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

Rawal SK*1, Tiwari R2, Sharma N3
1Production Manager, Gogia Chemicals, Surajpur, Greater Noida, Uttar Pradesh, India
2IMT Collge of Pharmacy, Knowledge Park-1, Greater Noida, Uttar Pradesh, India
3Ram-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 possess tremendous pharmacological potentials. Objective: To determine analgesic and anticonvulsant activities of the methanolic extracts of rhizomes of Cyperus rotundus. Materials and Methods: Rhizomes were extracted in methanol using Soxhlet apparatus and concentrated under vacuum. 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 150mg/kg body weight, i.p. produced a significant (p<0.01) effects in the extensor phase, 5.65±0.620 ** and 3.18±0.135 ** (p<0.001) sec, compared to control 8.27±0.142 and 198.46±3.465 sec, respectively. The Methanolic 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 rotundus, MES, Analgesiometer, Anticonvulsant activity, Analgesic activity.

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 “Virkshayurveda”, compiled 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 (Cinnamomum 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]

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

**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 withdrawal 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.

**Animal grouping and dosing**

Rats were divided into 4 groups of 6 rats each.

- **Group 1:** Vehicle control (saline solution)
- **Group 2:** Standard drug (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 V** (n=6), Animals treated with Methanolic extract (150mg/kg body weight, i.p).
Rawal et al, Analgesic and Anticonvulsant activity of Cyperus rotundus Linn.

RESULT AND DISCUSSION

The enalgesic 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±0.187” sec, 3.18±0.0570 ** sec respectively and recovery 20.133±0.620” and 9.89±0.135” (P<0.001) sec, compared to control 8.271±0.142 and 198.46±3.465 sec, respectively as presented in Table 2. The Methanolic 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

<table>
<thead>
<tr>
<th>Group</th>
<th>Treatment</th>
<th>Dose</th>
<th>Mean value of Tail Flick method sec ± S.E.M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 min.</td>
</tr>
<tr>
<td>1</td>
<td>Control</td>
<td>5ml/kg</td>
<td>3.483 ±0.017</td>
</tr>
<tr>
<td>2</td>
<td>Standard dose</td>
<td>10mg/kg</td>
<td>8.196 ±0.154”</td>
</tr>
<tr>
<td>3</td>
<td>Methanolic Extract</td>
<td>500mg/kg</td>
<td>3.981 ±0.020</td>
</tr>
<tr>
<td>4</td>
<td>Methanolic Extract</td>
<td>1000mg/kg</td>
<td>4.818 ±0.067”</td>
</tr>
</tbody>
</table>

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

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

Table 3: Anticonvulsant activity of methanolic extract of Cyperus rotundus in mice

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment</th>
<th>Dose</th>
<th>Duration of convulsions (sec)</th>
<th>Recovery time (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>Saline</td>
<td>5ml/kg</td>
<td>4.818±0.067”</td>
<td>198.45±3.46</td>
</tr>
<tr>
<td>Group II</td>
<td>Phenytoin sodium (10mg/kg)</td>
<td>2.565** ±0.016</td>
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<tr>
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<tr>
<td>Group IV</td>
<td>Methanolic Extract (100mg/kg)</td>
<td>1.113** ±0.393</td>
<td>9.89** ±0.135</td>
<td></td>
</tr>
<tr>
<td>Group V</td>
<td>Methanolic Extract (150mg/kg)</td>
<td>11.135** ±0.683</td>
<td>39.84** ±0.915</td>
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</table>

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.

REFERENCES


