

Anticonvulsant Activity of Chloroform Extract of Bark & Root of *Erythrina variegata* L.

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ABSTRACT

To determine the anticonvulsant activity of the root and bark extract of *Erythrina variegata* L in mice and rats, and in order to verify the traditional use of the plant in the treatment of epilepsy. The pentylenetetrazole (PTZ) and the maximal electroshock seizure (MES) models were used for assessing the anticonvulsant effects of the chloroform bark & root extract in mice and rats. The chloroform extract (500 mg/kg p.o) of that produced significant protection (71.4%) against PTZ-induced convulsion and onset of seizures compared with the control group in mice. At 500 mg/kg p.o., the extract also produced significant protection (71.4%) against MES-induced convulsions in rat. The results obtained from this study indicate that the chloroform root and bark extract of *Erythrina variegata* L may be beneficial in both absence and tonic clonic seizures.

Key Words: *Erythrina variegata* L, Mice, Rats, Anticonvulsant, Pentylenetetrazole, MES test.

INTRODUCTION

Epilepsy is a major neurological disorder and up to 5% of the world population develops epilepsy in their lifetime¹. The current therapy of epilepsy with modern antiepileptic drugs is associated with side effects, dose-related and chronic toxicity, as well as teratogenic effects, and approximately 30% of the patients continue to have seizures with current antiepileptic drugs therapy²⁻⁴. Traditional systems of medicine are popular in developing countries and up to 80% of the population relies on traditional medicines or folk remedies for their primary health care need⁵. Medicinal plants are believed to be an important source of new chemical substances with potential therapeutic effects⁶.

The plant *Erythrina variegata* L. is a middle sized tree widely distributed throughout India. Traditionally its leaves are used as laxative, diuretic, emmenagogue, galactagogue and also used in the treatment of anti-helminthic and joints pain⁷⁻⁹. In siddha system, it is being considered useful for anticonvulsant activity⁸. Since, no scientific proof about anticonvulsant activity in leaf extract of *Erythrina variegata* L, an attempt has been made to explore such activity for *Erythrina variegata* L. In the present work, vacuum dried chloroform extracts were evaluated for anticonvulsant activity.

MATERIALS AND METHODS

Plant material: Bark and root of *Erythrina variegata* L. (fam:Fabaceae) was collected from Belhe, (Pune) during September. It was authenticated by Mrs. Savita Rahangdale, assist. Professor in botany, B. J. College Ale, pune.

Preparation of the extract: Dried and powdered Root & Bark of *Erythrina variegata* L were extracted by

using chloroform in soxhlet apparatus. The total extract obtained was dried at 60 °C on steam bath followed by a vacuum oven (50 °C) to obtain dried extracts. The extractive value was calculated as % w/w yield and was found to be 5.92%.

Animal used: Healthy adult albino rats of Wistar strain weighing 180-250g and Albino mice (20-25 g) were used for this study. Animals were housed at temperature of 24±2 °C and relative humidity of 30-70%. A 12:12 light: day cycle was followed. All the animals were allowed to free access to water and fed with standard commercial pelleted rat chaw. All the experimental procedures and protocols used in this study were reviewed by the Institutional Animal Ethics committee (1409 / a / 11/ CPCSEA) of VIPER. Drugs: The drugs used were supplied, i.e Phenytoin from the stock of Genpharma Int'l Pvt ltd. Pune and PTZ from Antya mfg companies, Pune.

Phytochemical Evaluation⁵: The chloroform extract obtained above was subjected to qualitative analytical test for the detection of various chemical constituents viz Steroides, carbohydrates, glycosides, tannins, proteins, saponin and flavonoids.

PHARMACOLOGICAL EVALUATION

1.MES induced convulsion in rat- Twenty-one male rat were allotted into three groups of seven animals each and treated.

Group I (control): distilled water (0.5 ml p.o.).

Group II: Phenytoin (30 mg/kg i.p.).

Groups III: Chloroform extract (500 mg/kg p.o.) was administered.

After a pre-treatment time of 60 minutes, a CFP stimulator (model 8048) was used to deliver a stimulus of 50 Hertz at 20 volts via ear electrodes to the different groups. The animals were observed

Table 1: Effect of chloroform extract of *erythrina variegata L.* on MES-induced seizures in rats

Treatment	Onset of convulsion (seconds)	Number of convulsed/ number used	Mortality (%)	Protection (%)
Distilled water	10.21±0.67	7/7	100	00
Phenytoin(30mg/k)	-	0/7	-	100
<i>Erythrina variegata L.</i> (500 mg/kg)	29.45±1.00*	2/7	28.6	71.4*

Tabel 2: Effect of chloroform extract of *erythrina variegata L.* on PTZ-induced seizures in mice

Treatment	Onset of convulsion (seconds)	Number of convulsed/ number used	Mortality (%)	Protection (%)
Distilled water	47.0±0.73	7/7	100	0
Phenytoin(30 mg/kg)	-	0/7	0	100
<i>Erythrina variegata L.</i> (500 mg/kg)	112.5±0.80*	2/7	28.6	71.4*

for 2 minutes. The onset of tonic hind limb extension and number of animals protected was recorded¹⁰.

2. PTZ- induced convulsion in mice: A total of twenty-one mice were divided into three groups of seven animals each. They were treated as follow:

Group I (control): distilled water (0.5 ml p.o.).

Group II: Phenytoin (30 mg/kg i.p.).

Groups III: Chloroform extract (500 mg/kg p.o.) was administered.

After a pre-treatment time of 60 minutes, PTZ (85 mg/kg i.p.) was administered to the six groups of animals. The onset of convulsion, number of animals that convulsed and number of animal that were protected were recorded¹¹.

STATISTICAL ANALYSIS

The data are expressed as mean ± S.E.M. The data were statistically analyzed using One-Way Analysis of Variance (ANOVA), followed by Duncan's multiple range post test and Chi square test. Values of $p < 0.05$ were considered significant.

RESULT

Phytochemical evaluation of *Erythrina variegata L.* Bark and root showed the presence of carbohydrate, glycoside, proteins, volatile oils and tannins.

1. The anticonvulsant effect of *erythrina variegata l.* was studied using mes induced convulsion in rat-The extract (500 mg/kg p.o.) significantly ($p < 0.05$) increased the threshold of MES-induced convulsions in rat compared with the control group. At 500 mg/kg p.o., the extract produced (71.4%) protection in rat.

Results are expressed as mean ± S.E.M. and as % mortality and protection (n=7). * $p < 0.05$ compared with control; One-way ANOVA followed by Duncan post test and Chi square test.

2.The anticonvulsant effect of *erythrina variegata l.* was studied using ptz-induced convulsion in mice - The extract (500 mg/kg p.o.) significantly ($p < 0.05$) increased the threshold of PTZ-induced convulsion in mice compared with the control group. At 500 mg/kg p.o., the extract produced significant protection (71.4%) against PTZ-induced convulsion in mice. Results are expressed as mean ± S.E.M. and as % mortality and protection (n=7). * $p < 0.05$ compared with control; One-way ANOVA followed by Duncan post test and Chi square test.

DISCUSSION

The chloroform extract of *Erythrina variegata L* increased the threshold of PTZ-induced convulsion in rats and offered protection against PTZ-induced convulsion. The protection offered against PTZ-induced convulsion in mice (71.4%) was significant compared to that produced in rats (42.9%). Clonic seizures induced by PTZ are blocked by drugs that reduce T-type calcium currents (Ethosuximide) and drugs that enhance inhibitory Neuro-transmission by GABA receptors (benzodiazepine, Phenobarbital and Valproate)¹².

Convulsants whose actions previously were unexplained (including penicillin and PTZ) may act as relatively selective antagonist of the action of GABA¹³⁻¹⁴. The fact that the extract protected animal against PTZ-induced seizures may suggest that the plant extract contains compound(s) that facilitate GABAnergic transmission. The extract also increased the threshold of seizures and offered protection in the MES test. It has been found empirically that drugs which inhibit PTZ-induced convulsions and raise the threshold for production of electrically-induced seizures are generally effective against absence seizures, whereas those that reduce the

duration and spread of electrically-induced convulsions are effective in tonic-clonic seizures¹⁵. The results of this study shows that the chloroform extracts of *Erythrina variegata L.* possess anticonvulsant properties which are possibly mediated partly via facilitation of GABA transmission. These results suggest that the leaves of *Erythrina variegata L.* will be beneficial in the management of absence and tonic-clonic seizures. The present study is a preliminary attempt in evaluating the anti-convulsants activity of *Erythrina variegata L.* bark and root extract. Further pharmacological investigations are warranted in this direction for establishing its detailed mechanism of action and for substantiating its traditional and folk claims.

ACKNOWLEDGEMENTS

I wish to acknowledge the Mrs S. Rahangdale B. J. College, Ale for plant authentication & management of VJSM'S Vishal Institute of Pharmaceutical Education & Research Ale, Junnar, Pune for providing facilities.

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