

EVALUATION OF THE ANTIPILEPTIC POTENTIAL OF METHANOLIC EXTRACT OF CYPERUS ARTICULATUS LINN. IN MES-INDUCED SEIZURES IN RATS**EVALUATION OF THE ANTIPILEPTIC POTENTIAL OF METHANOLIC EXTRACT OF *CYPERUS ARTICULATUS LINN.* IN MES-INDUCED SEIZURES IN RATS**Baddala Poorna Chandrika¹, B. Ramesh²,¹Prabhath college of Pharmacy, Nandyal.²CES college of Pharmacy, Kurnool.**ABSTRACT:**

Epilepsy is a chronic neurological disorder characterized by spontaneous and recurrent seizures. The search for safer and more effective antiepileptic agents has led to increasing investigation of medicinal plants. Objective: This study investigates the antiepileptic activity of the methanolic extract of *Cyperus Articulatus Linn.* leaves in Wistar rats exposed to maximal electroshock (MES)-induced seizures. Methods: The methanolic leaf extract of *Cyperus Articulatus Linn* (EECE) was administered orally at doses of 200 mg/kg and 400 mg/kg for 14 days. Phenytoin (25 mg/kg, i.p.) served as the standard drug. MES-induced convulsions were produced using a 60 Hz, 150 mA current for 0.2 seconds. Various phases of convulsions were recorded, and protection against hind-limb tonic extension (HLTE) was evaluated. Results: EECE produced significant, dose-dependent protection against MES-induced seizures. Animals treated with 200 mg/kg and 400 mg/kg showed 68.8% and 85.3% protection, respectively, with marked reductions in the duration of HLTE. The higher dose exhibited activity comparable to phenytoin.

Conclusion: The methanolic extract of *Cyperus Articulatus Linn* demonstrates promising antiepileptic activity and may serve as a potential source for developing novel therapies for generalized tonic-clonic seizures

Keywords: *Cyperus Articulatus Linn*, antiepileptic activity, MES, seizures, Wistar rats, HLTE.

INTRODUCTION:

Epilepsy comprises a diverse group of neurological disorders characterized by recurrent, unprovoked seizures resulting from abnormal and excessive neuronal discharges. Globally, epilepsy affects approximately 1–2% of the population, posing significant clinical and **social** challenges. Despite the availability of numerous antiepileptic drugs (AEDs), nearly one-third of patients continue to experience uncontrolled seizures, highlighting the need for new therapeutic agents with improved safety and efficacy profiles.

Neurotransmitter imbalance, particularly involving glutamate and γ -aminobutyric acid (GABA), plays a central role in seizure generation. Excessive excitation or impaired inhibition promotes synchronous neuronal firing, leading to seizure onset. Current AEDs primarily modulate ion channels or neurotransmitter systems; however, adverse effects and drug resistance remain major limitations.

EVALUATION OF THE ANTIEPILEPTIC POTENTIAL OF METHANOLIC EXTRACT OF CYPERUS ARTICULATUS LINN. IN MES-INDUCED SEIZURES IN RATS

Medicinal plants provide a rich source of bioactive compounds with CNS activity. *Cyperus Articulatus Linn.* (tiger nut) is traditionally used for nutritional and therapeutic purposes and contains alkaloids, flavonoids, tannins, saponins, and phytosterols—phytochemicals known to possess neuroprotective and antioxidant properties. However, its antiepileptic potential remains underexplored. This study evaluates the protective effects of its methanolic leaf extract against MES-induced seizures in rats

PATHOPHYSIOLOGY OF EPILEPSY

Seizures occur due to sudden, excessive, and synchronous discharge of cortical neurons. Disruption in ion channel function, neurotransmitter imbalance, structural lesions, or genetic abnormalities may lower the seizure threshold. Increased excitatory transmission (glutamate, acetylcholine) or reduced inhibitory influences (GABA, glycine) can trigger uncontrolled neuronal firing.

Generalized tonic-clonic seizures are associated with widespread neuronal activation, often originating in the brainstem or subcortical structures. During prolonged seizures, metabolic demands rise sharply, increasing risks of neuronal injury through excitotoxicity and oxidative stress. Effective AEDs either elevate the seizure threshold or inhibit propagation of abnormal electrical activity

EXPERIMENTAL MODELS OF SEIZURES

Experimental seizure models play a crucial role in screening potential anticonvulsant agents. These include:

Electric Shock Models

Maximal Electroshock Seizure (MES) Test: Predicts efficacy against generalized tonic-clonic seizures. Abolition of HLTE indicates protection.

Kindling Models: Repeated subthreshold stimulation leads to permanent increases in seizure susceptibility.

Chemically Induced Seizure Models

Agents such as PTZ, strychnine, picrotoxin, isoniazid, and 4-aminopyridine produce seizures by modulating neurotransmission, particularly affecting GABAergic and glutamatergic systems.

Genetic Models

Spontaneous epileptic rodents are useful for studying inherited seizure disorders.

The MES model was selected for this study due to its strong predictive value for human tonic-clonic epilepsy.

PLANT PROFILE: *CYPERUS ARTICULATUS LINN*

Cyperus Articulatus Linn., commonly known as tiger nut or chufa, is a perennial plant known for its edible tubers. It is cultivated in parts of Africa and Europe and is valued for its nutritional richness, including carbohydrates, essential fatty acids, fiber, and various phytochemicals.

EVALUATION OF THE ANTIPILEPTIC POTENTIAL OF METHANOLIC EXTRACT OF CYPERUS ARTICULATUS LINN. IN MES-INDUCED SEIZURES IN RATS

Pharmacological studies have reported antioxidant, anti-inflammatory, antimicrobial, and potential CNS-modulating activities. However, its antiepileptic properties remain largely unexplored, which forms the basis of this investigation

REVIEW OF LITERATURE:

Studies on medicinal plants rich in flavonoids, terpenoids, and phenolic compounds have demonstrated notable anticonvulsant activity. These phytochemicals may modulate GABAergic pathways, inhibit voltage-gated sodium channels, or possess antioxidant effects that reduce neuronal excitability. Considering the phytochemical profile of *Cyperus Articulatus Linn*, its extract may exhibit similar neuroprotective or anticonvulsant effects.

AIM AND OBJECTIVES

The present study aims to evaluate the antiepileptic potential of the methanolic extract of *Cyperus Articulatus Linn* leaves in MES-induced convulsions in rats.

Objectives: Collection and authentication of *Cyperus Articulatus Linn* plant material.

Determination of acute toxicity of the methanolic extract. Evaluation of anticonvulsant activity using the MES model

MATERIAL AND METHODS:**Plant Material and Extraction**

Leaves of *Cyperus Articulatus Linn* were collected, shade-dried, powdered, and extracted

using methanol in a Soxhlet apparatus at 60–70°C. The extract was concentrated under reduced pressure to obtain a semisolid residue (yield: 25.8% w/w). Phytochemical screening confirmed the presence of alkaloids, flavonoids, tannins, glycosides, terpenoids, and phenolic compounds.

Experimental Animals

Male Wistar rats (150–220 g) were housed under standard laboratory conditions. All procedures followed CPCSEA guidelines and were approved by the Institutional Animal Ethics Committee.

Acute Toxicity

Conducted per OECD guideline 423. The extract was safe up to 2000 mg/kg; therefore, 200 mg/kg and 400 mg/kg were selected for pharmacological studies.

Experimental Design:

Four groups (n=6 each):

- Control (Vehicle + MES) Baseline comparison
- Standard (Phenytoin 25 mg/kg) Reference standard
- Test 1 (EECE 200 mg/kg) Evaluate low-dose effect
- Test 2 (EECE 400 mg/kg) Evaluate high-dose effect

MES-Induced Convulsions

On day 14, seizures were induced using a convulsimeter delivering 150 mA, 60 Hz current for 0.2 s via corneal electrodes. Duration of each seizure phase—flexion, extension, clonus, stupor, and recovery—was recorded. Protection was defined as abolition or reduction (<90°) of HLTE.

EVALUATION OF THE ANTIPILEPTIC POTENTIAL OF METHANOLIC EXTRACT OF CYPERUS ARTICULATUS LINN. IN MES-INDUCED SEIZURES IN RATS

Statistical Analysis

Data were presented as mean ± SEM and analyzed using one-way ANOVA followed by Tukey’s test. Significance was set at p < 0.05.

RESULTS:

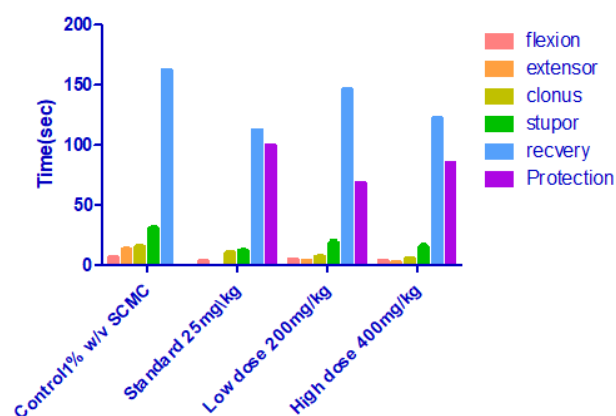
Both EECE doses showed significant anticonvulsant activity.

Phenytoin: 100% protection.

EECE 200 mg/kg: 68.8% protection.

EECE 400 mg/kg: 85.3% protection.

The extract markedly reduced the duration of HLTE, with the higher dose nearly approximating phenytoin’s effect.



DISCUSSION

In the MES model, suppression of HLTE is a key indicator of efficacy against generalized tonic-clonic seizures. The methanolic extract of *Cyperus Articulatus Linn* significantly inhibited HLTE and reduced overall seizure duration, suggesting modulation of voltage-gated sodium channels or enhancement of inhibitory neurotransmission—mechanisms similar to conventional AEDs.

The presence of flavonoids, terpenoids, and phenolic compounds may contribute to neuronal stabilization through antioxidant or membrane-protective actions. The dose-dependent activity further supports the pharmacological potential of the plant.

CONCLUSION

The methanolic extract of *Cyperus Articulatus Linn* exhibits significant anticonvulsant activity in MES-induced seizures in rats and demonstrates a favorable safety profile. These findings indicate that the plant may serve as a promising natural source for developing new antiepileptic agents. Future research should explore its mechanism of action, active constituents, and efficacy in additional seizure models.

REFERENCE:

- Sander JW, Shorvon SD. Epidemiology of the epilepsies. J. Neurol. Neurosurg. Psychiat. 1996, 61, 433-443.
- WHO. The World Health Report. Mental Health: New Understanding New Hope; WHO: Geneva, Switzerland, 2001.
- Dichter M. Basic mechanisms of epilepsy: targets for therapeutic intervention. Epilepsia 1997; 38 (Suppl. 9): S2– S6.
- Rang HP, Dale MM, Ritter JM, Moore PK, Pharmacology. Churchill Livingstone, Edinburgh 2007.

Source of Support: Nil. Conflicts of Interest: None