

Evaluation of anti convulsant activity of aerial parts of *Phyllanthus longiflorus* heyne ex hook

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Abstract. – OBJECTIVE, To evaluate anti convulsant effect of aerial parts of *Phyllanthus longiflorus* (PHL).

MATERIALS AND METHOD, Methanol extract of aerial parts of PHL (MPHL) was prepared by continuous hot extraction method using Soxhlet apparatus. MPHL at the doses 100, 200 and 400 mg/kg were administered to male albino mice by oral route and the activity was assessed against maximal electro shock (MES) and pentylene tetrazole (PTZ) induced seizure. Abolition of hind limb extension and onset of clonic convulsion were taken as a measure of MES and PTZ induced convulsion respectively.

RESULTS, MPHL reduced the duration of extensor phase of convulsion in MES test by 62.5% (at 400 mg/kg) and also delayed the onset of clonic phase of convulsion in PTZ test by 50.7% (at 400 mg/kg). The activity was significant ($p < 0.01$) and comparable to the reference drug diazepam (2 mg/kg).

CONCLUSION, Results suggest that aerial parts of *Phyllanthus longiflorus* are useful in the management of convulsion.

Key Words:

Aerial parts, Anti convulsion, *Phyllanthus longiflorus*, Phyllanthaceae.

Introduction

Epilepsy is a chronic neurological disorder characterized by recurrent unprovoked seizures¹. Nearly 30% of epileptic people in the world do not have seizure control with the available epileptic drugs^{2,3}. Traditional system of medicine prescribes plant drugs for various ailments⁴. Herbs are less toxic and free from side effects than synthetic drugs⁵. Therefore, the alternative therapy for the management of epilepsy can be the use of medicinal plants.

Phyllanthus longiflorus (PHL) Heyne ex Hook f, Synonym – *Reidia longiflora* Gamble; *Reidia ovalifolia* wright, commonly known as Nallapulatti in Tamil, is a small bush, distributed in the Western Ghats of southern India⁶. It belongs to the family Phyllanthaceae. Several species of *Phyllanthus longiflorus* have been reported for anti tumor⁷, anti inflammatory⁸, hepatoprotective⁹, diuretic¹⁰, and anti bacterial¹¹ activities. In the present study we have investigated the anti convulsion activity of aerial parts of *Phyllanthus longiflorus* on maximal electro shock (MES) and pentylenetetrazole (PTZ) induced convulsion.

Materials and Methods

Plant Collection and Authentication

The aerial parts of *Phyllanthus longiflorus* was collected in the month of march 2008, from the Western Ghats, Tamilnadu, India. The plant was identified and authenticated by Dr. V. Chelladurai, Govt. Research officer, Botany C.C.R.A.S. Govt. of India, (Retired), Tirunelveli, Tamilnadu, India. A voucher specimen (PHL001) has been deposited in our Laboratory for future reference.

Preparation of Plant Extract

The plant material was dried under shade, powdered using mechanical grinder, sieved through sieve number 22 and the uniformly sized coarse powder was extracted exhaustively with methanol by hot continuous extraction method using Soxhlet apparatus for 20 h¹². The solvent was removed under reduced pressure, dried using rotary evaporator and the green solid mass obtained was preserved in desiccators until further use. The phytoconstituents present in the extract were identified by standard procedure¹³. During experimentation the crude ex-

tract was formulated into suspension using 1% aqueous tween 80 for simple administration.

Animals

Male albino mice 25-30 g of wistar strain were procured from the Central Animal House of our Institute. They were housed in standard polypropylene cages and kept under controlled room temperature ($23 \pm 1^\circ\text{C}$; relative humidity 55-65%) in a 12 h light-dark cycle. The rats were given a standard laboratory diet (Hindustan Lever Ltd, Mumbai, India) and water *ad libitum*. Food was withdrawn 12 h before and during the experimental hours. The protocol for the present study was approved by Institutional Animal Ethics Committee (Approval no. 509/02/C/CPCSEA).

Acute Toxicity Study

Acute toxicity study was carried out by graded doses in albino rats. The extracts were administered in graded doses (100 to 2000 mg/kg body weight by *i.p.*). The animals were observed continuously for the first 2 h for any characteristic changes in the behavior or toxic symptoms and up to 24 h for mortality¹⁴.

Anticonvulsant Activity

The animals were divided into different groups each group consist of six animals. In both models, Group I served as control and received 10% aqueous tween 80 *p.o.* Group II received diazepam (2.0 mg/kg, *i.p.*). Groups III, IV and V received MPHL in the doses 100, 200 and 400 mg/kg *p.o.* respectively. In MES test¹⁵, 30 min after drug administration maximal electroshock seizures are elicited by the application of electric shock (42 mA, 0.2 sec) through corneal electrodes using electroconvulsometer. Various phases of convulsion such as flexion, extensor, clonus and stuper were recorded and abolition of the hind limb tonic extensor spasm was taken as a measure of anticonvulsant activity. While in PTZ test¹⁶, 30 min after drug administration, seizure was induced by subcutaneous injection of PTZ (70 mg/kg) and the mice were observed for onset of myoclonic spasm and clonic convulsions.

Statistical Analysis

Data obtained were analyzed for statistical significance using GraphPad InStat v. 3.0.10.0 (GraphPad Software, Lajolla, CA, USA). $p < 0.01$ were considered significant.

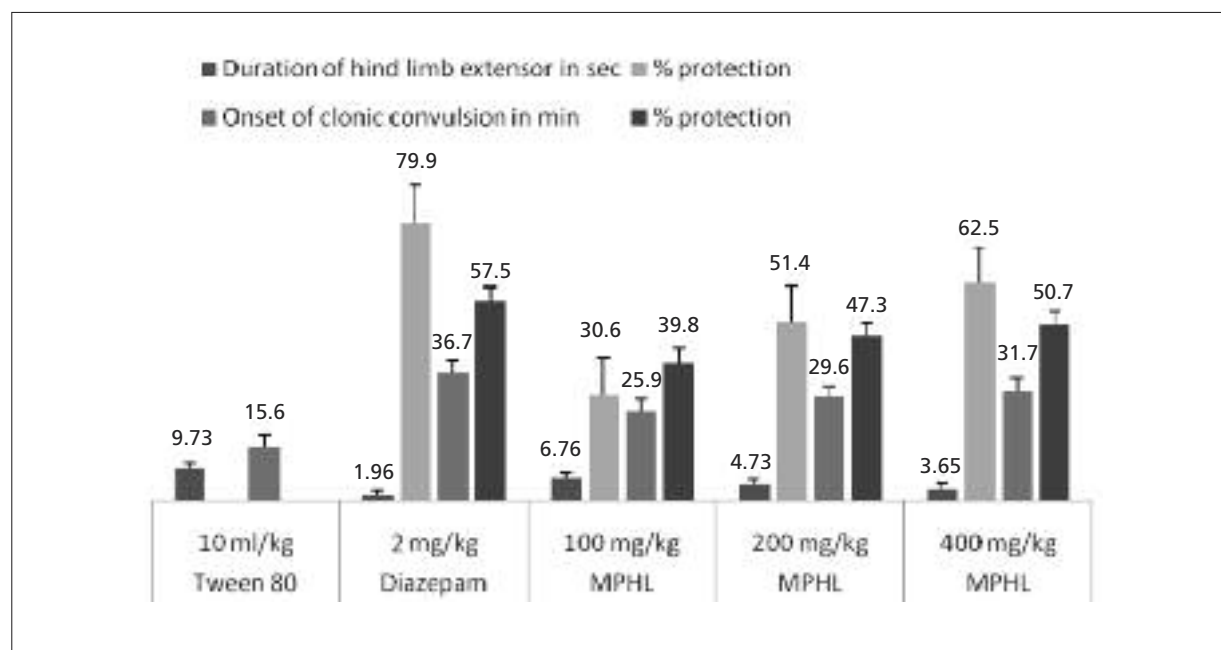


Figure 1. Effect of methanol extract of aerial parts *Phyllanthus longiflorus* on MES and PTZ induced seizures in mice.

Results

The PHL was found to be safe in the doses used and there was no mortality in a dose of 2 g/kg, *i.p.* Convulsion induced by MES and PTZ were identified by tonic-clonic and tonic-extensor seizures. Treatment with methanol extract of *Phyllanthus longiflorus* showed significant ($p < 0.01$) protection on both experimental models in a dose dependent manner. The protection shown by MPHL was 25.9%, 29.6%, and 31.7% (at 100, 200 and 400 mg/kg respectively) against PTZ-induced seizure, while diazepam it was 57.5%. For MES induced seizure MPHL produced 30.6%, 51.4% and 62.5% (at 100, 200 and 400 mg/kg respectively) protection, whereas diazepam exhibited 79.9% protection.

Discussion

Epilepsy is a chronic neurological disorder. The main reason for the convulsion is the imbalance between excitatory and inhibitory neurotransmission in the brain. Gamma amino butyric acid (GABA) is the important inhibitory neurotransmitter in the CNS. Seizures induced by the MES are due to the distressed GABA activity in the brain and the seizure induced by the PTZ is due to the interruption of GABA-ergic neurotransmission in the CNS. Most of the available anti epileptic drugs inhibit seizures by regulating GABA mediated synaptic inhibition¹⁷ and/or by blocking post-synaptic 5-HT receptors and/or by inhibiting serotonergic transmission¹⁸.

Preliminary phytochemical analysis of PHL revealed the presence of alkaloids, steroids, flavonoids and tannins, these phytoconstituents by individual or in combination may be responsible for the anticonvulsive effect exhibited by PHL and which may involve one or both of the above mechanism. Exact mechanism involved and the active constituent responsible for the seizure protective effect of PHL is under study. However, the present investigation suggested that PHL is useful in suppressing generalized tonic-clonic and tonic-extensor seizures.

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