

ANTICONVULSANT ACTIVITY OF *SAUSSUREA LAPPA*

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Summary

The ethanolic extracts of the root of *Saussurea lappa*, was prepared and evaluated for their anticonvulsant activity. Both the maximal electro-shock induced convulsions and pentylenetetrazol-induced clonic convulsions methods were used for the evaluation of anticonvulsant activity in swiss albino mice. The ethanolic extract of the root exhibited significant anticonvulsant activity in both the test.

Keywords: *Saussurea lappa*, Anticonvulsant.

Introduction

Saussurea lappa C B Clarke, Syn. *S. coustus* (Falc), lipsch (Asteraceae) is a Himalayan species and occurs in the region from 2700- 4000m in Kashmir, Lahul Valley in Himachal Pradesh and Garhwal in Uttaranchal.^[1, 2, 3] The roots possess carminative, analgesic, anthelmintic and emmenagogic properties stimulate the brain and cure blood diseases and liver and kidney disorders.^[4, 5] They are prescribed in advance stages of typhus fever, rheumatism, nervous disorders, irregular menstruation, and heart diseases, to improve complexion, as hair wash to kill lice and to turn grey hair to black.^[6, 7, 8] Several studies on the roots of the plant have been reported for their anti-inflammatory, inhibit nitric oxide production, lipopolysaccharide (LPS) activated mouse peritoneal macrophage, antiangiogenic effect, tumour necrosis factor, antiviral activity, free radical scavenging and antifatigue and antiulcer. The phytochemical studies revealed the presence of resins, alkaloids, steroids and flavonoids. In our present study we prepared extract from the roots for the evaluation of anticonvulsant activity.^[9-22]

Materials and Methods

The powdered roots material was extracted exhaustively in a soxhlet apparatus with ethanol (95%). The combined extracts are dried under reduced pressure to secure a viscous brownish colored residue. The extract was evaluated for their anticonvulsant activity in test.

Evaluation of Anticonvulsant Activity

a) Maximal electro-shock induced convulsions (Thompson et al., 1962):

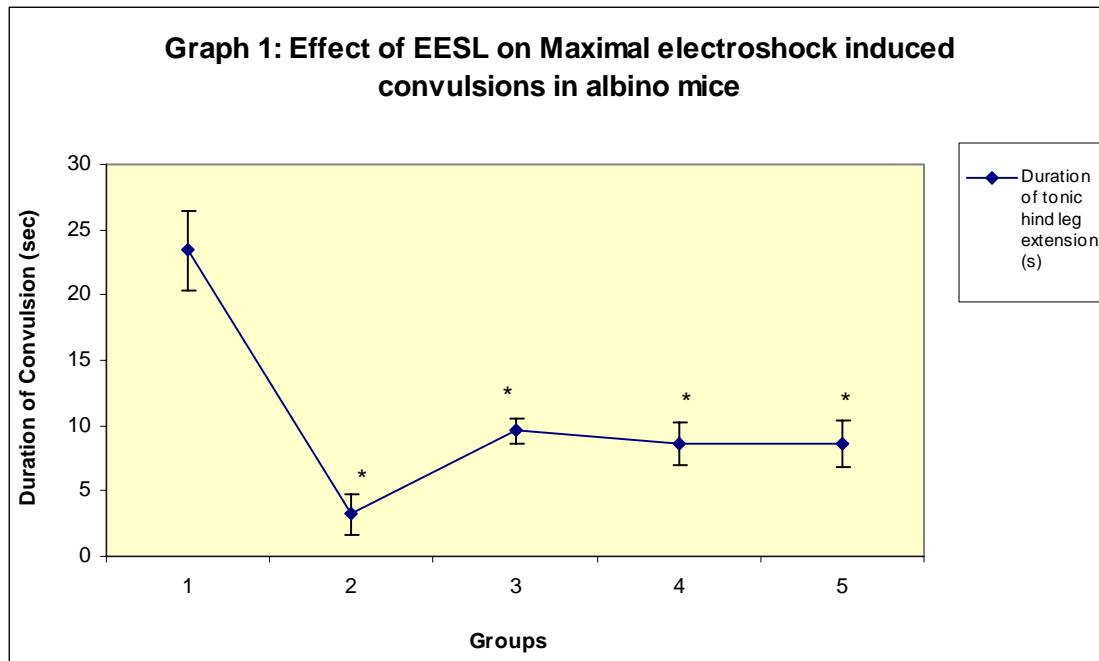
Corneal electrodes was placed on the cornea of the mice and 30mA current was applied for 0.2 sec. Note the different stages of convulsions i.e., a) tonic flexion, b) tonic extensor phase, c) clonic convulsions, d) stupor, and e) recovery or death. Note the time (sec) spent by the mice in each phase of the convulsions. Saline was administered to group1 and diazepam (1mg/kg, i.p.) to group 2 and the reduction or abolition of

convulsion by *S. lappa* (50, 100 and 200 mg/kg, p.o.) was assessed for the anticonvulsant activity and administered to group 3, 4 and 5 respectively. [23, 25, 26] Refer table 1 & graph 1.

Table no. 1: Effect of EESL on MES induced convulsions in albino mice.

Treatment (mg/kg)	Duration of tonic hind limb extension (mean ± SEM)	Incidence of convulsion	Percentage of protection
Vehicle	23.4 ± 3.1	5/5	0
Diazepam (2)	3.2 ± 1.53*	0/5	100
EESL (50)	9.6 ± 0.92*	2/5	60
EESL (100)	8.6 ± 1.59*	1/5	80
EESL (200)	8.6 ± 1.77*	2/5	60

Values are mean ± SEM
 n=5, * P< 0.001; (Significance of difference with respect to the control group was evaluated by the Student's t test followed by ANOVA and Dunnet's test.)



n=5, * P< 0.001, indicates the significance.
 (Significance of difference with respect to the control group was evaluated by the Student's t test followed by ANOVA and Dunnet's test.)

- Groups: -
 Group 1: Vehicle
 Group 2: Diazepam (2 mg/kg), i.p.
 Group 3: EESL (50 mg/kg), p.o.
 Group 4: EESL (100 mg/kg), p.o.
 Group 5: EESL (200 mg/kg).p.o.

b) Pentylenetetrazol-induced clonic convulsions (Turner et al., 1965):

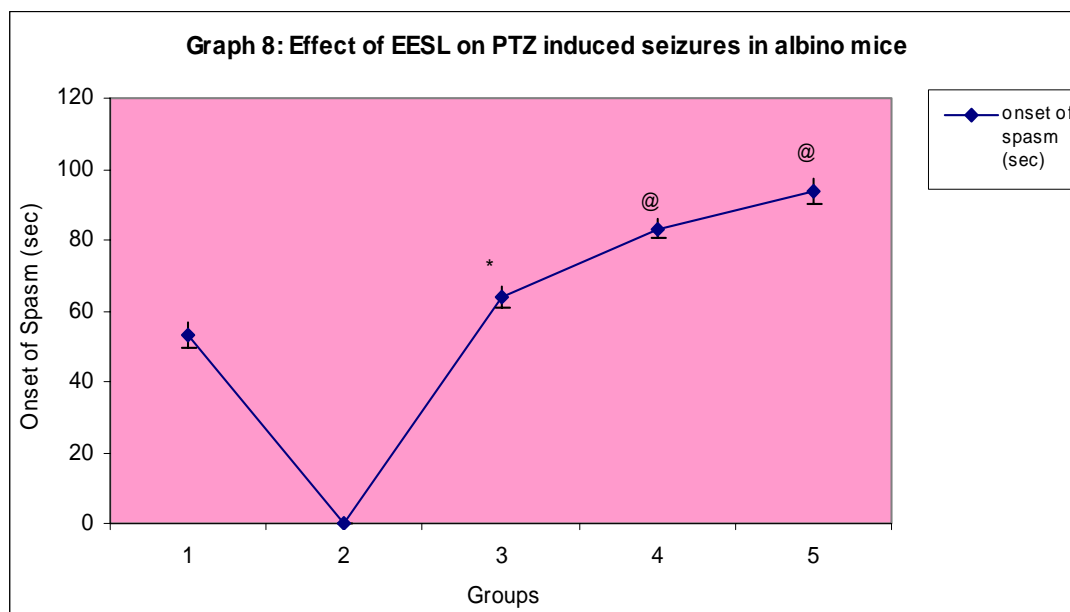
Pentylenetetrazole (PTZ) is a central nervous system stimulant and produces jerky type of clonic convulsions in rats and mice. Pentylenetetrazole (PTZ), 80 mg/kg, was injected through i.p., to all the groups 30 min after the p.o. administration of EESL at doses 50, 100, 200 mg/kg, and the animals were observed for the onset of clonic convulsions and incidence of convulsions. Diazepam (2 mg/kg, i.p.) was used as a reference standard. Each group consisted of five mice of either sex. ^[24, 25, 26] (Table 2 & graph 8).

Table no. 2: Effect of EESL on Pentylenetetrazol (PTZ) induced clonic seizures in albino mice.

Treatment (mg/kg)	Onset of spasm (sec \pm SEM)	Incidence of convulsion	Percentage mortality
Vehicle	53.30 \pm 3.48	5/5	100
Diazepam (2)	---	0/5	0
EESL (50)	63.78 \pm 3.15 [#]	3/5	60
EESL (100)	83.21 \pm 2.67 [*]	2/5	40
EESL (200)	93.55 \pm 3.57 [*]	2/5	40

Values are mean \pm SEM

n=5, * P< 0.001, # P< 0.05; (Significance of difference with respect to the control group was evaluated by the Student's t test followed by ANOVA and Dunnet's test.)



n=5, * P< 0.05, @ P< 0.001 indicates the significance.

(Significance of difference with respect to the control group was evaluated by the Student's t test followed by ANOVA and Dunnet's test.)

Groups: -

Group 1: Vehicle

Group 2: Diazepam (2 mg/kg).

Group 3: EESL (50 mg/kg),

Group 4: EESL (100 mg/kg),

Group 5: EESL (200 mg/kg).

Results

Maximal Electro Shock (MES) Test

All animals treated with vehicle exhibited tonic hind limb extension with the electroshock of 30 mA for 0.2sec and the duration of hind limb extension was 23.4 ± 3.1 sec. The ethanolic extract of S.L (50, 100 and 200 mg/kg, orally) reduced the incidence of convulsion from 100 to 20 % and duration of hind limb extension was reduced to 9.6 ± 0.92 sec, 8.6 ± 1.59 sec and 8.6 ± 1.77 sec ($P < 0.001$) respectively, whereas Diazepam (2 mg/kg) abolished the duration of hind limb extension to 3.2 ± 1.53 sec ($P < 0.001$). The observations are given in table no. 1 and graph 1.

Pentylentetrazol Induced Clonic Seizures

The ethanolic extract of S.L (50, 100 & 200 mg/kg, orally) produced a dose related protective effect on the seizures induced by PTZ. The onset of seizures was significantly delayed by doses 50 mg/kg to 63.78 ± 3.15 sec ($P < 0.05$) whereas 100 and 200 mg/kg of SL to 83.21 ± 2.67 sec and 93.55 ± 3.57 sec ($P < 0.001$) respectively, while Diazepam (2 mg/kg) ($P < 0.001$) abolished the onset of spasm and percentage mortality was also reduced. The observations are given in table no. 2 and graph 8.

Discussion

The result emanated in the present study indicated that EESL possessed significant anticonvulsant activity. The EESL showed marked decrease in the duration of tonic hind limb extension significantly in a dose dependent manner. In the pentylenetetrazole (PTZ) induced clonic seizure paradigm the EESL also significantly decreases the onset of spasm i.e. convulsions in a dose dependent manner. This may also suggest that the anticonvulsant action of the EESL is mediated by the chloride channel of the GABA/benzodiazepine receptor complex. [27-33]

Conclusion

The ethanolic extract of *S. lappa* exhibited anticonvulsant activity against seizures induced by both maximal electroshock (MES) and pentylenetetrazol (PTZ). *S. lappa* significantly delayed or abolished clonic seizures induced by PTZ. *S. lappa* significantly decreased the tonic extensor phase of convulsion at 50, 100 and 200 mg/kg.

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