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Analgesic activity of aqueous extract of *Musa paradisiaca*

Surbhi Gupta*, Vipin K. Garg, Pramod K. Sharma, Anita Singh

Department of Pharmaceutical Technology, Meerut Institute of Engineering & Technology, Meerut, UP, India

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ABSTRACT

The analgesic efficacy of aqueous extract of leaves of Musa paradisiaca was evaluated by hot plate reaction time and acetic acid induced writhing models. The aqueous extract was found to possess significant analgesic activity in both models and these effects could be due to the presence of two components: one acting centrally and another peripherally.

Key Words: *Musa paradisiaca*, analgesia, hot plate method, acetic acid induced method.

INTRODUCTION

Musa paradisica, a member of family Musaceae is well known as Plantain or banana. The plant is widely distributed in the parts of West and East Africa, Nigeria, Malaysia, Camroon and southern parts of United States [1]. Banana fruits are the balanced source of nutrients containing mineral salts, carbohydrates and proteins. Banana fruits are eaten raw as desert fruits [2].

Musa paradisiaca is used to balance pitta and vata doshas. The rhizomes are good remedy for ear diseases. The tender banana fruit balances pitta. Raw flowers are treated as remedy for diabetes and ulcers. It acts a pain reliever in case of insect stings. The tender leaves give cooling effect when applied on burns. The juice of this plant works for fevers, hemorrhages, hysteria, epilepsy, leprosy, dysentery, digestive disorders, dysentery, hemorrhoids and diarrhea [3].

There are some reports showing the potential hypoglycemic, anthelminthic, antimicrobial and hematological activity of *Musa paradisiac*a. Since enough scientific data is not available on analgesic activity of leaves of *Musa paradisiaca*, we have undertaken this work to validate the same.

MATERIALS AND METHODS

Plant material

The leaves of *Musa paradisiaca* were collected from the local area of Meerut district and identified and authenticated by Dr. Anjula Pandey, Principal Scientist, National Herbarium of Cultivated Plants, NewDelhi. Voucher specimens (NHCP/NBPGR/2011-18/7264) have been kept in National Herbarium of Cultivated Plants, New Delhi and Department of Pharmaceutical Technology, MIET for future reference.

Animals

Healthy albino mice of both sexes weighing between 20 – 25g were used. Institutional Animal Ethics Committee approved the experimental protocol. Animals were maintained under standard conditions in an animal house approved by Committee for the Purpose of Control and Supervision on Experiments on Animals (CPCSEA). (Approval No. 711/02/a/CPCSEA).

Extraction

The leaves were dried under shade, reduced to moderately coarse powder, and were macerated with hot water for 48 hours to get the aqueous extract of *Musa paradisiaca* leaves. The aqueous extract was concentrated to dryness using Rotary evaporator, giving yield as 7.240% w/v. and preserved in a refrigerator. Aliquot portions of the aqueous extract of *Musa paradisiaca* were weighed and suspended in an appropriate volume of Tween 80 (2% v/v) for use on each day.

Preliminary Phytochemical Studies

The aqueous extract was then subjected to qualitative Phytochemical screening for the identification of different phytoconstituents. Aqueous extract showed positive tests for the presence of alkaloids, carbohydrates, sterols, proteins and flavonoids. As traditionally, the plant is used to cure pain, the analgesic activity of the aqueous extract of the plant in different dose levels (250mg/kg, 1000 mg/kg) [4] is being reported here.

Analgesic activity

Hot plate method and acetic induced writhing models were used to evaluate the analgesic activity of aqueous extract of *Musa paradisiaca*.

Hot Plate Method

The hot plate method described by Turner (1965) was followed for the assessment of analgesic activity. Albino mice were introduced to a hot plate maintained at 55 ± 0.5°C. The reaction time to the thermal stimulus was recorded as the time interval from introduction of the animal to the plate until the first lick of the limbs or the first jump of the animals. The test groups received aqueous extract of *Musa paradisiaca* at different dose levels prepared as suspension in 2% Tween 80 orally, the standard group received Pentazocine (10 mg/kg) [5] and control group received only 1 ml of 2% Tween 80 solution. The reaction times were determined before and after 30 minutes, 1 hour, 2 hours and 3 hours period with reference to the control group receiving only vehicle.

Acetic Acid Induced Writhing

Acetic acid induced writhing response in mice Acetic acid solution at a dose of 10ml/kg (0.6%) was injected i.p. and the number of writhes during the following 15 minutes period was observed. The test groups received aqueous extract of *Musa paradisiaca* at different dose levels prepared as suspension in 2% Tween 80 orally, the standard group received Aspirin (10 mg/kg) [5] and control group received only 1 ml of 2% Tween 80 solution orally. Significant reductions in number of writhes by drug treatment as compared to vehicle treatment animals were considered as a positive analgesic response. The percent inhibition of writhing was calculated [5].

$$\% \text{ Inhibition} = \frac{WC - WT}{WC} \times 100$$

Where,
WC = Mean number of writhes in control group.
WT = Number of writhes in test group.

Statistical Analysis [6]

All the results obtained from various activities, as described above, were analyzed statistically by using Student's t test and $p<0.05$ were considered significant. The results are summarized in the tables given below.

RESULTS

Table 1. Effect of different doses of Aqueous extract of *Musa paradisiaca* by Hot Plate reaction time in mice.

Groups	Dose (mg/kg)	Reaction Time (Seconds)				
		Initial	Time after drug administration (Hrs)			
			0.5 hrs	1 hr	2 hrs	3 hrs
Control		9.03± 0.0666	9.13 ± 0.0881	9.28 ± 0.1167	9.20 ± 0.1154	9.30 ± 0.1390
Pentazocine	10	8.98 ± 0.0945	15.53 ± 0.1115[a]	24.03 ± 0.0881[a]	29.48 ± 0.1013[a]	27.13± 0.1282[a]
Aq. Extract	250	8.90± 0.0894	10.60 ± 0.093[a]	15.15 ± 0.1175[a]	20.30 ± 0.1183[a]	16.33 ± 0.1605[a]
Aq. Extract	1000	9.10 ± 0.0966	12.55 ± 0.0991[a]	19.40 ± 0.1154[a]	26.53 ± 0.1686[a]	20.53 ± 0.1563[a]

Values are expressed as mean ±S.E.M. (n=6); significance at p< 0.001[a] as compared to control.

Table 2. Effect of different doses of Aqueous extract of *Musa paradisiaca* on Acetic acid induced writhing in mice

S. No.	Groups	Dose (mg/kg)	No. of Writhing (Mean ± SEM)	% Inhibition
1	Control		33.33 ± 1.0543	
2	Aspirin	10	8.5 ± 0.7639[a]	74.49
3	Aq. Extract	250	18.33 ± 0.6667[a]	45.00
4	Aq. Extract	1000	10.00 ± 0.5774[a]	69.99

Values are expressed as mean ±S.E.M. (n=6); significance at p< 0.001[a] as compared to control.

DISCUSSION

The present study establishes the analgesic activities of the aqueous extract of *Musa paradisiaca* in the models used. Since analgesic activities are commonly mentioned as characteristic of drugs or compounds which have an inhibitory effect on prostaglandin biosynthesis [7]. This result seems to support the view that the extract has some influence on prostaglandin biosynthesis [8].
The analgesic activity of aqueous extract of the plant was evaluated using the hot plate method and writhing test in mice. The hot plate method is useful in detecting centrally acting analgesics [8] whereas acetic acid induced writhing method is useful to detect peripheral analgesic effects. Acetic acid, which is used as an inducer for writhing syndrome, causes algesia by liberation of endogenous substances, which then excite the pain nerve endings [9]. The fact that aqueous extract of *Musa paradisiaca* showed analgesic activity in both the models studied, indicate that this effect could be due to the presence of two components; one acting centrally and the other via peripheral route [9]. From the above results, it can be deduced that aqueous extract has shown dose dependent activity. As the phytochemical screening has shown the presence of carbohydrates, sterols, proteins, flavonoids, alkaloids in aqueous extract of *Musa paradisiaca* leaves, its potent activity may be attributed to the presence of these phytoconstituents. More detailed phytochemical studies are, however, necessary to identify the active principle(s) and exact mechanism of action.

CONCLUSION

From the above study, it can be concluded that the aqueous extract of *Musa paradisiaca* leaves possesses analgesic activity.

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