RESEARCH ARTICLE

Evaluation of anticonvulasant activity of plumbago zeylanica Linn leaf extract

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Ayurveda is a traditional Indian medicinal system being practiced for thousands of years. Considerable research on pharmacognosy, phytochemistry, pharmacology and clinical therapeutics has been carried out on ayurvedic medicinal plants. Natural products, including plants, animals and minerals have been the basis of treatment of human diseases. Plumbago zeylanica L. commonly known as white chitrak (family: plumbaginaceae) is a perennial herb that is grown in most parts of India. Leaf extract of this plant were evaluated for anticonvulsant activity using PTZ induced convulsion and maximum electro shocked induced convulsion. It was found that extract has no anticonvulsant activity.

Keywords: *Ayurveda, Plumbago zeylanica, PTZ, Anticonvulsant.*

INTRODUCTION

Herbal products are extensively used globally for the treatment of many diseases where allopathic fails or has severe side effects. Psycho neural drugs are also have very serious side effects like physical dependence, tolerance, deterioration of cognitive function and affect on respiratory, digestive and immune system. So in this contest the treatment through natural source is seen with the hope that they have the lesser side effects than that observed with synthetic drugs.

Plumbago zeylanica L. commonly known as white chitrak (family: plumbaginaceae) is a perennial herb that is grown in most parts of India and is used in the traditional system of Indian medicine against a number of ailments including skin diseases, diarrhea and leprosy [1].

The pharmacological studies carried out by several workers indicate that *Plumbago zeylanica* L. possesses antibacterial, antifungal, anticarcinogenic [2] and radiomodifying properties [3]. It is also reported to have antitumor activity [4]. The roots of this plant has been reported to be a powerful poison when given orally or applied to ostium uteri, causes abortion [5].

MATERIALS AND METHODS

Plant collection and preparation of extract

Fresh leaves of *Plumbago zeylanica* L. were collected from Rajasthan Agriculture College Campus, Udaipur, Rajasthan, in the month of March. The plant was authenticated by Dr. S S Katewa, Department of Botany, College of Science, MLSU, Udaipur. Leaves were dried in shade, moderately grinded and macerated with hydroalcoholic solvent (70:30) for 7 days with intermittent shaking. On 8th day the macerate was filtered through muslin cloth and solvent was evaporated at room temperature [6]. The residue obtained, was lyophilized (lyophilizer-step origin electric, Lonavala) and freeze-dried (freeze dryer, Allied Frost) to provide dry hydroalcoholic extract of *Plumbago zeylanica* L. leaves (HEPZL) with the practical yield of 17% w/w.

Animals

Mature albino wistar rats of either sex weighing between 150-200 g were used in the study. Institution animal ethic committee approved all the experimental procedures (approval no. 03/ACR/BNCP-06/IAEC). All the animals were maintained under standard husbandry conditions with food (Chakan mill, Sangali, Maharashtra) and water ad libitum.

Acute oral toxicity

It was determined using OECD/OCDE guideline [7] 425, main test was performed and LD_{50} was found to be 5000 mg/kg. The dose selected was $1/10^{th}$ and $1/20^{th}$ of LD_{50}.

Pentylene tetrazole (PTZ) induced convulsion

The anticonvulsant activity of a compound is generally assessed by its ability to prevent the convulsions, to delay the onset of seizures or death and also shorten the duration of convulsions, spread of seizure discharge through neural tissue within the brain and central nervous system or elevating the seizure threshold [8].

PTZ is a central nervous system stimulant. It produces jerky type of clonic convulsions in rats and mice. The convulsive effect of this drug is considered to be analogue to petitmal type of convulsion in man. Activity in this model represents action on seizure focus itself.

Twenty four albino wistar rats of either sex, weighing between 150-200 g were divided into four groups, containing six in each.

- Group I received 1% CMC served as control.
- Group II received diazepam 4 mg/kg body weight intraperitoneally.
- Group III received HEPZL 250 mg/kg body weight.
- Group IV received HEPZL 500 mg/kg body weight.

Seizures were induced in rats with PTZ at 80 mg/kg i.p. which is the convulsive dose in 97% of the animals. PTZ was dissolved in 0.9% saline and injected i.p. in rats. All the extracts and standard drug are administered 60 min before the administration of PTZ and the rats were observed for onset of clonic convulsions [9].

Maximum electroshock induced convulsion

Shock is applied to the head produces tonic flexion-tonic extension-clonic convulsions. This is used primarily as an indication for compounds which are effective in grandmal epilepsy [10].

Twenty four albino wistar rats of either sex, weighing between, 150-200 g were divided into four groups, containing six in each.

- Group I received 1% CMC served as control.
- Group II received phenytoin 25 mg/kg body weight intraperitoneally.
- Group III received HEPZL 250 mg/kg body weight.
- Group IV received HEPZL 500 mg/kg body weight.

All the drugs are administered according to groups. After 60 min rats were subjected to MES at 150 mA, 60 Hz for 0.2 sec. through pinnal electrodes. MES results in hind limb tonic extension and duration was measured in seconds. The severity of convulsions was assessed by measuring the duration of tonic flexion, tonic extensor, clonus and stupor phase for each animal (in sec.) using stop watch [11].

RESULTS

Pentylene tetrazole induced convulsion

After PTZ administration, animals treated with vehicle, showed clonic convulsions after 144.66±5.031 seconds. Both the doses of extract did not protect the animals from seizures and the entire animals showed convulsion. The extract also did not delay the onset of convulsions. Diazepam inhibited seizures completely (Table 1).

Maximum electroshock induced convulsion

The rats treated with vehicle showed, duration of tonic hind limb extension for 14.33±0.494 seconds. The extract (HEPZL) did not protect the animals from seizures and duration of each phase (flexion, hind limb extension, clonus and stupor) was not reduced. HEPZL exhibited hind limb extension for 15.83±1.13 and 17.33±1.49 seconds, while in case of control group it was found for 14.33± 0.49 seconds. It clearly indicates that extract did not show any anticonvulsant activity (Table 2).

DISCUSSION

Epilepsy is characterized by recurrent episodes of seizures. A seizure is due to abnormal discharge of some neurons in the brain. Antiepileptic drugs may have a stabilizing influence on neuronal membrane; prevent detonation of normal brain cells by the focal discharge, these drugs act only on those neurons which are firing repeatedly. Some drugs reduce low threshold Ca^{++} current and abolish absence seizures whereas some drugs increase GABA activity in the

Table 1. It shows effect of HEPZL on pentylene tetrazole induced convulsion

Groups	Treatment	Dose (mg/kg)	Onset of clonic convulsion (sec.)	% incidence of convulsion
I	Control	-	144.66±5.03	100
II	Diazepam	4, i.p.	Absent	0
III	HEPZL	250, p.o.	149.00±6.70	100
IV	HEPZL	500, p.o.	153.50±5.05	100

Data are analysed using one way ANOVA followed by dunnet's test. Values are Mean ± SEM, N=6
$^{**}p<0.01$, compared with control group

Table 2. It shows effect of HEPZL on maximum electro shock induced convulsion

Groups	Treatment	Dose (mg/kg)	Time (sec.) In various phases of convulsion			
			Flexion	Extension	Clonus	Stupor
I	Control	-	2.86±0.37	14.33±0.49	10.16±0.79	134.16±7.10
II	Phenytoin	25, i.p.	0.00^{***}	0.00^{***}	9.50±0.88	$111.00±5.43^{**}$
III	HEPZL	250, p.o.	2.68±0.44	15.83±1.13	12.83±1.35	132.33±5.70
IV	HEPZL	500, p.o.	2.95±0.45	17.33±1.49	13.00±1.17	140.16±5.56

Data are analysed using one way ANOVA followed by dunnet's test. Values are Mean ± SEM, N=6
$^{***}P<0.001$, $^{**}p<0.01$, compared with control group

synapse causing neuronal inhibition hence antiseizure effect. Glutamic acid causes increased synaptic transmission. A variety of glutamic acid receptors is NMDA receptors and reduction of NMDA receptor activity reduces seizure development [12].

The ability of compound to prevent maximal electroshock seizures is believed to correlate with its ability to prevent spread of seizure discharge through neural tissue. Whereas the ability of compound to prevent threshold seizures (induced by pentylene tetrazole), has been correlated with the ability to raise the threshold for excitation of neural tissue [13]. Inhibition of the MES test predicts activity against generalized tonic-clonic and cortical focal seizures, lack of activity against MES induced seizures suggests that the drugs are ineffective in suppressing generalized tonic-clonic seizures.

In present investigation the extract was ineffective to protect the animals from seizures, both in PTZ test and MES test. Finally it is concluded that the hydroalcoholic extract of leaves of *Plumbago zeylanica* L. has no anticonvulsant activity.

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