

## Research Article



## An Investigation of Anticonvulsant Activity of Aqueous Extract of *Ficus carica* Linn Fruits in Experimental Animal Models

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### ABSTRACT

The main moto of the present study is to evaluate the anticonvulsant property of *Ficus carica* fruits in Swiss albino mice using Maximal electroshock seizures (MES) model. Animals were divided into 5 groups of n=6 each using Phenytoin (25 mg/kg i.p) as the standard drug. The Aqueous extract of *Ficus carica* was given at three doses of 250 mg/kg, 500 mg/kg and 750 mg/kg p.o. The test samples had been given one hour prior to the induction of convulsions. The present study reveals that the aqueous extract of *Ficus carica* at the doses of 250 mg/kg, 500 mg/kg and 750 mg/kg p.o significantly reduced the duration of tonic hind limb extension (THLE) in mice ( $P < 0.001$ ,  $P < 0.01$ ,  $P < 0.05$ ) in a dose dependent manner as compared to the vehicle control. The aqueous extract of dose 750 mg/kg body weight was found to have much similar like that of Phenytoin (Standard drug). As a result of the foregoing findings, the aqueous extract of *Ficus carica* was found to have considerable anticonvulsant activity in the Maximal electroshock seizures (MES) model.

**Keywords:** Aqueous extract of *Ficus carica* fruit (AEFC), Maximal electroshock (MES), Tonic hind limb extension (THLE), Seizure.

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### INTRODUCTION

Epilepsy is usual chronic neurological condition that is characterized by recurrent unprovoked epileptic seizures. These seizures are ephemeral signs or symptoms due to abnormal excessive or synchronous neuronal activity in the brain.<sup>1</sup> Epilepsy can be defined as the neuropsychological disorder, which occurs due to discharge of neurotransmitter substance characterized by paroxysmal cerebral dysrhythmia and having brief episodes of loss or disturbance, consciousness with or without characteristic body movement.<sup>2</sup>

*Ficus carica* Linn. belonging to a family Moraceae with a common name as Anjeera. The fig is a deciduous tree that grows to 50 ft tall. The fruits are having a tough peel that often crack upon ripeness that exposes the pulp beneath. The pulp is white jelly like having the seed inside them. The plants of were used thousands of years back and are mentioned in the "Holy Bible" as the plant of healing.<sup>3,4,5</sup> Plants are rich in Vitamins, minerals, calcium, iron, mucilage, tyrosine, rutin, glycosides, polyphenols and flavonoids.<sup>3,6</sup> The phenolic compounds that were found in the plant are phenol ferulic, 3-5 dimethoxy coumaric, phenolphthalein, chysin, lupeol acetate.<sup>7,9</sup>

The plant shows various pharmacological activities like anthelmintic, antioxidant, hypoglycaemic, hepatoprotective, antifungal, anti-inflammatory, analgesic and anticancer. Literature review also revealed that *Ficus carica* Linn fruits are used in the treatment of anxiety, stress, gastric and peptic ulcer, irritable bowel syndrome, crohn's disease, insanity, epilepsy, asthma.<sup>7,8,9</sup>

So, the present study was done to evaluate anticonvulsant activity of *Ficus carica* as it has various active constituents so as to minimize the side effects caused by synthetic drugs and to promote the use of a novel natural medicinal plant.

### MATERIALS AND METHODS

The *Ficus carica* fruits was procured from local market of Mangalore and it was authenticated by botanist Dr. Siddaraju M N. M.Sc. PhD Assistant professor, Department of Botany, University College, Mangalore. The present study was conducted in the Department of Pharmacology, Karavali college of Pharmacy.

### Animals

Adult Swiss albino mice of both sexes weighing 18-30 g was used in the study. The animals were fed with standard pelleted diet (Lipton India Ltd., Mumbai) and distilled water ad libitum was maintained at 210°C-230°C under a constant 12hrs light and dark cycle. Before conducting the experiment, all animals were acclimatized to laboratory condition for 5 days. All experiments were done after following the guidelines on ethical standards for investigation of experimental pain in animals and the guideline for the investigation of experimental seizures in conscious animals.



## Plant Extract

The fruits were washed 2 or 3 times with tap water so that it was made free from all dust materials. They were cut into small pieces and made into a paste with the help of a blender. For the aqueous extract, 500 g of plant material was extracted by infusion boiled water (500 ml) for three days. The respective aqueous extracts were separated from its residues by gravity filtration. The final crude extract was obtained as brownish greasy powder in percentage from dry weight (15.2% d.w). The extract was stored in refrigerator at 4 – 8 °C.<sup>10</sup>

## Experimental Design

**MES induced convulsion:** After acclimatization, animals were randomly divided into 5 groups of six mice each (n = 6).

- Group I – Received 1% v/v Tween 80 orally.
- Group II – Received Phenytoin sodium 25mg/kg intra peritoneally.
- Group III – Received 250 mg/kg AEFC fruit orally.
- Group IV – Received 500 mg/kg AEFC fruit orally.
- Group V – Received 750 mg/kg AEFC fruit orally.

Group 1 served as control (vehicle treated), Group II served as standard (received Phenytoin sodium 25mg/kg body weight); Group III, Group IV and Group V were treated with aqueous extract of *Ficus carica* as 250mg/kg, 500 mg/kg, 750mg/kg body weight. The test extract was administered orally in 1% v/v Tween 80, 1hr prior to induce the convulsion and standard drug (Phenytoin sodium 25mg/kg) was administered i.p.30 min before. Electroconvulsive shock (150 mA; 50Hz; for 0.2 sec) was delivered through corneal electrode to induce convulsions to five groups of mice (n=6).

The various phases of convulsion which were produced are Flexion, Extension, Clonus and stupor. Prior to delivery,

current output was checked by multimeter. After the electric stimulation occurrence, the duration of phases was noted.<sup>11</sup> The number of animals protected from tonic hind limb extension seizure (i.e., abolition of tonic hind limb extension within 10 sec after delivery of the electroshock was considered as protected rat)<sup>12,13</sup>. It was calculated in each group by-

$$\text{Percentage of protection (\%)} = \frac{\text{Number of animals with THLE lasting less than 10sec}}{\text{Total number of animals}} \times 100$$

Anticonvulsant activity was expressed as the percentage of inhibition of convulsion compared with control animals. All precautions were taken to minimize animals suffering.

## RESULTS AND OBSERVATION

The AEFC at a dose of 750mg/kg showed high significance in flexion when compared to vehicle control (P<0.001). AEFC at a dose of 500mg/kg significantly (P<0.01) inhibited flexion in mice, whereas AEFC at a dose of 250mg/kg protected with less significance on flexion in mice (P<0.05) when compared with vehicle group.

The AEFC at a dose 750mg/kg showed high significance in THLE when compared with vehicle control (P<0.001). AEFC at a dose of 500mg/kg significantly (P<0.01) inhibited THLE in mice, whereas AEFC at dose of 250mg/kg protected with less significance on mice (P<0.05) when compared with vehicle group.

The AEFC at a dose 750mg/kg significantly (P<0.001) decreased the duration of stupor period when compared with vehicle control. AEFC at a dose 500mg/kg significantly (P<0.01) inhibited and AEFC at a dose of 250mg/kg less significance with (P<0.05) with that of control.

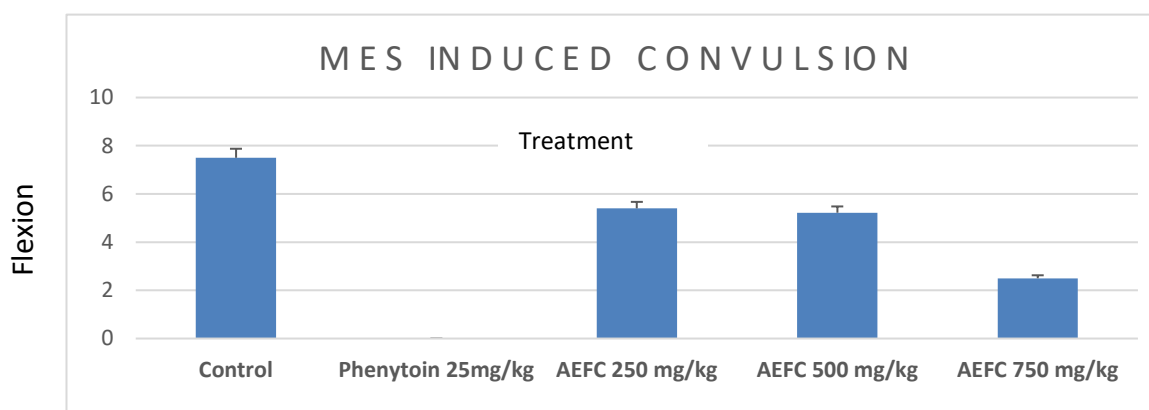
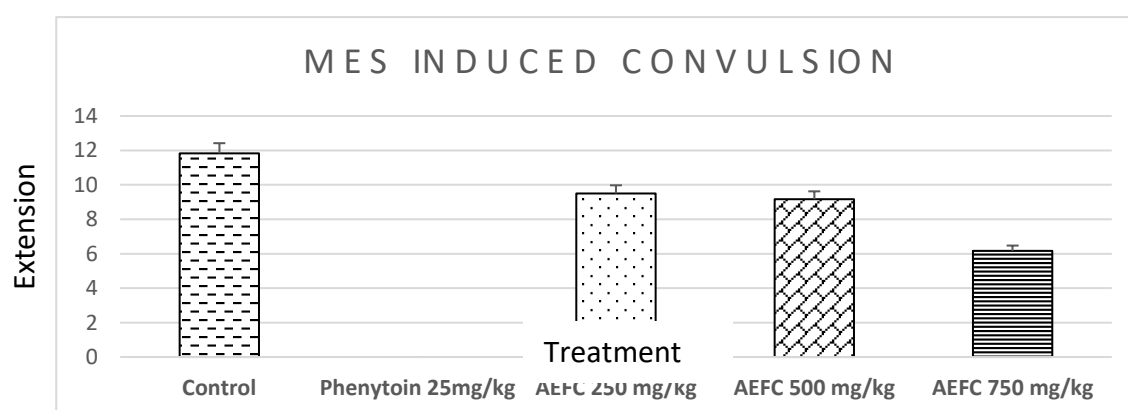
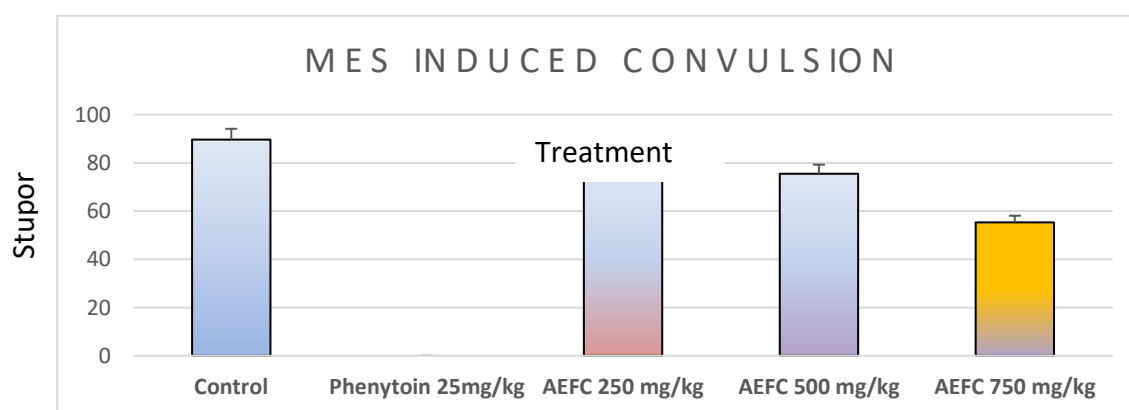
The protection against mortality standard drug phenytoin and AEFC dose 750mg/kg shows high significance (P<0.001) with no death recorded. The 500mg/kg and 250mg/kg dose of AEFC showed 33.36% and 16.66% respectively. The control group with 5 deaths out of 6 stands with 16.66% mortality.

**Table 1:** The effect of aqueous fruit extract of *Ficus carica* on MES induced convulsion.

Group	Treatment	Duration of convulsion in sec			
		FLEXON	THLE	STUPOR	% MORTALITY
1.	Control	7.500±0.428	11.83±0.792	89.67±3.211	16.66
2.	Phenytoin20mg/kg	0	0	0	100
3.	AEFC250mg/kg	5.667±0.421*	9.50±0.223*	79.50±1.176*	16.66
4.	AEFC500mg/kg	5.333±0.333**	9.167±0.307**	75.50±1.455**	33.33
5.	AEFC750mg/kg	2.500±0.428***	6.167±0.609***	55.33±3.694***	100

Values were mean ± S.E.M. for (n=6) expressed as the time (in sec) of 6 animals in each group. Data analysis was performed using Dunnett's test. \*P < 0.05, \*\*P < 0.01, \*\*\*P < 0.001 vs. control



**Graph 1:** Comparative profile of duration of flexion after oral administration 250, 500, 750mg/kg of AEFC.**Graph 2:** Comparative profile of duration of THLE after oral administration 250, 500, 750 mg/kg of AEFC.**Graph 3:** Comparative profile of duration of stupor after oral administration of 250, 500, 750mg/kg of AEFC.

## DISCUSSION

The current study was conducted to evaluate the anti-convulsant activity of aqueous extract of *Ficus carica* fruits. MES-induced convulsion method is one among most widely used method for screening of anticonvulsant drugs that produces generalized tonic-clonic seizures i.e., hind limb tonic extensor (HLTE) and clonic convulsions. It is said that the antiepileptic drugs that block MES induced tonic extension mainly acts by blocking the spread of seizure and MES induced tonic extension can be prevented by drugs either by inhibiting voltage dependent Na<sup>+</sup> channels (phenytoin, valproate) or by drugs that blocks glutaminergic

excitation mediated by the N-methyl- D-aspartate (NMDA) receptor.<sup>14</sup>

A dose related increase in anticonvulsant activity of AEFC suggest the presence of anticonvulsant compounds in AEFC. Three doses of AEFC showed good decrease in duration of flexion, THLE and stupor period. The dose of 750mg/kg showed high significance ( $P < 0.001$ ) whereas 500mg/kg showed ( $p < 0.01$ ) and 250mg/kg showed less significance ( $p < 0.05$ ) with that of control. This indicates the presence of anticonvulsant compounds in *Ficus carica* that can be effective in suppressing MES induced convulsion and suggests that compounds in the *Ficus carica* are effective in

treating generalized tonic-clonic seizure and partial seizure. Our results demonstrates that AEFC possess anticonvulsant activity.

## CONCLUSION

From the above study we can conclude that the aqueous extract *Ficus carica* fruits showed significant dose dependent anticonvulsant activity in MES induced seizures, thus making it a novel promising medicinal plant with diverse effect on central system which is devoid of side effects of conventional antiepileptic drugs. However further research is required to elucidate specific mechanism and active principles responsible for its anticonvulsant property.

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