INTERNATIONAL JOURNAL OF PHARMACEUTICAL EDUCATION AND RESEARCH

E-ISSN: Applied

IJPER, 1(1):10-13

Research Article

ANALGESIC AND ANTI-CONVULSANT ACTIVITIES OF *CYPERUS ROTUNDUS* (LINN.)

Rawal SK*[1], Tiwari R[2], Sharma N[3]

[1]Production Manager, Gogia Chemicals, Surajpur, Greater Noida, Uttar Pradesh, India

[2]IIMT Collge of Pharmacy, Knowledge Park-1, Greater Noida. Uttar Pradesh, India

[3]Ram-Eesh Institute of Vocational and Technical Education, Greater Noida, Uttar Pradesh, India

ABSTRACT

Introduction: *Cyperus rotundus* Linn. (Family- Cyperaceae) is an important medicinal plant found in upland and paddy fields in temperate to tropical regions throughout India, China, Pakistan, Europe, France, Sri Lanka, Switzerland and Austria. The scented rhizomes of *Cyperus rotundus* posses tremendous pharmacological potentials. **Objective:** To determine analgesic and anticonvulsant activities of the methanolic extracts of rhizomes of *Cyperus rotendus*. **Materials and Methods:** Rhizomes were extracted in methanol using Soxhlet apparatus and concentrated under vaccume. The Analgesic activity was performed on rats by Tail flick method using Analgesiometer. Anticonvulsant activity was carried out using Maximal Electroshock (MES) method in mice. **Results:** The methanolic extract (500 and 1000mg/kg body weight.) showed significant analgesic effect ($p<0.01$) when compared with control and standard Diclofenac Sodium. *Cyperus rotundus* at 100mg/kg and 150 mg/kg body weight, i.p. produced a significant ($p<0.01$) effects in the extensor phase, $5.653\pm0.187^{**}$ sec, 3.18 ± 0.0570 ** sec respectively and recovery $20.133\pm0.620^{**}$ and $9.89\pm0.135^{**}$ ($P<0.001$) sec, compared to control 8.271 ± 0.142 and 198.46 ± 3.465 sec, respectively. The Metanolic extract of *Cyperus rotundus* at doses 100mg/kg and 150mg/kg didn't abolish the hind limb extension, but decreased it by nearly half the extension time in control. **Conclusion:** The present study revealed that methanolic extract of rhizomes of *Cyperus rotundus* possess significant analgesic and anticonvulsant activity and can be employed to develop future medicines for treatment of diseases like Epilepsy.

Keywords: Cyperus rotendus, MES, Analgesiometer, Anticonvulsant activity, Analgesic activity.

Article info:

Received: August 13, 2018

Revised: October 18, 2018

Published Online: April 15, 2019

DOI: https://doi.org/10.31069/xxxxxxxx

Correspondence:

Suneet Kumar Rawal

Quality Control Department, Gogia Chemicals Pvt. Ltd., Surajpur Industrial Area, Greater Noida, Uttar Pradesh, India.

Phone: +91-9654227192

Email: suneet@gogia.com

INTRODUCTION

Plants have been used to treat or prevent illness since before recorded history. The sacred Vedas dating back between 3500 B.C and 800 B.C give many references of medicinal plants. One of the remotest works in traditional herbal medicine is "Virikshayurveda", complied even before the beginning of Christian era. "Rig Veda," one of the oldest available literatures written around 2000 B.C. mentions the use of Cinnamon (*Cinamonum verum*), Ginger (*Zingiber officinale*), Sandalwood (*Santalum album*) etc. not only in religious ceremonies but also in medical preparation. Plants and plant based medicaments are the basis of many of the modern pharmaceuticals we use today for our various ailments. [1]

Although herbal remedies are often perceived as being natural and therefore safe, they are not free from adverse effects. Adverse effects of herbal medicine may be due to factors such as adulteration, substitution, contamination, misidentification, lack of standardization, incorrect preparation and dosage, and inappropriate labeling and advertisement. Adulteration with synthetic drugs and toxic heavy metal are major problems with herbal medicine. [2]

Cyperus rotundus Linn. (Family- Cyperaceae) is an important medicinal plant found in upland and paddy fields in temperate to tropical regions throughout India, China, Pakistan, Europe, France, Sri Lanka, Switzerland and Austria. It is common in waste grounds, gardens and roadsides, up to an elevation of 1800m. [3]

Pain is a sensation triggered by the nervous system in response to tissue damage. Pain is a warning signal, which is a discomfort. Excessive pain is unbearable and leads to sinking sensation, sweating, nausea, rise (or) fall in BP, Tachypnoea, Inflammation, redness, hot occurs at the affected area. Analgesic is defined as a state of reduction awareness to pain and analgesics are the stimuli. [4] Drugs that alleviates pain or calm down pain are termed as 'Analgesics'.

Epilepsy or Apasmara is known to humanity since the time of Acharya Charaka. Epilepsy is a common chronic neurological disorder affecting more than 2% population worldwide. Epilepsy is a complex disorder of brain electrical activity that results in recurrent convulsions. [5] Synthetic anticonvulsants are associated with hepatotoxicity, aplastic anemia, and deleterious effects on

some essential biochemicals such as vitamin D, carnitine, vitamin K, and folic acid on prolonged use. Some neurologists prescribe a ketogenic and Atkins diet as adjuvant along with synthetic anticonvulsants. These diets are supposed to suppress the onset of seizures but have nothing to do with post-seizure neuronal repair and toxicities associated with anticonvulsants. [6] There exists a plethora of analgesic and anticonvulsant drugs in the market but they are also associated with their side effects as mentioned above.

The present investigation is aimed to screen the methanolic extract of rhizomes of *Cyperus rotundus* Linn. for analgesic and anticonvulsant activities.

MATERIALS AND METHODS

Plant material and methanolic extraction

The rhizomes of *Cyperus rotundus* (Family: Cyperaceae) was collected from Khari-baoli, local market of New Delhi, identified and authenticated by Dr. H. B Singh (Taxonomist), National Bureau of Plant Genetic Resources (NBPGR), Pusa Campus New Delhi, with Ref. no. NISCAIR/RHMD/Consult/-2011-12/1801/101. After authentication of rhizomes were dried in shade and powdered to obtain coarse powder. The coarse powder material was extracted with methanol (95%v/v) by using Soxhlet apparatus. Then methanol extract was concentrated in vacuum and kept in a vacuum desiccator for complete removal of solvent.

Animals

For Analgesic activity: Albino rats weighing 150-250 gm. of either sex were used for the study. The animals were procured and housed in the animal house of Ram-Eesh Institute of Vocational and Technical Education for at least 2 week prior to the study for acclimatization. Animal house was well maintained under standard hygienic conditions at a temperature (25^0C), room humidity (45-55%) with food and water ad libitum. Cleaning and sanitation was done on alternate days. Paddy husk was provided as bedding material and was changed every day. All the experiments were performed after obtaining prior permission from Institute of Animal Ethical Committee.

For anticonvulsant activity: Swiss albino mice of either sex, weighing between 25-40 g were used in this study. They were housed under standard laboratory conditions for one week before experiment and kept in groups of 3-4 per cage at controlled temperature and humidity. They received standard diet and water ad libitum.

Chemicals and Equipments

Diclofenac Sodium (Ankur Drugs and Pharma Village, Baddi, Himachal Pradesh, India), 1% C.M.C solution (Thomas Baker Chemical Pvt, Ltd), Phenytoin sodium (Zydus Neurosciences, cadila Healthcare Ltd.), Glycol 400 (RANKEM Pvt. Ltd), Analgesiometer, Electroconvulsometer (INCO Elec. Co. Ltd.).

Methods

Tail Flick method for Analgesic activity

Analgesic activity was performed on rats using tail flick method. In this method the pain induced in the tail of rats by placing the last 1-2 cm tail on analgesiometer. The tail withdrawl time from the source of heat was calculated. The cut off period taken was not more than 20 seconds to prevent the damage to the tail. [4] [7]

Animal grouping and dosing

Rats were divided into 4 groups of 6 rats each.

Group 1: Vehicle control (saline solution)

Group 2: Standard fdrug (Diclofenac sodium, 10mg/kg body weight, p.o.)

Group 3: Test drug (Methanolic extract, 500mg/kg body weight, p.o.)

Group 4: Test drug (Methanolic extract, 1000mg/kg body weight, p.o.)

The basal reaction time to radiant heat (initial reading) was measured by placing the tip of the tail (last 1-2 cm) on the radiant heat source. The drug was orally administered to all groups and individually placed according to groups in analgesiometer. The tail flick time was noted respectively after 30, 60, 120 minutes. The percent increase in reaction time was calculated at each time interval and all values were subjected to statistical analysis.

Maximal electroshocks (MES) seizures method for anticonvulsant activity

All mice were subjected to MES seizures by using Electroconvulsometer (INCO Elec. Co. Ltd.). Then the hind limb extension was recorded and mice showing a positive response were selected for the experiment. The mice were allowed for resting to duration of 72 hrs and then grouped.

Grouping of Animals

Group I (n=6), Control animals (normal saline treated)

Group II (n=6), Animals treated with standard drug (Phenytoin sodium 10 mg/kg body weight, i.p)

Group III (n=6), Animals treated with Methanolic extract (50 mg/kg body weight, i.p)

Group IV (n=6), Animals treated with Methanolic extract (100mg/kg body weight, i.p).

Group V (n=6), Animals treated with Methanolic extract (150mg/kg body weight, i.p).

Dose Treatment

The control groups were given normal saline. All mice were given the electric stimulus twice, first given after 30 min. and second given after 4 hours to given doses (24mA, 0.2sec). The different stages of convulsions and time (sec) duration were observed in all groups of animals in each phase of the convulsion. The threshold, duration of tonic convulsion and % inhibition were recorded.[4] [5] [8] [9]

RESULT AND DISCUSSION

The Analgesic activity was performed on rats by Tail flick method using Analgesiometer. The methanolic extract (500 and 1000mg/kg body weight.) showed significant analgesic effect ($p<0.01$) when compared with control as seen in Table 1. The result showed that the *Cyperus rotundus* has significant analgesic activity.

Cyperus rotundus at 100mg/kg and 150 mg/kg body weight, i.p. produced a significant ($p<0.01$) effects in the extensor phase, $5.653\pm0.187^{**}$ sec, 3.18 ± 0.0570 ** sec respectively and recovery $20.133\pm0.620^{**}$ and $9.89\pm0.135^{**}$ ($P<0.001$) sec, compared to control 8.271 ± 0.142 and 198.46 ± 3.465 sec, respectively as presented in Table 2. The Metanolic extract of *Cyperus rotundus* at doses 100mg/kg and 150mg/kg didn't abolish the hind limb extension, but decreased it by nearly half the extension time in control. This observation revealed its ability to prevent the spread of seizures in the central nervous system.

Table 1: Effect of *Cyperus rotundus* extract on Tail flick method in rats

Group	Treatment	Dose	Mean value of Tail Flick method sec ± S.E.M		
			30 min.	60 min.	120 min.
1	Control	5ml/kg	3.483 ±0.017	3.48 ±0.012	3.566±0.107
2	Standard dose	10mg/kg	8.196 ±0.154**	12.09±0.045**	12.78±0.144**
3	Methanolic Extract	500mg/kg	3.981 ±0.020	4.001 ±0.064	4.706±0.0818**
4	Methanolic Extract	1000mg/kg	4.818 ±0.067**	5.286 ±0.079**	5.681±0.144**

Note: n=6 Values indicate mean ± S.E.M (ANOVA test followed by Dunnett's t-test).
Significance variation against control at *p<0.05, **p<0.01, ***p<s0.001.

Table 2: Effects of *Cyperus rotundus* extract on MES induced seizures in mice

Groups	Treatment and dose (mg/kg)	Duration of flexion phase (sec)	Duration of extensor phase (sec)	Duration of clonus phase (sec)	Duration of stupar phase (sec)	Recovery time 9sec)
Group I	Saline	3.541±0.197	8.271±0.142	5.883±0.537	180.07±3.635	198.45±3.46
Group II	Phenytoin sodium (10mg/kg)	0.00±000	2.668** ±0.266	1.668** ±0.187	3.095** ±0.338	7.14** ±0.377
Group III	Methanolic Extract (50mg/kg)	2.565** ±0.016	6.448** ±0.224	3.36** ±0.045	15.34** ±0.159	27.721±0.288
Group IV	Methanolic Extract (100mg/kg)	2.131±0.039	5.653** ±0.187	2.381** ±0.0451	9.966** ±0.502	20.133** ±0.620
Group V	Methanolic Extract (150mg/kg)	1.113** ±0.393	3.18 **±0.0570	1.52** ±0.0312	4.085** ±0.130	9.89** ±0.135

Note: n=6 Data represents as Mean ±SEM, **P<0.01 and ***<0.001when compared with control group (significance by One way ANOVA followed by Dunnett t test)

CONCLUSION

The study showed significant analgesic and mild anticonvulsant activity of methanolic extract of *Cyperus rotundus* rhizomes. The study results can be beneficial for herbal drug industry to establish the pharmacological activities of their drug products or formulations containing *Cyperus rotundus* Linn.

CONFLICT OF INTEREST

The author declares that he has no competing interests.

REFERNCES

1. Abraham Z., 1981. Glimpses of Indian Ethno botany. New Delhi: Oxford & IBH.

2. Lau CBS, Wong CK, Leung PC. A Commentary: Herbal Medicine Offers Great Potential in Support of Metronomic Cancer Therapy. Journal of Cancer Therapy. 2017; 8(2):86-95.
3. Ministry of Ayush, Government of India, *The Ayurvedic Pharmacopoeia of India*, Part-1, vol. IX, New Delhi: Pharmacopoeia Commission for Indian Medicine & Homoeopathy, 2016.
4. Kulkarni, SK. Hand Book of Experimental Pharmacology. New Delhi: Vallabh Prakashan.
5. Kaushik R, Jain J, Yadav R, Singh L, Gupta D, Gupta A. Isolation of β-Asarone from Acorus calamus Linn. and Evaluation of its Anticonvulsant Activity using MES and PTZ Models in Mice. Pharmacology, Toxicology and Biomedical Reports. 2017b; 3(2):21-26.
6. Kaushik R, Jain J, Mazumdar A, Singh L. Studying the pharmacological basis of an antiepileptic Ayurvedic formulation- Sarasvata Churna. International Journal of Green Pharmacy 2017; 11(2):1-7.
7. Damor B, Gaur K, Dashora A, Parra SA. Evaluation of analgesic and anti-inflammatory activity of methanolic extract of Guazuma Ulmifolia. Journal of Applied Pharmaceutical Sciences and Research. 2018; 1(4): 23-29.
8. Sinha R, Singh UVS, Khosa RL, Jain J. Anticonvulsant Activity of Isonicotinic Acid Hydrazone Derivatives using MES, scPTZ and Rotorod neurotoxicity models. Journal of Applied Pharmaceutical Sciences and Research. 2018; 1(1):29-40.
9. Kaushik R, Jain J, Yadav R, Singh L, Gupta D, Gupta A. Ameliorative Effect of Methanolic Extract of *Allium cepa* on Anticonvulsant Activity of Chloroform Extract of *Acorus calamus* Linn. Rhizomes. Pharmacology, Toxicology and Biomedical Reports. 2017b; 3(2):39-42.