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Research Article

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Evaluation of Anti Convulsant Effect of *Cassia Angustifolia* Seed Extract in Mice

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ABSTRACT

The aim of this study was to investigate anticonvulsant effect of *Cassia angustifolia* on Maximal electroshock-induced seizures (MES) and Pentylentetrazole (PTZ) induced seizures. The ethanolic seed extract of *Cassia angustifolia* (100,200,400 mg/kg. p.o.) were studied for their anticonvulsant effect on MES and PTZ induced seizures in rats. The onset and duration of Hind Limb Tonic Extension were noted. The ethanolic seed extract of *Cassia angustifolia* significantly abolished the hind limb tonic extension in MES and PTZ method. The 400mg/kg dose more significantly ($p < 0.001$) protected the animals from induced tonic convulsions. The data suggests that the ethanolic seed extracts of *Cassia angustifolia* may produce its anticonvulsant effects via non-specific mechanisms since it abolished the hind limb tonic extension induced by MES as well as PTZ method.

Keywords: *Cassia angustifolia*, Pentylene tetra triazole, Maximal electroshock, Ethanolic extract, anti-epileptic.

ARTICLE INFO

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1. Introduction

Epilepsy is a group of chronic seizure disorder characterized by common, sudden and transient episodes

(seizure) of loss or disturbance of consciousness¹, usually but not always with characteristic body movements

(convulsions) & sometimes with autonomic hyperactivity². This chronic disorder involves alterations in the voltage dependent ion channels, reduction in inhibitory, i.e. GABA-mediated drive or increase in excitatory, i.e. glutamate mediated inputs³. More over the conventional drug therapy is associated with a lot of side effects, chronic toxic effects and teratogenicity⁴. Therefore, there is a great need for the development of cheap, effective and safe anticonvulsant agents from plants and other sources. *Cassia angustifolia* (Fabaceae) is an indigenous herb, mentioned in the traditional system of medicine as a remedy for many diseases⁵. It is used as a febrifuge, in splenic enlargements, anaemia, typhoid, cholera, biliousness, jaundice, gout, rheumatism, tumours, foul breath and bronchitis and probably in leprosy⁶. It has anti inflammatory properties⁷, detoxification ability⁸ and also helps improve the function of the digestive system⁹. In the present study the anticonvulsant effect of seed extract of *Cassia angustifolia* was studied.

2. Materials and Methods

Experimental Animals and Housing of Animals:-

Albino Wister rats of both sex (150-250g) were procured from National Institute of Nutrition (Hyderabad). They are maintained under standard conditions (temperature 25 °C) at least 2 weeks prior to the study, so that animals could acclimatize to the new environment. The animals were housed in sanitized polypropylene cages (32x24x16) with stainless steel grill top, bedded with rice husk containing sterile conditions. They had free access to standard pellet diet and water was provided *ad libitum*.

Plant material

The seed of *Cassia angustifolia* were collected from local area of Ranga reddy, Hyderabad, India and botanically authenticated by the botanists (department of Botany, Osmania University). The seed of *Cassia angustifolia* were shade dried for 15 days and Powdered.

Extraction

The dried seed powder of *Cassia angustifolia* was extracted using ethanol as a solvent in Maceration method. The extract was finally air dried then stored in an air tight container till used. A known volume of the ethanolic residual extract was suspended in distilled water and was orally administered to the animals by gastric intubation using a force-feeding needle during the experimental period.

Preliminary phytochemical studies

A portion residue from extract was subjected for phytochemical analysis in order to see the presence of glycosides, polyphenols, saponines, flavonoids, tanins and steroids.

Anticonvulsant method

Maximal Electroshock seizure (MES) model:

Maximal electroshock seizure model was used to evaluate the anticonvulsant activity of ethanolic extracts orally. Seizures were induced in mice by delivering electroshock of 50 mA for 0.2 sec by means of an electro convulsimeter through a pair of ear clip electrodes. The test animals (n=6) received 100,200,400 mg/kg of ethanolic seed extract of *Cassia angustifolia* orally and standard group received

phenytoin (25 mg/kg b.w.) injected i.p. and tested after 30 min for MES induced seizure response. All the experimental groups were compared with the control treated with vehicle.

Pentylenetetrazole induced seizures (PTZ) model:

PTZ at the dose of 60 mg/kg b.w. (Minimal dose needed to induce convulsions) was injected i.p. to induce clonic-tonic convulsions in mice. The test animals (n=6) received 100,200,400 mg/kg of ethanolic seed extract of *Cassia angustifolia* orally and standard group received phenytoin (25 mg/kg b.w.) injected i.p. PTZ was injected i.p. 60 min after the administration of drugs. Occurrence of hind limb tonic extension (HLTE) and duration of seizures were noted. If no HLTE occurred during the time limit, the animals were considered protected.¹¹

Statistical analysis:

The data were analysed using One-way analysis of variance (ANOVA) followed by Dunnett's test. P values <0.05 were considered significant.

3. Results and Discussion

Details of various phytochemical constituents present in seed extract of *Cassia angustifolia* in which the ethanolic extract was found to small quantities of alkaloids, flavonoids, saponins and large amounts of cardiac glycosides, triterpenoids, phenolic compounds and tannins. The anticonvulsant activity of ethanolic extracts at various dose levels 100, 200, 400 mg/kg. p. o. were studied by the maximum electro-shock-induced and PTZ seizure models. The anticonvulsant activity induced by MES model of the ethanolic extracts of *Cassia angustifolia* is shown in Table 1, in which the ethanolic extract at dose level of 500 mg/kg elicits significant activity, though lesser comparable to that of phenytoin (standard). Whereas the ethanolic extract (200 & 400mg/kg) also show potent activity. In PTZ induced seizures, the administration of *Cassia angustifolia* ethanolic seed extract at doses of 200 and 400 mg/kg b.w. 1 hr prior to the injection of PTZ, significantly (p<0.01) delayed the on-set of convulsions as shown in Table 2.

Discussion

Neurological and behavioral disorders are common to all countries and cause of staggering economic and social costs. Habituation, dependence and the resulting potential for addiction are the greater disadvantages of the modern synthetic psycho-pharmacological agents. Therefore, modern researcher now cautiously discovering traditional herbal medicines, particularly those which have been proved to be effective in controlled studies and which in some cases demonstrated even better galenic properties than the conventional medicines. Pharmacological evaluation of the anticonvulsant properties of the ethanolic seed extract of *Cassia angustifolia* against PTZ induced seizure revealed that the ethanolic extracts exhibited statistically significant and dose dependent delay in the onset of seizure and also reduction in the duration of HLTE. On the other hand, extracts showed significant and dose dependent reduction of the HLTE induced by MES. MES and PTZ may be exerting their convulsant effects by inhibiting the activity of gamma amino butyric acid

(GABA) at GABA-A receptors.¹² Gamma amino butyric acid is the major inhibitory neuro-transmitter which is implicated in epilepsy. The enhancement and inhibition of the neurotransmission of GABA will attenuate and enhance convulsion, respectively.¹³ Pentylenetetrazole is an antagonist of GABA at GABA receptor which has been widely implicated in epilepsy.¹⁴ Further-more; drugs which protect animals against the generalized clonic seizure induced by PTZ are effective in protection and management of petit mal epilepsy.¹⁵ MES induced seizure can be prevented either by drugs that inhibit volt-age gated sodium channel such as phenytoin or by drugs that inhibit glutaminergic excitation mediated by NMDA receptors such as felbamate. This implies that *Cassia angustifolia* may be effective as an anticonvulsant medicinal plant and its anticonvulsant effect may involve Gabergic inhibitory and glutaminergic excitatory mechanisms or inhibition of the voltage gated sodium channel. However, triterpenic steroids and triterpenoidal saponins are reported to possess anticonvulsant activity in some experimental seizure models such as MES and PTZ¹⁹. Some alkaloids, monoterpenes, flavonoids also have protective effects against PTZ, picrotoxin and NMDLA-induced convulsions²⁰. Phytochemical screening of the plant showed that the plant contains alkaloids, flavonoids, sterols, glycosides, triterpenoid and saponins, to which the anticonvulsant activity of the plant extracts may be attributed.

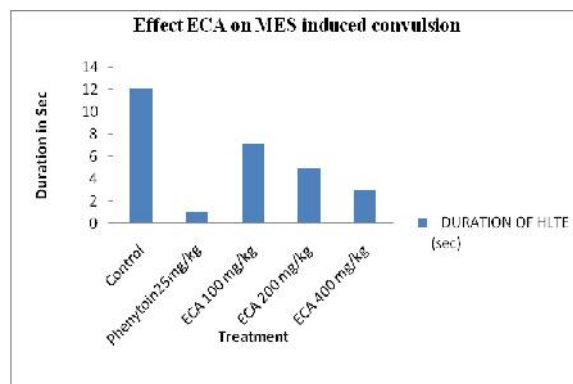


Figure 1: Effect of ethanolic seed extract of *Cassia angustifolia* on MES induced convulsions in mice

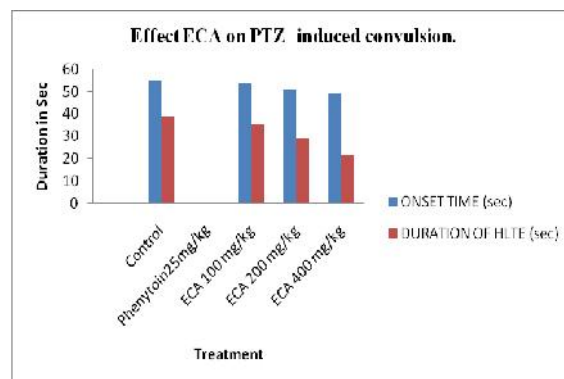


Figure 2: Effect of ethanolic extract of *Cassia angustifolia* seed on PTZ (60mg/kg s.c.) induced convulsions in mice.

Table 1: Effect of ethanolic extract of *Cassia angustifolia* seed on MES induced convulsions in mice

S. No.	Group	Dose (mg/kg)	Duration of HLTE (sec)
1	Control	2% gum acacia p.o.	12.1±0.41
2	Phenytoin	25 mg/kg	1.14 ±0.52**
3	ECA	100 mg/kg	7.2±0.15*
4	ECA	200 mg/kg	5.1±0.54**
5	ECA	400 mg/kg	3.10±0.20***

Values are expressed as mean±S.E.M; (n=6) *P<0.05, **P<0.01, ***P<0.001

Table 2: Effect of ethanolic extract of *Cassia angustifolia* seed on PTZ induced convulsions in mice

S. No.	Group	Dose(mg/kg)	Onset Time (sec)	Duration of HLTE (sec)
1	Control	2% gum acacia p.o.	55.0±5.14	38.5±0.85
2	Phenytoin	25 mg/kg p.o.	0.21±0.56**	0.12±0.46*
3	ECA	100 mg/kg p.o.	54.1±1.54*	35.14±0.65*
4	ECA	200 mg/kg p.o.	51.2±1.35*	29.2±0.85**
5	ECA	400 mg/kg p.o.	49.1±1.12**	22.12±0.35**

Values are expressed as mean ± S.E.M; (n=6), *P<0.05, **P<0.01, ***P<0.001

HLTE-Hind Limb Tonic Extension, SEM- Standard Error mean

4. Conclusion

In conclusion, *C. angustifolia* extracts may have potential anticonvulsant activity which may be due to the presence of certain active phytoconstituent. The anti-convulsant activity of *C. angustifolia* may involve gabaergic transmission and glutaminergic transmission or sodium channel blockage. However, extensive studies are needed to evaluate the precise mechanism(s), active principles, and the safety profile of the plant as a medicinal remedy for convulsive disorders.

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