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Anticonvulsant activity of ethanolic extract of *Cynodon dactylon*

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ABSTRACT

Anticonvulsant activity was studied against maximal electroshock (MES) and Pentylenetetrazol (PTZ) induced convulsions in mice. The extract suppressed hind limb tonic extensions (HLTE) induced by MES and also exhibited protector effect in PTZ-induced seizures. In conclusion, we showed that the ethanolic extract of Cynodon dactylon has anticonvulsant effect in the both models, suggesting their possible depressant action in the central nervous system.

Key Words: *Cynodon dactylon*, anti-convulsant activity, maximal electro shock, pentylenetetrazole.

INTRODUCTION

Traditional systems of medicine are popular in developing countries and up to 80% of the population relies on traditional medicines or folk remedies for their primary health care need. Medicinal plants are believed to be an important source of new chemical substances with potential therapeutic effects. Several plants used for the treatment of epilepsy in different systems of traditional medicine have shown activity when tested in modern bioassays for the detection of anticonvulsant activity and many such plants are yet to be scientifically investigated [1].

The past decade has seen considerable change in opinion regarding ethnopharmacological therapeutic applications [2].

The presence of various life sustaining constituents in plants has urged scientists to examine these plants with a view to determine potential antiepileptic properties.

Epilepsy is a neurological disorder that affects a wide range of people throughout the world. It is a disorder of brain characterized by unpredictable and periodic occurrence of a transient alteration of behavior due to the disordered, synchronous and rhythmic firing of populations of brain neurons. The current therapeutic treatment of epilepsy with modern antiepileptic drugs [AEDs] is associated with side-effects, dose related and chronic toxicity. Approximately 30% of the patients continue to have seizures with current AED therapy. Natural products from folk remedies have contributed significantly in the discovery of modern drugs and can be an alternative source for the discovery of AEDs with novel structures and better safety and efficacy profiles [3].

The grass *Cynodon dactylon* (Family: Poaceae) grows throughout India up to a height above sea level of 8,000ft.The plant is also known by the name of Bermudagrass. A hardy perennial grass with creeping culms, rooting at nodes and forming spreading mats on the surface of the soil. It is abundant on road sides and paths, and readily takes possession of any uncultivated area. It flowers nearly throughout the year. The aerial parts and rhizomes of *Cynodon dactylon* was reported for its cardioprotective action, antibacterial, antimicrobial, antioxidant, wound healing, anti diabetic, diuretic effects. *Cynodon dactylon* is reported to contain cynodin, hydrocyanic acid and triticin. The plant is traditionally used for jaundice, diuretics, and astringent, to stop bleeding in piles, skin infections in India at West Bengal, Assam, Manipur, and Mizoram parts [4]. The plant is beneficial in the treatment of epilepsy [5].

MATERIALS AND METHODS

Plant material

The whole plants with roots of *Cynodon dactylon* were collected from the local area of Meerut district and identified and authenticated by Dr. Anjula Pandey, Taxonomist, National Herbarium of Cultivated Plants, New Delhi. Voucher specimens (No. NHCP/NBPGR/2006/94/51/8929) have been kept in National Herbarium of Cultivated Plants, New Delhi and Department of Pharmaceutical Technology, MIET for future reference.

Extraction

The whole plant along with roots was dried under shade, reduced to moderately coarse powder, loaded into soxhlet extractor and was subjected to successive extraction with Petroleum Ether, Benzene, Chloroform, Ethanol and Water to get different extracts.

Preliminary Phytochemical Studies

The different extracts were then subjected to qualitative phytochemical screening for the identification of the phytoconstituents. While petroleum ether, benzene, chloroform does not show any appreciable tests for the presence of different phytoconstituents, ethanolic extract showed positive tests for the presence of glycosides, flavonoids and alkaloids. However, aqueous extract showed positive tests for glycosides & flavonoids only. The anti-convulsant activity of the ethanolic extract of the plant in different dose levels (200 mg/kg, 400mg/kg and 600 mg/kg) [6] is being reported here.

Experimental Animals

The Institutional Animal Ethics Committee, (IAEC) approved the use of animals for the present study, (Ethical clearance number: 711/02/a/CPCSEA). Swiss albino mice weighing 18-25 g of either sex were used for the study. They were individually housed and were allowed free access to standard pellet diet and water *ad libitum*.

Anticonvulsant activity

Maximal electroshock induced seizures

Maximal electroshock seizure model was used to evaluate the anticonvulsant activity of ethanolic extract. Seizures were induced in mice by delivering electroshock of 50mA for 0.2 seconds by means of an electro- convulsiometer through a pair of ear clip electrodes [7]. The test animals (n=6) received 200, 400, 600 mg/kg of ethanolic extract orally as a suspension prepared in 2% Tween 80 solution and standard group received phenytoin (25 mg/kg) injected i.p. [8] and tested after 30 minutes for MES induced seizure response. All the experimental groups were compared with the control treated with vehicle.

PTZ-induced seizures

PTZ at the dose of 80 mg/kg (minimal dose needed to induce convulsions) was injected i.p. to induce clonic-tonic convulsions in mice. The test animals (n=6) received 200, 400, 600 mg/kg of ethanolic extract orally as a suspension prepared in 2% Tween 80 solution and standard group received phenytoin (25 mg/kg) injected i.p. PTZ was injected i.p. 60 min after the administration of drug. Occurrence of HLTE and duration of seizures were noted. If no HLTE occurred during the time limit, the animals were considered protected [9].

Statistical Analysis [10]

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

As shown in table 1, ethanolic extract of *Cynodon dactylon* at doses of 400 and 600 mg/kg and Phenytoin (25 mg/kg) have shown significant reduction ($p<0.001$) in duration of convulsions.

Also as shown in table 2, ethanolic extract of *Cynodon dactylon* at doses of 400 and 600 mg/kg and Phenytoin (25 mg/kg) significantly reduced ($p<0.001$) the onset and duration of convulsions.

Table 1: Effect of ethanolic extract of *Cynodon dactylon* on Hind limb extension induced by MES in mice.

S. No.	Group	Dose (mg/kg)	Hind limb extension (Sec)
1	Control	-	13.5 ± 1.1763
2	Phenytoin	25	0.16 ± 0.1666[b]
3	EECD	200	6.16 ± 1.1379[a]
4	EECD	400	3.33 ± 0.8820[b]
5	EECD	600	2.16 ± 0.9100[b]

Value are expressed as mean ± SEM (n =6)
[a]p<0.01, [b]p<0.001 as compared to control

Table 2: Effect of ethanolic extract of *Cynodon dactylon* on PTZ induced seizures in mice.

S. No.	Group	Dose (mg/kg)	Onset Time (Sec)	Duration of HLTE (Sec)
1	Control		50.81 ± 0.1904	37.28 ± 0.5030
2	Phenytoin	25	00 ± 00[b]	00 ± 00[b]
3	EECD	200	53.80 ± 0.2582[b]	35.16 ± 0.3939[a]
4	EECD	400	56.41± 0.1939[b]	32.63 ± 0.6228[b]
5	EECD	600	58.20 ± 0.1770[b]	29.68 ± 0.7605[b]

Value are expressed as mean ±SEM (n =6)
[a]p<0.01, [b]p<0.001 as compared to control

DISCUSSION

It was found from the above observations that ethanolic extract of *Cynodon dactylon* has shown anticonvulsant activity against seizures induced by MES and PTZ in a dose dependent manner.

It was effective against MES induced seizures, since inhibition of the MES test predicts activity against generalized tonic-clonic and cortical focal seizures [11]. PTZ is a most frequently used substance as well as an acute experimental model in the preliminary screening to test potential anticonvulsant drugs. PTZ induces convulsion by antagonizing the ã-aminobutyric acid $(GABA)_A$ receptor chloride (Cl)-channel complex to attenuate GABA-dependent inhibition. Drugs protecting against tonic-clonic seizures induced by PTZ are considered useful in controlling myoclonic and absence seizures in humans [12].

CONCLUSION

Therefore, the results obtained from the study suggest that ethanolic extract of *Cynodon dactylon* has anti-convulsant property and the results verify its traditional use in epilepsy. Further phytochemical studies are in progress to isolate, characterize and identify the specific active compounds in this plant responsible for anti-convulsant activity.

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