

EVALUATION OF ANTI CONVULSANT ACTIVITY OF ETHANOLIC EXTRACT OF *MOMORDICA TUBEROSA* IN EXPERIMENTAL ANIMALS

YAKAIAH VANGOORI¹, MEGHAVANI GADEKAL², DEEPIKA KLNRR², RAMESH P², PRATHIBHA A²

¹Assistant Professor & ²PG of Pharmacology, Santhiram medical college, Nandyal, AP.

Received: 03 Apr 2013, Revised and Accepted: 10 May 2013

ABSTRACT

Objective: The aim of the present study was to evaluate the anti convulsant property of ethanolic extract of *Momordica tuberosa* in Pentylenetetrazole and MES induced convulsions in experimental models.

Materials & Methods: The purpose of this study is to explore the anticonvulsant activity of ethanolic extract of *Momordica tuberosa* using Pentylenetetrazole and maximal electric shock induced convulsions in rats. **MES Model:** rats were divided into 4 groups of 6 rats each. GROUP-I (NC) received 2% GA 2ml, GROUP-II (STD) received Phenytoin 25mg/kg, GROUP-III, IV received low dose (250 mg/kg) & high dose (500 mg/kg) of *Momordica tuberosa* respectively orally. Convulsions were produced in all groups by giving maximal electric shock of 150 mA for 0.2sec after 1 hour of giving test and standard drugs orally. Tonic clonic seizures were produced after giving electric shock. Recovery time was noted. The percentage of inhibition of convulsions by drugs was measured and compared between the control, standard and test. **PTZ model:** Rats were divided and test drugs were given same as above model but standard drug was Sodium valproate (50mg/Kg). Convulsions were induced by giving the Pentylenetetrazole IP 1 hr after giving test and standard drugs intraperitonally (IP). The onset of convulsions, duration of action, type of seizures were noted and compared between standard and test groups.

Results: In MES Model, ethanolic extract of *Momordica tuberosa* significantly ($p < 0.001$) decreased the duration of tonic clonic seizures and recovery time. The percentage of inhibition was 66%. In PTZ Model the onset of seizures was delayed ($p < 0.002$) with low and high doses and the duration of convulsions was reduced effectively ($p < 0.001$). Type of seizure was controlled in initial phase and number of seizures were also reduced.

Conclusion: *Momordica tuberosa* was shown anticonvulsant property in both MES and PTZ animal models.

Keywords: Convulsions, *Momordica tuberosa*, Phenytoin, Sodium valproate.

INTRODUCTION

Epilepsy is a chronic brain disorder characterized by recurrent derangement of the nervous system due to sudden excessive uncontrolled discharge from the cerebral neurons. It is the second most common neurological disorder with an annual incidence of 50 cases /100,000 per year [1]. Herbal remedies have been recommended in various medicinal treatises for the cure of different diseases. *Momordica tuberosa* (synonyms- Luffa tuberosa, *Momordica cymbalaria*) belongs to the family Cucurbitaceae commonly known as *Momordica cymbalaria*. The plant is a perennial herbaceous climber either allowed to trail on the ground or to climb on supports with the aid of tendrils. It is found in the south Indian states of Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra and Tamil Nadu as a weed [2]. It has been recognized in different systems of traditional medicines for the treatment of different diseases and ailments of human beings [3]. It contains several phyto-constituents belonging to category flavonoids, steroids, triterpenes, carbohydrates. The fruits, tubers and leaves of *Momordica tuberosa* were used in folk remedies for diabetes, inflammatory disorders, malaria, wounds, worms, parasites, ulcers, for hepatitis and fevers. This fruit extract also used in convulsions [4]. *Momordica tuberosa* has been extensively studied for its anti- diabetic [5], hepatoprotective [6], antiarrhoeal [7] in the past, but no one has studied about its anti-convulsant property except one reference [4]. So this present study was taken to evaluate its anti-convulsant property in animal models.

MATERIALS AND METHODS

Plant material

Fresh green fruits of *Momordica tuberosa* popularly known as kasarakai were obtained in sufficient quantity from local market in Kurnool, A.P August 2012. They were carefully washed to remove dust particles and other foreign materials and dried in shaded area. The completely dried fruits was powdered with electric grinder and stored in well closed bottles.

Preparation of alcohol extract

The dried fine powder of the *Momordica tuberosa* was weighed on balance 30g. and taken into the sac like cloth material and placed in the Soxhlet basket. The coarsely powdered dried fruit of *Momordica tuberosa* (30 g) was defatted with petroleum ether (300ml) by hot extraction process (Soxhlet) for 12 h. The marc left after petroleum ether extraction, was dried and extracted with 95% (v/v) ethanol (300ml) by hot extraction process for 20 h. 300ml of ethyl alcohol was taken as solvent into the Soxhlet flask. [8] Cold tap water must flow through the inlet and outlet of the condenser. The Soxhlet apparatus kept running for 24hours for proper extraction. The extract laden solvent falling from the Soxhlet basket is dark in colour and it becomes clearer, that indicates the extraction process is finished. At the end of the extraction process the solvent is then evaporated and the remaining mass is measured.

Table 1: The percentage yields are calculated as mg per gm dried powder.

S. No.	Weight in gm.			Percentage Yields
	Solvent	Dry <i>Momordica</i> Powder	Extract	
1.	Ethyl Alcohol	30gm.	2.4gm.	8%

The yield of the ethyl alcohol extract is 8%. The extract was suspended in 2ml of 2% Gum acacia and used for the oral administration in rats.

Experimental animals

The animals were supplied from Sainath Agencies, Hyderabad, AP, India. They were randomly distributed into groups and housed in

cages (6/cage) and maintained under standard conditions at $26\pm 2^{\circ}\text{C}$ and relative humidity 44-56% and 10 hours light: 14 hrs dark cycles each day for 1 week before and during the experiments. All animals were fed the standard rodent pellet diet and water. So this study was cleared by institutional animal ethical committee.

Experiment design

The animals were divided into four groups with each group consisting of six animals. Group-I received gum acacia (2%) served as control, Group-III and IV were administered two graded doses of test drug (extract) i.e. 250, 500mg/kg, orally in MES and IP in PTZ experimental models. Group-II received diphenylhydantoin (25 mg/kg, orally) [9] and valproic acid (50 mg/kg, i.p) [10] as standards in MES method and PTZ induced seizures method respectively orally. In MES model, Convulsions were produced in all groups by giving maximal electric shock of 150 mA for 0.2sec after 1 hour of giving test and standard drugs orally. Tonic clonic seizures were produced after giving electric shock. Recovery time and

percentage of inhibition of seizures were noted. In PTZ model, Convulsions were induced by giving the Pentylentetrazole (80mg/Kg) [9] IP 1 hr after giving test and standard drugs intraperitoneally (IP). The onset of convulsions, duration of action, type of seizures were noted and compared between standard and test groups.

Statistical Analysis

Statistical analysis was done by One way Analysis of Variance (ANOVA). Results were expressed as Means \pm SEM from 6 rats in each groups. P values <0.001 were considered significant.

RESULTS

Momordica tuberosa extract was subjected for anti convulsant effect using MES induced convulsant models in rats. The extract exhibit significant anti convulsant activity with high dose (500mg/kg) by reducing the recovery time (124.3 ± 7.03) and $p < 0.001$ and increasing the Percentage of inhibition (66.66%).

Table 2: Anti convulsant effect of Momordica tuberosa extract in MES model.

Groups	Treatment	Dose	Time in seconds of recovery from convulsions (Mean \pm SEM)	% of inhibition of convulsions
1	Control-2% GA	2% gum acacia (2ml/100g)	223.3 \pm 8.44	0
2	Standard-Phenytoin	Phenytoin(25mg/kg)	89.33 \pm 12.96**	100
3	Test-T ₁ -extract	Low dose-250mg/kg	137.0 \pm 5.88*	50
4	Test-T ₂ -extract	Highdose-500mg/kg	124.3 \pm 7.03**	66.66

*P<0.05, **P<0.01, ***P<0.001 compared to Control.

In PTZ induced model, the ethanolic extract of *Momordica tuberosa* was shown significant anti convulsant effect with high and low dose by increasing onset of action and reducing the duration of action of convulsions. Recovery/death was observed in all groups.

Table 3: Anti convulsant effect of Momordica tuberosa extract in PTZ model.

Groups	Treatment	Dose	Onset of action (time in sec) (Mean \pm SEM)	Duration of action (sec) (Mean \pm SEM)	Recovery/death
1	Control-2% GA	2% gum acacia (2ml/100g)	564.3 \pm 110.7	913.8 \pm 95.54	Death
2	Standard- Sodium valproate	Sodium valproate(50mg/kg)	96.67 \pm 38.91***	15 \pm 5.02**	Recovered
3	Test-T ₁ -extract	Low dose-250mg/kg	625.2 \pm 114.2*	436.5 \pm 165.2*	Death/recovered
4	Test-T ₂ -extract	Highdose-500mg/kg	641.7 \pm 110.4*	98 \pm 28.93***	Recovered

*P<0.05, **P<0.01, ***P<0.001 compared to Control.

DISCUSSION

Inspite of tremendous development in the field of synthetic drugs during recent era, they are found to have some or other side effects, whereas plant products or homeo drugs still hold their own unique place by the way of having no side effects. Therefore a systemic approach should be made to find out the efficacy of plant products against epilepsy so as to exploit them as herbal anti-epileptic agents. Epilepsy is a chronic common neurological disorder that affects people of all ages. Around 50 million people worldwide have epilepsy. Nearly 90% of the people with epilepsy are found in developing regions. [11] The prevalence is 5-10/1000 persons with higher incidence in infants.[12] Epilepsy is often progressive disorder characterized by the periodic and unpredictable occurrence of epileptic seizures which are caused by an abnormal discharge of cerebral neurons. The definition of epilepsy requires occurrence of at least one epileptic seizure.[13] Many different types of seizures can be identified on the basis of their clinical phenomena.[14] Seizures are broadly categorized into two types: partial and generalized seizures [15]. Partial (focal, local) seizures are those in which clinical or electrographic evidence exists to suggest that the attacks have a localized onset in the brain, usually in a portion of one hemisphere, while generalized seizures are those in which evidence for a localized onset is lacking. Partial seizures are further subdivided into simple partial, complex partial and partial seizures evolving to secondarily generalized seizures, while

generalized seizures are categorized into absence (non convulsive), myoclonic, clonic, tonic, tonic-clonic and atonic seizures. In addition to classifying the seizures that occur in patients with epilepsy, patients are classified into appropriate types of epilepsy or epileptic syndromes characterized by different seizure types, etiologies, ages of onset and Electroencephalographic (EEG) features. However, despite several anti-epileptic drugs both old and novel, many patients have intractable epilepsy or epilepsy with intolerable side effects. Better understanding of processes leading to epilepsy is required to create therapies aimed at prevention of epilepsy in patients at risk. Further there is need to develop disease modifying therapies which could halt the progression of epilepsy.[16]

The discovery of novel antiepileptic drugs (AEDs) relies upon the preclinical employment of animal models to establish efficacy and safety prior to the introduction of the AEDs in human volunteers. Clearly, the more predictive the animal model for any given seizure type or syndrome, the greater the likelihood that an investigational AED will demonstrate efficacy in human clinical trials. [17] Thus, many plants were known for their anticonvulsant activity. Various physiochemical and pharmacological studies have been carried out on these anticonvulsant plants [18]. Currently available anticonvulsant drugs are able to efficiently control epileptic seizures in about 50% of the patients; another 25% may show improvement where as the remainder does not benefit significantly [19]. Furthermore,

undesirable side effects from the drugs used clinically often render treatment difficult, so, a demand for new types of anticonvulsants exists. One of the approaches to search for new antiepileptic drugs is the investigation of naturally occurring compound, which may belong to new classes. In the present study the antiepileptic action of *Momordica tuberosa* extract was evaluated in Swiss albino rats. According to literature, *Momordica tuberosa* having number of medicinal properties like anti-ulcer, antidiabetic, hepatoprotective, anti-diarrhoeal and antiepileptic property. The present study antiepileptic property of this plant was selected to evaluate its action in epileptic seizures of experimental animals. In our study ethanol fruit extract of *Momordica tuberosa* has shown protection against Maximum Electroshock Seizures and PTZ induced seizures.

In MES induced seizures (Table no.2), the extract of *Momordica tuberosa* inhibits the type of seizures and shortens the recovery time effectively with high dose and less action with the low dose when compared with control group. High dose (500mg/Kg) more active than low dose (250mg/Kg) but less active than standard drug (Phenytoin). Percentage of inhibition of seizures with extract is 66.66%.

In PTZ induced seizures (Table no.3), the extract of *Momordica tuberosa* was shown to act to reduce number of seizures, increase the onset of action and shorten the duration of action of seizures when compared with control group. High dose (500mg/Kg) more active than low dose (250mg/Kg) but less active than standard drug (Sodium valproate).

CONCLUSION

The present study indicates that the plant *Momordica tuberosa* has potential anti-convulsant activity against MES induced and Chemical (PTZ) induced convulsions in experimental animals. So this activity of plant probably due to the compounds present such as Flavonoids. So the plant *Momordica tuberosa* uses for both Ayurvedic and Modern drug development areas because of its phyto-medicinal uses.

REFERENCES

- Maiha BB, Magaji MG, Yaro AH, Hamza AH, Ahmed SJ, Magaj AR. Anticonvulsant studies on *cochlospermum tinctorium* and *paullinia pinnata* extracts in laboratory animals. Nig J Pharm Sci 2009; 8: 102-08.
- Parvathi S, Kumar VJF. Studies on chemical composition and utilization of the wild edible vegetable athalakkai (*Momordica tuberosa*). Plant Foods for Human Nutrition 2002; 57: 215-222.
- Kirtikar KR and Basu BD, Indian Medicinal plants. 2nd ed. Dehradun Publisher Ltd., India, 1994; 1: 830-832.
- Murthy SN, Snehalatha N, Anuradha N, Seetharam YN. Anticonvulsant activity of ethanolic extract of *Momordica cymbalaria* Fenzl. ex Naud.
- Kameswara Rao B, Kesavulu MM, Giri R, Appa Rao CH. Antidiabetic and hypolipidemic effects of *Momordica cymbalaria* Hook. fruit powder in alloxan-diabetic rats. J Ethnopharmacol 1999; 67: 103-109.
- Pramod Kumar, Deval Rao G, Lakshmayya, Ramachandra Setty S. Antioxidant and hepatoprotective activity of tubers of *Momordica tuberosa* Cogn. against CCl₄ induced liver injury in rats. Indian J Exp Biol 2008; 46: 510-513
- Vrushabendra Swamy BM, Jayaveera KN, Ravindra Reddy K, Bharathi T. Anti-diarrhoeal activity of fruit extract of *Momordica cymbalaria* Hook. F. Int J Nutr & Wellness 2008; 5: 2.
- Rajal Shah, Sachin Parmar, Punit Bhatt, Sumitra Chanda, Shah et, Evaluation of hepatoprotective activity of ethyl acetate fraction of *tephrosia purpurea*. Pharmacologyonline 2011; 3: 188-194
- ashish manigauha and sunita patel ,anticonvulsant study of *pongamia pinnata* linn against pentylenetetrazole induced convulsion in rats, international journal of pharma and bio sciences v1(2)2010.
- Kulkarni S.k, hand book of Experimental pharmacology ;Third edition; page no-195.
- World Health Organization [Internet] Health topics Epilepsy. Available from <http://www.who.int/mediacentre/factsheets/fs999/en/>
- Fisher RS, Boas WE, Blume W, Eiger C, Genton P, Lee P, Enjel J. Epileptic seizures and Epilepsy: Definitions proposed by International League Against Epilepsy (ILAE) and International Bureau of Epilepsy (IBE). Epilepsia 2005;46:470-2.
- Commission on Classification Terminology of the International League Against Epilepsy, Epilepsia 1981;22,489-502.
- Wolfgang Löscher, New visions in the pharmacology of anticonvulsion, Eur J Pharmacol, 1998 ; 342, 1-13.
- Loscher, W.Schmidt D, New horizons in the development of antiepileptic drugs: the search for new targets, Epilepsy Res, 2004;60:77-159.
- Misty Smith, Karen S, Wilcox, H. Steve White, Discovery of Antiepileptic Drugs. Neuro therapeutics: The Journal of American Society of Experimental Neurotherapeutics, 2007; 4:12-7.
- Lucindo J, Quintans Junior et al, Plants with anticonvulsant properties - A Review, Brazilian Journal of Pharmacognosy, 2008;18:798-819.
- Loscher W, Schmidt D., Which animal models should be used in the search for new antiepileptic drugs: A proposal based on experimental and clinical considerations, Epilepsy Research, 1988; 2:145-181.
- Nadkarni, A K. The Indian Materia Medica, Vol I, 2nd Edition. Bombay, India, Popular Prakashan, 1982; 1102-03.