inflammation accessed on Mar 20,2012
2. Mitchell RN and Cotran RS. Robinsons Basic Pathology. 7th ed, Harcourt Pvt. Ltd. New Delhi, India. 2000:33-42.
3. Rang HP, Dale MM, Ritter JM and Flower RJ. Pharmacology. 6th ed. Edinburgh (England) Harcourt Publishers Ltd. 2007:226-31.
4. Achinto S, Muniruddin A. The Analgesic and Anti-inflammatory activities of the extract of *Albizia Lebbeck* in animal model. Pak J Pharm Sci. 2009;1(22):74-77.
5. Kokate CK. Practical Pharmacognosy. Vallabh Prakashan, New Delhi, 1994;4:110-111.
6. OECD guidelines for testing of chemicals 425, 17th December 2001.
7. H. Gerhard Vogel, Drug discovery and Evaluation 2nd ed.Chapter; H.3 p.no.725.