

Evaluation of anticonvulsant activity of *Pongamia pinnata* Linn in experimental animals

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ABSTRACT: The present study was undertaken to investigate the anticonvulsant efficacy of the leaf extract of *Pongamia pinnata* using maximal electroshock-induced seizure (MES) in mice. *Pongamia pinnata* is an indigenous plant belonging to the family Fabaceae (Papilionaceae) commonly known as Karanj. Freshly powdered leaves were evenly packed in soxhlet apparatus and extraction was done with 70% ethanol. The electric shock applied (150 mA for 0.2 s) through corneal electrodes to wistar albino mice produced convulsion and those showing response were divided into three groups of six animals each. The group I treated with 1% normal saline (1ml/100gm, orally), Groups II treated with phenytoin sodium (25 mg/kg, i.p.) and Groups III treated with ethanolic extract of PPLE at a dose of (250 mg/kg i.p.). The ethanolic extract showed significant anticonvulsant activity by lowering the duration of extension phase (4.12 ± 0.67) when compared to control group (9.64 ± 0.41). These significant results indicate that the anticonvulsant action of *Pongamia pinnata* leaf extract on mice, probably due to the presence of flavonoids.

Key words: *Pongamia pinnata*, anticonvulsant activity, electroshock-induced seizure

INTRODUCTION

Epilepsy is the chronic disorder of the central nervous system manifested by recurrent unprovoked seizures. Seizures are discrete; time limited alteration in brain function including changes in motor activity, autonomic function, consciousness, or sensation that results from an abnormal and excessive electrical discharge of a group of neurons within the brain. It has been shown to affect several brain activities and promote long-term changes in multiple neural systems. This disorder, if untreated, can lead to impaired intellectual function or death and is typically accompanied by Psychopathological consequences such as loss of self-esteem^{1, 2}. Many herbal remedies have been recommended in various medical treatises for the cure of different diseases. *Pongamia pinnata* (Synonyms: *Derris indica*, Bennett, *Pongamia glabra* Vent, *Pongamia pinnata* Merr.) belonging to the family Fabaceae (Papilionaceae) commonly known as Karanj. It is a small evergreen tree, which is widely distributed in India, Bangladesh, China, and Australia. It has been recognized in different system of traditional medicines for the treatment of different diseases and ailments of human

beings^{3, 4}. It contains several phytoconstituents belonging to category flavonoids and fixed oils. The fruits and sprouts of *Pongamia pinnata* were used in folk remedies for tumors⁵. Seed extract of this plant has hypotensive effects and produce uterine contractions. Powdered seed is used in bronchitis, chronic fever, whooping cough and chronic skin diseases and painful rheumatic joints⁶. Seed oil is used in scabies, leprosy, piles, ulcers, chronic fever, liver pain and lumbago. Leaves are active against *Micrococcus*; their juice is used for cold, cough, diarrhoea, dyspepsia, flatulence, gonorrhoea and leprosy. Roots are used for cleaning gums, teeth and ulcers. Bark is used internally for bleeding piles. Juices from the plant as well as oil are antiseptic. In the traditional systems of medicines, such as Ayurveda and Unani, the *Pongamia pinnata* plant is used for anti-inflammatory, anti-plasmodial, anti-nociceptive, anti-hyperglycaemics, anti-lipidoxidative, anti-diarrhoeal, anti-ulcer,⁷ anti-hyperammonic, CNS depressant activity⁷ and antioxidant. Its oil is a source of biodiesel. It has also alternative source of energy, which is renewable, safe and non-pollutant. There is no information about anticonvulsant activity of *P. pinnata* in experimental

animals. Hence we have selected *P. pinnata* for studying its anticonvulsant effect on mice.

MATERIALS AND METHODS

Plant Materials

The mature green leaves of *Pongamia pinnata* (L.) Pierre was collected from the Coimbatore District, Tamil Nadu, India. The plant was identified and authenticated by the Department of Botany Annamalai University. A voucher specimen No.3670 was deposited in the Herbarium Department of the University.

Preparation of *Pongamia pinnata* leaves extracts (PPLE)

Fresh leaves of *Pongamia pinnata* were collected and shade dried at room temperature. Dried leaves were powdered mechanically through mesh sieve. 100 g of freshly powdered leaves were evenly packed in soxhlet apparatus and the extraction was done with 70% ethanol. Then solvent was evaporated at low temperature under reduced pressure⁸.

In the preliminary phytochemical screening, the ethanolic extract of PPLE gave positive tests for glycosides, sterols, tannins and flavonoids. The residual extract was dissolved in sterile water and used in the investigation⁹.

Experimental Animals

18 adult male mice, weighing between 150-200 gm, were procured from the Departmental Animal House, SASTRA Deemed University, Thanjavur, India. Animals were housed in polycarbonate cages at a room with a 12 h day-night cycle, temperature of $22 \pm 2^\circ\text{C}$ and humidity of 45-64%. During the whole experimental period, animals were fed with a balanced commercial diet and water *ad libitum*. The experimental study was conducted according to CPCSEA norms, after obtaining Animal Ethical Committee approval from the Institutional Animal Ethical Committee, Ref. No. 817/08/ac/ CPCSEA.

Experimental design

The anticonvulsant activity of *Pongamia pinnata* leaf extract was evaluated for maximum electroshock induced seizure (MES) in mice¹⁰. The electrical shock applied (150 mA for 0.2 s) through corneal electrodes to wistar albino mice produced convulsion and those showing response were divided into three groups of six animals each. The first group of animals were administered 1% normal saline (1ml/100gm) orally which served as negative control. II group of animals were treated with phenytoin sodium (were obtained from

Merck, India) (25 mg/kg, i.p.) which served as positive control¹¹. III group of animals were treated with ethanolic extract of PPLE at a dose of (250 mg/kg i.p.). Drug pretreatment was given 30 min prior to the electric shock and animal were observed for the duration of tonic, flexion, tonic extension, clonus and death/recovery.

Statistical analysis

Statistical analysis was done by one-way analysis of variance (ANOVA) followed by Student's t-test. Results are expressed as means \pm SEM from six mice in each group. P values <0.001 were considered significant¹².

RESULTS

Leaf extract showed significant anticonvulsant activity by lowering the duration of extension phase when compared to control group. The duration of tonic and hind limb extension in rates with ethanolic extract was 4.12 ± 0.67 at a dose 250 mg/kg. The activity of ethanolic extract was comparable ($P < 0.001$) to that produced by phenytoin sodium, a standard antiepileptic drug (Table 1).

DISCUSSIONS

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. 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 MES¹³. Phytochemicals such as quercetin, kaempferol and flavonoidal compounds are the active principles probably responsible for anticonvulsant activity of *Pongamia pinnata*¹⁴. Flavonoids have been reported to process significant anticonvulsant activity in various plants¹⁵.

CONCLUSION

Pongamia pinnata may be considered as a valuable plant in both ayurvedic and modern drug development areas of its versatile medicinal uses. This study provides pharmacological evidence for the folk claim that this plant is anticonvulsant. From the experimental study it can be concluded that ethanolic extract of *Pongamia pinnata* had exhibit significant anticonvulsant activity against electroshock-induced seizure (MES) in mice.

TABLE 1: Anticonvulsant activity of *Pongamia pinnata* leaves extracts on Maximal Electroshock induced convulsion in mice

Treatment	Dose mg/kg	Time in seconds of various phase of convulsion				
		Flexion	Extension	Convulsion	Stupor	Recovery/Death
Control	—	4.13±0.34	9.64±0.41	5.35±0.73	105.00±9.54	Recovery
Phenytoin sodium	25	2.13±0.20	—	8.16±0.32	92.00±6.45	Recovery
Ethanol extract	250	2.00±0.23	4.12±0.67*	9.26±1.95	103.00±9.78	Recovery

Data are expressed in mean ± SEM, n = 6 in each groups

*P < 0.001 vs Phenytoin sodium – treated mice by student's t-test.

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