EVALUATION OF ANTICONVULSANT ACTIVITY OF *PACHYRRHIZUS EROZUS* SEEDS BY PENTYLENETETRAZOLE INDUCED CONVULSION IN MICE

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Summary

Pachyrrhizus erozus (leguminosae) is traditionally used as antifungal, antisecretory, spasmolytic, sedative and antianxiety. The present work deals with the screening of ethanolic extract of *Pachyrrhizus erozus* seeds (EEPES) for anticonvulsant activity. The anticonvulsant activity of EEPES (75 and 150 mg/kg) was evaluated by using Pentylenetetrazole (PTZ) induced convulsant model. Seizure was assessed in term of jerky movement of body, clonus, extensor phase and mortality time. Higher dose of EEPES increased onset of clonus time and mortality time while standard drug Diazepam (4mg/kg) increased significantly myoclonic jerk, clonus, extensor and mortality time compared to control. Low dose of test drug did not prevent any symptoms of epilepsy. We conclude that higher dose of EEPES has anticonvulsant property.

Key Word: Clonus, Diazepam, Extensor, Mortality, Myoclonic jerk, PTZ

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Introduction

Epilepsy is a neurological disorder characterized by seizure (recurrent episodic electrical discharge) in whole brain or part of brain with or without convulsant and or with or without loss of consciousness. Epilepsy is major neurological disorder and up to 50 million of the world population develops epilepsy during any stage of their life [1]. Epilepsy is the second most common neurological disorder in India [2]. *Pachyrrhizus erozus* belonging to family leguminosae contains rotinoids, isoflavonoid, phenylfurano coumarine and dulcitol etc and have antibacterial activity against *H. pylori*, antifungal, antisecretory, spasmolytic, sedative and anti anxiety properties [3].
Synthetic drugs for epilepsy are associated with dose related side effects and chronic toxicity as well as teratogenic effect [4]. Most common antiepileptic drugs like Phenytoin sodium causes gum hypertrophy , hersuitism,cleft palate and osteomalasia, Barbiturates have behavioral abnormalities, diminishes intelligence, impairment of learning and memory whereas Sodium valproate have vomiting, drowsiness, ataxia and alopecia as a side effects [5]. The drugs which are obtained from natural sources are popular in developing countries and up to 80% of the population believes in traditional medicine for their preliminary health care needs [6]. *Pachyrrhizus erozus* was used as folk medicine in treatment of insomnia and producing sedative and hypnotic effect, although it is not reported in literature. So we made a plan to study the antiepileptic effect of this drug.

Materials and Methods

Animals

Swiss albino mice were kept in animal house in standard condition. Mice were housed in groups of six per cage and were provided commercial food palates and tape water *ad libitum.*The protocol of study was approved by Committee for the purpose of control and supervision of experimentation on animals.

Preparation of extract

Pachyrrhizus erozus seeds were obtained from Bengal; they were dried, made coarse powder then extracted by soxhlet method. Extract was dried by rotatory vacuum evaporator and kept in desiccator until further use.

Induction of seizure

Seizure was induced in animal by administration of PTZ (80mg/kg) intraperitonially. Jerky movement, convulsant and percentage mortality were recorded.

Experimental design

In this study four groups were used and each group contains 6 animals.
Group I- (Vehicle + PTZ treated control group) Mice were given vehicle (6 ml/kg, p. o.) 60 min before administration of PTZ (80mg/kg, i. p.)
Group II- (EEPES + PTZ treated test group) Mice were given EEPES (75 mg/kg, p. o.) 60 min before administration of PTZ (80mg/kg, i. p.)
Group III- (EEPES+ PTZ treated test group) Mice were given EEPES (150 mg/kg, p. o.) 60 min before administration of PTZ (80mg/kg, i. p.)
Group IV- (Diazepam+ PTZ treated test group) Mice were given Diazepam (4mg/kg, i.p.) 30 min before administration of PTZ (80mg/kg, i. p.)

Drugs and chemicals
PTZ (Sigma, St, Louis, USA); Diazepam (Cipla, Ahmadabad: India)

Statistical analysis
Data obtained from the research work were statistically analyzed using one-way ANOVA followed by Dunnet's test. A value of $p<0.05$ was considered to be statistically significant.

Results

In control group 5 animal out of 6, in low dose of EEPES group (75mg/kg, p. o.) 4 animals out of 6, in higher dose of EEPES (75mg/kg, p. o.) 3 animals out of 6, and in Standard group (4mg/kg, i. p.) 1 animal out of 6, showed all the symptoms of epilepsy. Higher dose of EEPES increased significantly onset of clonus time and mortality time, while standard drug increased significantly onset of myoclonic jerk, clonus, extensor phase and mortality time. The percentage mortality was less in standard group (16.66) and slightly more (33.66 and 66.66) in groups which were treated with higher and lower doses of the test drug respectively. The low dose of the test drug treated group did not prevent significantly any symptoms of epilepsy compared to control (Table 1).

Table 1. Effects of ethanolic extract of Pachyrrhizus erosus seeds (EEPES) and diazepam in PTZ induced convulsion

Treatment (Dose/kg, p, o, 60 min before PTZ)	n	No of animal showing convulsion	Onset time (Mean ± SEM, sec)				Mortality (%)
			Myoclonic Jerk	Clonus	Extensor	Mortality	
Control (Vehicle-*p.o.*)	6	5	105.16 ± 18.16	139.16 ± 11.43	420.00 ± 103.14	399.33 ± 118.00	83.33
EEPES (75 mg/kg, *p.o.*)	6	4	107.16 ± 24.21	202.33 ± 21.318	299.00 ± 48.69	464.00 ± 103.19	66.66
EEPES (150 mg/kg, *p.o.*)	6	3	148.5 ± 65.29	357.00 ± 47.92*	711.00 ± 121.18	821.33 ± 72.83*	33.66
Diazepam (4 mg/kg,*i.p.*)	6	1	293.00 ± 119.59**	818.33 ± 36.45**	821.00 ± 335.10*	851.00 ± 49.00**	16.66

All values are Mean ± SEM (n = 6); *P>0.05, **P<0.01 when compared with control

Discussion

The present study reflected that EEPES (150mg/kg) showed less number of mortality and increased onset of time significantly in treated group compared to control. Prevention of seizure caused by PTZ in animals is used in screening test for characterizing potential antiepileptic drugs. GABA is the major inhibitory transmitter present in brain where as excitatory neurotransmitter in brain is glutamic acid, there is always remain balance

between excitatory and inhibitory neurotransmitters in brain, if imbalance taken place in between these neurotransmitters that is increase level of excitatory neurotransmitter and decreased level of inhibitory neurotransmitter leads to epilepsy [7]. Epileptic agents like PTZ show its epileptic action by inhibiting the GABA activity and causes to increase the electrical activity in brain [8].

Diazepam and phenobarbitone are antiepileptic drugs, supposed to produce their effect by enhancing GABA mediated inhibition in brain, thus reduced the electrical activity in brain cortex. [1] It is therefore, possible that the antiepileptic effect shown in this study might be due to the activation of GABA. Most of the flavonoids interact with GABA receptors in brain and modulate its function [9] where as isoflavonoids have protective effects against PTZ and Picrotoxin induced seizure [10]. Hence, the extract may antagonize seizure elicited by PTZ in mice by affecting gabaergic mechanism because the extract contains isoflavonoids [3].

Generally, compounds with anticonvulsant activity in the petitmal epilepsy are effective in PTZ induced seizure model [11]. Hence, it can be suggested from this results of present study that EEPES may be effective in treating petitmal epilepsy. However, further work can be under taken to isolate and identify the bioactive constituents responsible for antiepileptic activity.

Acknowledgment

The authors are immensely grateful to Principal Dr. A. K. Das, Krupabidhi College of Pharmacy, Kormangla, Banglore, Karnataka for providing the requisite facilities and financial support.

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