

Anticonvulsant activity of folklore: *Pithecellobium dulce* Benth.

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ABSTRACT

Ethanollic and aqueous leaf extract of *Pithecellobium dulce* were studied for its anticonvulsant activity using maximal electroshock-induced seizure (MES) in rats. Both extracts showed significant anticonvulsant activity by lowering the duration of extension phase at the tested dose level. The aqueous extract showed more than the ethanol extract which was comparable to phenytoin sodium, a standard antiepileptic drug.

Key words: *Pithecellobium dulce*, anticonvulsant activity, electroshock-induced convulsion.

INTRODUCTION

Pithecellobium dulce Benth. (Leguminosae)¹ is a small to medium sized, evergreen, spiny tree up to 18m height, native of tropical America and cultivated throughout the plains of the India in the Andamans. It is known as 'Vilayati Babul' in Hindi and 'Kodukkapuli' in Tamil. The bark of the plant is reported to be used as astringent in dysentery, febrifuge and its is also useful in dermatitis and eye inflammation. The leaves have been reported to posses astringent, emollient, abortifacient and antidiabetic properties. The presence of steroids, saponins, lipids, phospholipids, glycosides, glycolipids and polysaccharides have been reported in the seeds. The bark contain 37% of tannins of catechol type. Quercitin, kaempferol, dulcitol and afezilin have been reported from the leaves. Roots have been reported to possess estrogenic activity. Studies on alkylated resins from seed oil have been reported recently⁹. The present study was focused on the pharmacological validation and justification of its use for the treatment of convulsion in the folk medicine of Mexico².

MATERIAL AND METHODS

Fresh leaves of *Pithecellobium dulce* were collected from Sembulam Village at Kancheerpuram District, T.N. in the month of January 2005. The plant was identified by local people of that village and authenticated by Dr. P. Jayaraman, Directory, Plant Anatomy Research Centre (PARC), Chennai. A herbarium specimen of the plant (APCP-3/2005) was preserved in the Department of Pharmacology of our institute for further reference.

Preparation of leaf extracts

The fresh leaves of *P. dulce* were washed with water, air-dried at room temperature and then reduced of coarse powder. The powdered mass of leaf was defatted with petroleum ether (60-80°) followed by extraction with alcohol (95% v/v) and then water for about 18h by using soxhlet apparatus. The extracts were filtered and the filtrates were concentrated under reduced pressure to obtain the extracts as solids mass. Extractive value (%w/w) of alcohol and aqueous extracts were 17.93 and 18.58 respectively. The phytoconstituents in the extracts were identified to be phenols, tannins and flavonoids

by treating the extracts with various chemical reagents³.

Screening of anticonvulsant activity

Wistar albino rats (Weighing between 150-200 g) procured from the animal house of our institute and used for investigations. Ethical clearance for performing the experiment on animals was obtained from the Institutional Animals Ethics Committee (Reg. No. - 409/2001/CPCSEA). Animals were maintained under standard environmental conditions of temperature ($23^{\circ}\pm 2^{\circ}$), relative humidity ($55\pm 10\%$) and a 12 hr light and dark place. Rats were supplied with standard pellet diet and water ad libitum.

The anticonvulsant activity of *P. dulce* was tested against maximal electroshock induced seizure (MES) in rats⁴. Application of electrical-shock

(150mA for 0.2s) through corneal electrodes in Wistar albino rats produced convulsion and those showing response were divided into four groups of six animals each. The first group animals were administered 1% normal saline (1 ml/100g) orally which served as negative control. Group II animals were treated with phenytoin sodium (25 mg/kg, i.p) which served as positive control⁵. Group III and IV animals were administered with alcoholic and aqueous leaf extract of *P. dulce* respectively at a dose of 250 mg/kg intraperitoneally. Drug pre-treatment was given 30min prior to the electroshock and animals were observed for the duration of tonic flexion, tonic extension, clonus and death/recovery. The results expressed as mean \pm SEM were calculated using⁶ Student's 't' test (paired) and the level of significance was set at $p < 0.001$. The results are given in Table 1.

Table 1: Anticonvulsant activity of *P. dulce* leaf extracts on maximal electroshock induced convulsion in rats

Treatment	Dose mg/kg	Time in seconds of various phases of convulsion				
		Flexion	Extension	Convulsion	Stupor	Recovery/Death
Control	-	3.00 \pm 0.51	8.33 \pm 0.61	5.17 \pm 0.60	102.00 \pm 8.06	Recovery
Phenytoin sodium	25	1.83 \pm 0.30	-	7.17 \pm 0.47	90.17 \pm 5.85	Recovery
Alcoholic extract	250	1.66 \pm 0.33	3.00 \pm 0.36	8.17 \pm 1.66	100.67 \pm 8.70	Recovery
Aqueous extract	250	2.33 \pm 0.33	1.83 \pm 0.30*	7.33 \pm 1.70	97.17 \pm 7.39	Recovery

RESULTS AND DISCUSSION

The maximal electroshock-induced convulsion in animals represents grandmal type of epilepsy. The tonic extensor phase is selectively abolished by the drugs effective in generalized tonic clonic seizure. Both the alcoholic and aqueous extract showed significant anticonvulsant activity (Table 1) by lowering the duration of extension phase when compared to control group. The duration of tonic and hind limb extension in rats with aqueous and alcoholic extract was 1.83 \pm 0.30 and 3.00 \pm 0.36s respectively at a dose 250mg/kg. The activity of

aqueous extract was comparable ($P < 0.001$) to that produced by phenytoin sodium, a standard antiepileptic drug. The most outstanding action of phenytoin showed abolition of tonic extensor phase of MES seizure. Many drugs that increase the brain content of Gama amino butyric acid (GABA) have exhibited anticonvulsant activity against seizures induced by MES⁷. This mechanism may be proposed for this drug also.

Though we have not studied the active principles responsible for the anticonvulsant activity of *P. dulce*, it is likely that flavonoidal compounds,

quercetin and kaempferol present in this plant may be involved in this action as flavonoids have been reported to possess significant anticonvulsant activity in various plants⁸. This study provides pharmacological evidence for the folk claim that this plant is anticonvulsant.

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