IJPSR (2021), Volume 12, Issue 4 (Research Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 03 April 2020; received in revised form, 29 August 2020; accepted, 07 September 2020; published 01 April 2021

EVALUATION OF ANTICONVULSANT, ANTIANXIETY ACTIVITY OF *IPOMOEA PES-TIGRIDIS* EXTRACTS IN MICE

V. I. Anaha * and R. Nithin Manohar

Department of Pharmacology, Sreekrishna College of Pharmacy and Research Centre, Parassala - 695502, Kerala, India.

Keywords:

Ipomoea pes-tigridis, Maximal electroshock, Holeboard test, Open field test, Anticonvulsant, Antianxiety

Correspondence to Author:
V. I. Anaha

Department of Pharmacology, Sreekrishna College of Pharmacy and Research Centre, Parassala - 695502, Kerala, India.

E-mail: anahavi@gmail.com

ABSTRACT: *Ipomoea pes-tigridis* (IP) is a twinning hairy herb grown in India. Based on the ethnopharmacological information of the plant, the ethanolic extract of the whole plant of *Ipomoea pes-tigridis* was evaluated for its anticonvulsant, antianxiety activity in mice. The Antiepileptic activity was assessed by using MES (maximal electroshock) model (200 and 400 mg/kg), and antianxiety activity was assessed by using the hole board and open field test. Bodyweight doses were used for the present study. In MES model, the ethanolic extracts showed a dose-dependent reduction in duration of the hind limb extensor phase when compared with the control group. It is evident that the mice which were treated with 400 mg/kg of EEIP (Ethanolic extract of *Ipomoea pes-tigridis*) showed a significant ($P<0.0001$) effect in all the phases on MES induced convulsion. In HBT (hole board test), It was noted that the mice which were treated with 400 mg/kg of EEIP showed a high significance ($P<0.0001$) effect on the number of head dipping due to the anxiolytic activity. In OFT (open field test), the mice which were treated with 400 mg/kg of EEIP showed significant ($P<0.0001$) as the locomotor activity lowering effect (anxiolytic effect) when compared to the Control. Glutamate level is significantly ($P<0.0001$) in the ethanolic extract group containing a high dose. The decreased glutamate level shows a good anticonvulsant effect. The results suggest a possible anticonvulsant, antianxiety activity through a GABA-ergic interaction.

INTRODUCTION: Epilepsy is a neurological disorder that affects a wide range of people throughout the world. The term epilepsy refers to a disorder of brain function distinguished by the periodic and unpredictable occurrence of seizures. The seizure refers to a momentary alteration of behaviour due to the disordered, synchronous, and periodic firing of populations of brain neurons.

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.12(4).2323-30

This article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.12(4).2323-30

The pharmacological agents in current clinical use to inhibit seizures are referred to as anticonvulsants or antiepileptic drugs. A seizure is thought to emerge from the cerebral cortex, and they can be classified into generalized seizures, those that involve both hemispheres widely from the outset.

The behavioural demonstrations of a seizure are determined by the functions normally served by the cortical site at which the seizure arises. For example, a seizure in the motor cortex is associated with clonic jerking of the body part controlled by this region of the cortex. A simple partial seizure is associated with preservation of consciousness, whilst a complex partial seizure is associated with

impairment of consciousness. Epilepsy is a neurological disorder associated with abnormal neurotransmitter function in the brain. A decrease in GABA-mediated inhibition or an increase in glutamate-mediated excitation in the brain may result in seizure activity. Indeed, both glutamate and GABA are thought to play a key role in the brain mechanisms causing epilepsy in man [1]. The conventional antiepileptic agents like phenytoin, carbamazepine, and sodium valproate carry with them several serious side effects, notably neuro-toxicity. Thus it is necessary to investigate for an antiepileptic agent that is highly efficacious as well as safe in items of drug-related toxicity.

Anxiety is an emotion characterized by an unpleasant state of inner turmoil, often accompanied by nervous behaviour such as pacing back and forth, somatic complaints, and rumination. It is the subjectively unpleasant feelings of dread over anticipated events, such as the feeling of imminent death. Anxiety is not the same as fear, which is a response to a real or perceived immediate threat, whereas anxiety is the expectation of future threat [2].

Opioids are drugs that are usually only prescribed for their painkilling properties, but some research is beginning to find that some varieties are effective at treating depression, obsessive-compulsive disorder, and other ailments often associated with or caused by anxiety. Many people become addicted to these drugs because they are so effective at blocking emotional pain, including anxiety [3]. Anxiety is a feeling of uneasiness and worry, usually generalized and unfocused as an overreaction to a situation that is only subjectively seen as menacing. It is often accompanied by muscular tension, restlessness, fatigue and problems in concentration. Anxiety can be appropriate, but when experienced regularly, the individual may suffer from an anxiety disorder [4].

The *Ipomoea pes-tigridis* Linn. commonly called Pulichuvadi in Malayalam, is a twinning hairy herb of the Convolvulaceae family. The plant is found more or less throughout India, usually in hedges, grasslands, waste places, bushes, fields, and seacoast. In North India, it grows profusely during the monsoon and remains green and succulent for 3-4 months. It is also distributed in tropical E. Africa and tropical Asia [5]. *Ipomoea pes-tigridis* is a spreading or twinning herb. It is herbaceous annual, almost throughout India ascending up to 4000 ft, plains from the coast to 750-900m, often in Arab islands. The climber flowers throughout the year. *Ipomoea pes-tigridis* Linn. stems twining clothed with long spreading hairs. Leaves 3.8-10 cm diam., rotundate in outline, usually more or less deeply palmately 5-9-lobed, sometimes 3-lobed or occasionally entire; lobes ovate, acute or acuminate, narrowed at the base, hirsute on both surfaces; petioles 3.8-7.5 cm. long, hairy. Flowers sessile, 3 or more in a head; peduncles 2.5-7.5 cm. long, very hairy; outer bracts nearly 2.5 cm long, the inner about 1 cm. long, all ovate-oblong, subobtuse, very hairy. Sepals 8.13 mm. long, densely hairy and ciliate -with long stiff hairs, the 2 outer sepals broader than the inner, ovate-lanceolate, the 3 inner linear-oblong, acute. Corolla about 2.5 cm. long, tubular. Camp annulate, white or pale pink. Capsules 5 mm. diam., globose, glabrous, papery, concealed in the calyx. Seeds grey- pubescent [6].

Today there is a need for scientific validation of plants that have been used in folklore and tribal medicine because of the loss of information, advancement of therapy, and deforestation that is taking place. The ethnomedical information of the plant reveals that the herb *Ipomoea pes-tigridis* was used as an antidote to a dog bite, boils, and carbuncles; the leaves were applied as poultices for boils, carbuncles, and sores [7]. The leaves are applied to the forehead for restlessness in children. The root of this plant possesses purgative action. The phytochemical studies on the leaves have been reported for the presence of carbohydrates, proteins, resins, flavonoids [8]. *Ipomoea pes-tigridis* scientifically evaluated for antioxidant, cytotoxic and *in-vivo* neuropharmacological activities. The habit and plant parts used for ethnomedicinal practices were analyzed.

A study illustrates the diversity and morphology of the species of Ipomoea, which are separated from each other on the basis of their morphological characters. Studies show that the bioengineered nanoparticles of Ipomoea have high efficiency against drug-resistant microbes. Studies on anatomy and phytochemical analysis of *Ipomoea pes-tigridis* L. carried out to determine the requisite anatomical features of root, stem, leaf, petiole, and

phytochemical analysis for evaluating the *Ipomoea pes-tigridis* an important medicinal plant used in the traditional systems of medicine [9-13].

The *Ipomoea pes-tigridis* shows the presence of multiple components like flavanones, flavonols, chlorophyll, hydrocarbon, aurones, and simple phenols at a varying concentration in the aqueous, petroleum ether, chloroform extracts [14].

However, the anticonvulsant, antianxiety activity has not been thoroughly investigated scientifically. The present study's objective is to evaluate the anticonvulsant, antianxiety activity of *Ipomoea pes-tigridis* extracts in mice.

MATERIALS AND METHODS:

Plant Material: The plant of *Ipomoea pes-tigridis* was collected from southern regions of Kerala during the month of September and authenticated by Mrs Christil Lila. R, Senior Research Officer (Botany) Pharmacognosy Unit, Ayurveda Research Institute, Poojappura, Thiruvananthapuram. A herbarium of the same plant was submitted to the Department of Pharmacognosy at Sree Krishna College of Pharmacy and Research Centre, Trivandrum, Voucher Specimen No: SKCPRC/ COG/HS 2018/001.

Preparation of Extract: The whole plant was washed thoroughly and dried in the shade. The shade-dried plants were powdered. About 500g of the dried powder of *Ipomoea pes-tigridis* was extracted in the Soxhlet extractor consecutively using solvents of non-polar to polar grade *i.e.,* by increasing polarity (petroleum ether, chloroform, ethanol, and water). Extracts obtained are distilled through distillation apparatus for the recovery of solvents. All the extracts were stored in a refrigerator for qualitative analysis.

Phytochemical Screening: The extract of *Ipomoea pes-tigridis* was analyzed for the presence of phytochemical constituents, such as flavonoids, saponins, carbohydrates, phenolic compounds, and alkaloids, with the standard qualitative phytochemical methods as described [15].

Drugs: Diazepam was purchased from Ranbaxy Ltd., India. Different concentrations of the drug were prepared freshly by suspending it in water for injection.

The solvents used were of analytical grade. Petroleum ether, Chloroform, Ethanol (NICE Chemicals Private Limited, Kochi, Kerala), Normal saline (Loba Chemi. Pvt. Ltd., India), and water for injection (Glaxo Smith Kline Phrm. Ltd. Mumbai) used as solvent and vehicle, respectively

Dosing Protocol: The extract was dissolved in water for injection and 0.9% w/v saline solution. Two sets of test doses (200,400 mg/kg respectively) were prepared by suspending dried extract in the vehicle. The extract was given according to the weight of the animal. Diazepam 5 and 1 mg/kg suspended in the vehicle was used as a standard drug. Vehicle (0.9% w/v saline solution was used as control.

Animals: The Balb/C albino mice (18-25g) of either sex were housed in a group of five per cage and were maintained under natural day and night cycle at 25±2 ºC ambient temperature, 45-55% relative humidity. They were allowed to acclimatize for one week before the experiment. They were placed in propylene cages with paddy husk as bedding. A 12:12 hour light: dark cycle was followed during the experiment. Animals were allowed free access to a standard pellet diet and water *ad libitum.*

The experiments were carried out as per the guidelines of the Committee for the purpose of control and supervision of experiments on animals (CPCSEA), New Delhi, India, and the study protocol was approved by the Institutional Animal Ethics Committee (IAEC). The protocol number is 01/01/IAEC/SKCPRC/2018 dated (29/6/18).

Anticonvulsant Effect:

Maximal Electroshock-Induced Seizure Model: The maximum electrical shock (MES) induced convulsion in animals represented grand mal type epilepsy. Electro-convulsive shock, inducing Hind Limb Tonic Extension (HLTE) in 99% of the animals, was previously determined. In MES convulsions, the electric shock will be applied through the ear electrode at 12mA for 0.2sec in mice, where tonic hind limb extensions will be produced. Maximal electroshock seizure model was used to evaluate the anticonvulsant activity of ethanolic extract orally. The test animals (n=4) received 200, 400 mg/kg b.w. of ethanolic extract

orally, and the standard group received diazepam (5 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. The MES-convulsion will be divided into five phases such as tonic flexion, tonic extensor, clonic convulsions, stupor, recovery or death.

For recording various parameters, mice were placed in clear rectangular plastic cages with an open-top, permitting a full view of the animal's motor responses to seizure. Note the reduction in tie or abolition of tonic extensor phase of MES convulsions [16-20].

Antianxiety Activity:

Hole Board Test: The apparatus was composed of a grey wooden box (50 cm × 50 cm × 50 cm) with four equidistant holes 3 cm in diameter in the floor. The center of each hole was 10 cm from the nearest wall of the box. The floor of the box was positioned 15 cm above the ground and divided into squares of 10 cm×10 cm with a water-resistant marker. An animal was placed in the centre of the hole-board and allowed to explore the apparatus for 2 min freely. The total locomotor activity (numbers of squares crossed) and the number and duration of head-dippings were recorded. A head dip was scored if both eyes disappeared into the hole. Mice (n=4) were treated with test doses of the prepared extract (200, 400 mg/kg, o.p. respectively), diazepam (1 mg/kg, i. p.), and normal saline 45 min before they were placed in the apparatus. The numbers of head dips and the time of head dipping during a 5 min period were recorded [21, 22].

Open Field Test: The floor of an open field of half square meter was divided into a series of squares, each alternatively coloured black and white. The apparatus had a wall of 40 cm in height. The number of squares visited by the animals was counted for 2 min at 0, 30, 60, 90, and 120 min after oral administration of the test drugs and the standard. In the open field test, the animals were divided into control, positive control, and test groups containing four mice each. The test groups received extracts 200,400 mg/kg body weight orally whereas the control group received vehicle (0.9% normal saline), animals in the positive control group received diazepam (1 mg/kg b.w.) [23].

Neurotransmitter Level in MES Induced Convulsive Mice:

Estimation of Glutamate:

Procedure: The level of Glutamate was estimated by multiple development paper Chromatography as described by Raju. 0.5g tissue weighed and placed in 5 mL of ice-cold TCA (10% w/v). The tissue was then homogenized and centrifuged at 10,000 rpm for 10 min at 0°C. The supernatant was used for the estimation of glutamate content. 1.0 mL of the supernatant from brain homogenate was evaporated to dryness at 70°C in an oven and the residue is reconstituted in 100 mL of distilled water. Standard solutions of glutamate and GABA at a concentration of 2mL along with the sample are spotted on Whatman no. 1 chromatography paper using a micropipette. It was placed on a chamber containing Butanol: acetic acid: water (12: 3: 5 v/v) as a solvent. When the solvent front reached the top of the paper, it was removed and dried. A second run is performed similarly, after which the papers are dried, sprayed with Ninhydrin reagent, and placed in an oven at 100 °C for 4 minutes. The portions which carry glutamate corresponding with the standard are cut and eluted with 0.005% $CuSO_4$ in 75% ethanol. Their absorbance is read against blank at 515 nm in a spectrophotometer [24].

Calculation: The amount of glutamate are calculated by using the following formula;

A = Unknown Optical density × Standard in µg (3µg) × 1000 / Standard optical density × Volume spotted (10µl) × Weight of tissue in gram

Where A = Amino acid content in moles/gram wet weight tissue, 100 = Conversion factor for gram wet weight tissue

Statistical Analysis: All the results obtained from various activities were analyzed statistically by using Paired student t-test in Graph Pad Prism software version 7.04, and $P<0.05$ (95% confidence limit) were considered as statistically significant. The measured parameters were expressed as mean ± SEM.

RESULTS:

Phytochemical Screening: The preliminary phyto-chemical screening of the ethanolic extract of *Ipomoea pes-tigridis* revealed the presence of carbohydrate, alkaloids, flavonoids, and tannins.

Assessment of Anticonvulsant Activity by MES-Induced Seizure: The MES-induced convulsion after oral administration of Ethanolic extract of *Ipomoea pes-tigridis* has been shown in **Fig. 1**. The data were shown in **Table 1**. It is evident that the mice which were treated with 400mg/kg of EEIP showed a significant (P<0.0001) effect in all the phases on MES-induced convulsion than the lower dose (200mg/kg) of ethanolic extract. The lower dose of EEIP was less significant (P<0.01) toward the extension phase.

TABLE 1: EFFECT OF ETHANOLIC EXTRACTS OF *IPOMOEA PES-TIGRIDIS* ON MAXIMAL ELECTRO-SHOCK INDUCED SEIZURE IN MICE

S. no.	Treatment Group	Duration of Time (Sec)				
		Flexion	Extensor	Clonus	Stupor	Recovery/Death
1	Control	2±0.40	17±0.70	20±0.40	80±0.40	130±0.40
2	Diazepam (5mg/kg)	1.25±0.25	11.75±0.47[b]	7.25±0.25[a]	19.75±0.62[a]	40±1.08[a]
3	EEIP (400mg/kg)	1.25±0.25	12±0.40[b]	7.75±0.47[a]	27.75±0.47[a]	40±1.47[a]
4	EEIP (200mg/kg)	1.75±0.25	12.25±0.47[c]	8.75±0.25[a]	31.75±0.47[a]	44.25±0.47[a]

The data were expressed as M±SEM; (n=4). The data analysed by student t-test. a-P<0.0001 (****) Compared to control, b-P<0.001 (***) Compared to control, c-P<0.01 (**) Compared to control.

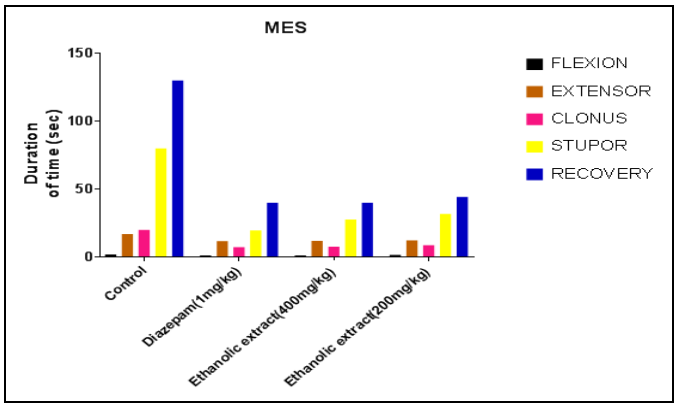

FIG. 1: MES INDUCED SEIZURE ON ETHANOLIC EXTRACT OF *IPOMOEA PES-TIGRIDIS* [EEIP]

Assessment of Antianxiety Activity:

Hole Board Test: The number of Head dipping in the Hole board test after oral administration of two doses of EEIP has been shown in **Fig. 2**. The data were shown in **Table 2**.

TABLE 2: HEAD DIPPING ACTIVITY IN HBT

S. no.	Treatment Group	No. of Head Dipping
1	Control	38±0.0
2	Diazepam (1 mg/kg)	96±1.47[a]
3	EEIP (400mg/kg)	91.75±1.10[a]
4	EEIP (200mg/kg)	80.5±1.93[a]

The data were expressed as M±SEM; (n=4). The data analysed by the Student t-test a-P<0.0001 (****) Compared to control.

Animals administered with Diazepam (1m/kg) showed an increased number of head dipping, thus showing the significant (P<0.0001) differences as compared to control. There was a significant (P<0.0001) dose-dependent increase in head dipping in animals treated with 400mg/kg and 200mg/kg doses of EEIP when compared to the control. It was noted that the mice which were treated with 400mg/kg of EEIP showed high significance (P<0.0001) effect on the number of head dipping due to the anxiolytic activity than the lower dose (200mg/kg) of ethanol extract.

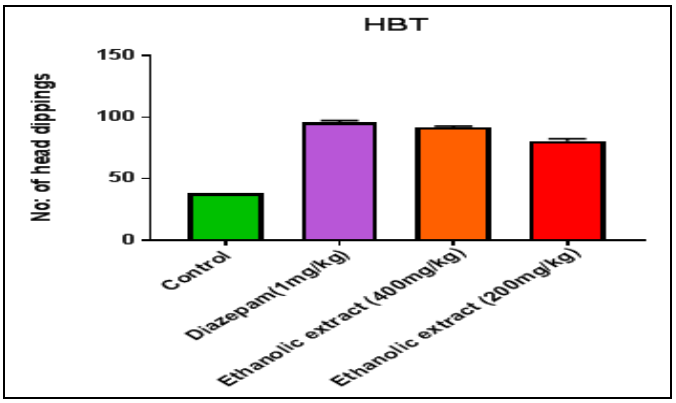

FIG. 2: NO. OF HEAD DIPPING IN HBT

Open Field Test: The effects of locomotor activity in the Open field test after oral administration of two doses of EEIP has been shown in **Fig. 3**. The data were shown in **Table 3**. It was understood that the mice which were treated with 400mg/kg of EEIP showed significant (P<0.0001) as the locomotor activity lowering effect (anxiolytic effect) than the lower dose (200mg/kg) of ethanolic extract when compared to the control. Thus, all the extracts significantly decreased the locomotor activity of the mice as the number of squares travelled by the mice at all the doses of the extract was reduced significantly from the initial score. The results were comparable to those of the control group.

TABLE 3: EFFECT OF EEIP ON LOCOMOTOR ACTIVITY IN OFT

S. no.	Treatments	Dose (mg/kg)	No. of Square Crossed
1	Control	-	273±0.0
2	Diazepam	1	238.5±3.12[a]
3	EEIP	400	245.8±2.49[a]
4	EEIP	200	252±2.88[a]

The data were expressed as M±SEM; (n=4). The data analyzed by Student t-test followed by Paired t-test, a-P<0.0001 (****) Compared to Control.

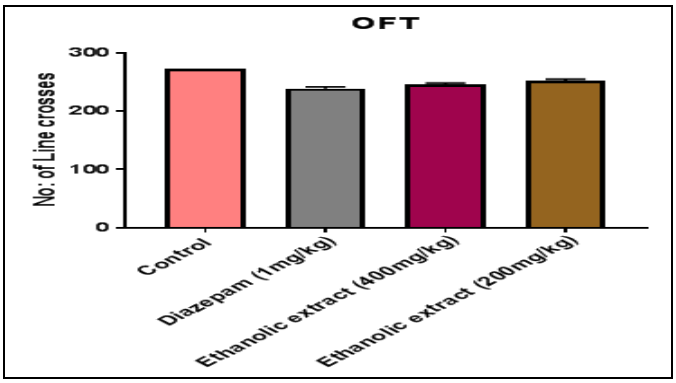

FIG. 3: NO. OF SQUARE CROSSED IN OFT ON EEIP

Estimation of Glutamate Content: Glutamate level is significantly (P<0.0001) in ethanolic extract group containing high dose. An increase in the glutamate level leads to epilepsy, but the extract and the standard drug should lower the glutamate level and possess promising anticonvulsant activity.

TABLE 4: EFFECT OF EEIP ON BRAIN GLUTAMATE LEVEL OF MAXIMUM ELECTROSHOCK INDUCE SEIZURE MICE

S. no.	Treatment Group	Glutamate
1	Control group	0.6±0.004
2	Standard drug Diazepam (5mg/kg)	0.25±0.004[a]
3	Ethanolic extract (400mg/kg)	0.26±0.002[a]
4	Ethanolic extract (200mg/kg)	0.28±0.004[a]

The data were expressed as Mean ±SEM; (n=4). The data analyzed by Student t-test, a-P<0.0001 (****), compared to the control.

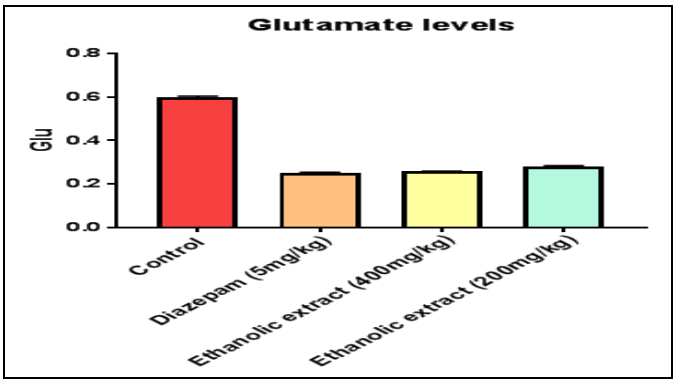

FIG. 4: GLUTAMATE LEVEL ON MES INDUCE SEIZURE MICE

The glutamate level of a lower dose of the ethanolic extract is less significant than the high dose of ethanolic extract when compared to diazepam group, as shown in **Fig. 4**. The data were shown in **Table 4**.

DISCUSSION: The plant has been used for healthcare and medicinal purposes long before it was recorded in history. The present study has been approached to demonstrate the anticonvulsant, antianxiety effects of ethanolic extract of the whole plant of *Ipomoea pes-tigridis*.

By phytochemical screening, the chemical constituents of *Ipomoea pes-tigridis* are obtained from the various extract. *Ipomoea pes-tigridis* contains flavonoids, glycosides, saponins, alkaloids, which are responsible for the various pharmacological activity of the plant. The presence of flavonoid has been responsible for the neuropharmacological effect of the drug [15].

The study was conducted to evaluate the potential of EEIP as anticonvulsant through maximal electroshock methods and antianxiety activity through behavioural assay system, *i.e.*, hole board and open field test. In MES model, the duration of tonic extension of the hind limb is used as an endpoint, *i.e.*, the protection action. The ethanolic extract shows dose-dependent protection in MES test. In MES test, *Ipomoea pes-tigridis* showed a significant effect in reducing hind limb tonic extension duration. Protection against HLTE indicates the ability of a test substance to inhibit or abolish the spread of seizure discharges within the brain. Moreover, drugs that inhibit voltage-dependent Na± channels, such as Diazepam can prevent MES-induced tonic extension. Diazepam does not suppress the focal activity but prevents it from spreading. In the present study, the ability of the ethanolic extract of *Ipomoea pes-tigridis* to inhibit the HLTE in the MES model as compared to Diazepam (100% protection) suggests the presence of anticonvulsant compounds in the extract.

Benzodiazepines have been extensively used for the last 40 years to treat several forms of anxiety, but due to their unwanted side effects, alternative treatment strategies with favourable side-effect profiles, credible benefits, and moderate costs are of interest, especially in primary care settings.

Medicinal plants are a good source to find new remedies for these disorders. In search of an alternative, more specific, and perhaps cost-free therapy, research has been conducted to investigate natural anxiolytic drugs as well as new antidepressant principles.

The hole board test provides a simple method for measuring the response of an animal to an unfamiliar environment. It has been showing that head dipping behaviour was sensitive to changes in the emotional state of the animal and suggested that the expression of an anxiolytic state in animals may be reflected by an increase in head dipping behaviour. In the present study, ethanol (400mg/kg) increased head-dip counts.

OFT is the most frequently used behavioural test in pharmacology and neuroscience. Consequently, it has been used to study exploratory activity and anxiety-related behaviours in rodents. Open-field behavioural assays are commonly used to test locomotor activity in rodents. The test area is made up of transparent walls and a black floor (30×30×15cm) divided into 9 square of equal areas and the locomotor activity of the rodents is seen. Open-field test describes the locomotor activity, *i.e.,* number of squares crossed by mice. The depressing action of the extracts was evident and maximum for EEIP higher dose, which shows prominent CNS depressant effect.

GABA is the major inhibitory neurotransmitter in the brain, while glutamic acid is an excitatory neurotransmitter in the brain. The inhibition of GABA neurotransmitter and the enhancement of the action of the glutamic acid has been shown to be the underlying factors in epilepsy. Glutamate level is significantly ($P<0.0001$) in the ethanolic extract group containing high dose. Increase in the glutamate level leads to epilepsy but the extract and the standard drug should lower the glutamate level and possess promising anticonvulsant activity. The study shows that the ethanol extract of the whole plant of *Ipomoea pes-tigridis* protected the animals against seizures induced by maximal electroshock.

Diazepam is a central sensory system depressant utilized as a part of the administration of rest issues, for example, a sleeping disorder: these mixes have a coupling site on GABA receptor sort an ionophore complex GABA. It decreases activity, moderates excitement, and calms the recipient. Substances like diazepam (which has been picked as the standard reference drug in this study) diminish onset of and expand the length of time of barbiturate- actuated rest and decrease exploratory action having possibilities as soothing. Diazepam is a very well known anxiolytic benzodiazepine (BDS) that produces not only anxiolytic-like effect but also important sedative action. In this respect, *Ipomoea pes-tigridis* extract is produced to allow hyperpolarizing of the membrane, leading to CNS depression and resulting in sedation and hypnosis activity. Glutamate and GABA are quantitatively the most important excitatory and inhibitory neurotransmitters, respectively, in the mammalian brain. Thus, the receptor of these two neurotransmitters is regarded as important targets for psychotropic drugs.

Flavonoids and Diazepam are structurally similar. The anticonvulsant and antianxiety effect of ethanolic extract of *Ipomoea pes-tigridis* may be related to their flavonoid content. The effects are attributed to the affinity of flavonoids for the central benzodiazepine receptors. However, further studies are needed to explore the exact mechanism of action.

CONCLUSION: In conclusion, the present investigation shows that *Ipomoea pes-tigridis* extract exhibits better pharmacological action, as the phytoconstituent contains flavonoids. Many flavonoids and phytosterols have been found to be ligands for the $GABA_A$ receptor; hence can act like benzodiazepine-like molecules. Therefore these phytoconstituents may be responsible for the anticonvulsant activity of *Ipomoea pes-tigridis*. Further studies can be conducted for the bioactive constituent and to ascertain an exact mechanism of action.

ACKNOWLEDGEMENT: The authors are thankful to Chairman S.K.C.P.R.C. for providing laboratory facilities to carry out the study. A special thanks to Mr. Nithin Manohar R, M. Pharm (Ph.D.), for his helpful guidance and continuous encouragement for doing the project.

CONFLICTS OF INTEREST: There is no conflict of interest.

REFERENCES:

1. Lippincott: Textbook of pharmacology. Philadelphia: Lippincott Williams &Wilkins, Fourth edition 2005.
2. Arlington, VA: Diagnostic and Statistical Manual of Mental Disorders. American Psychiatric Publishing, Fifth edition 2013: 189.
3. "Heroin addiction and anxiety disorder". Dual Diagnosis. Retrieved 16 April 2016.
4. Bouras N, Holt G: Psychiatric and Behavioral Disorders in Intellectual and Developmental Disabilities. Cambridge University Press, Second edition 2007.
5. Matthew KM: The Flora of the Tamil Nadu Carnatic, 1981; 2: 1017-33.
6. Neeli ER and Dixit VK: Ethnopharmacognostical studies on medicinal plants of Jashpur District, Chhattisgarh. International Journal of Green Pharmacy 2007; 1(1): 2-4.
7. Pawar S, Patil DA: Observations on Folkloric Medicinal Plants of Jalgaon District, Maharashtra. Indian Journal of Traditional Knowledge 2004; 3(4): 437-41.
8. The Wealth of India, The dictionary of raw materials, CSIR. New Delhi, Volume V: 251.
9. Hossain SMT, Shihab AN, Akhter F, Hassa N, Zaman T, Rahman MM, Barua R and Hossain MM: *In-vitro* antioxidant, cytotoxic and *in-vivo* neuropharmacological effects of Ipomoea pes-tigridis. EJPMR 2017; 4(12): 522-29.
10. Suryanarayana B and Kumar RB: Ethanomedical recipes for psychoactive problems and nervous disorders from tribals of Sriharikota Island, Andhra Pradesh. Int. J Pharm Sci Rev Res 2015; 34(2): 245-50.
11. Undirwade DN, Bhadane VV and Baviskar PS: Diversity of Ipomoea (Convolvulaceae) in some regions of maharastra. International Journal of life Science 2015.
12. Banu AN, Raut AM and Balasubramanian: Bioengineered nanoparticles synthesized using *Ipomoea pes-tigridis* for improved antimicrobial activity against drug-resistant microbes. International J of Zoology and Applied Biosciences 2017; 2(6): 338-47.
13. Babu K, Dharishini MP and Austin A: Studies on anatomy and phytochemical analysis of *Ipomoea pes-tigridis* L. JPP 2018; 7(1): 791-94.
14. Selvam NT, Kumar KGV and Acharya MV: Physico-chemical, phytochemical and spectroscopic characterization of various extracts of leaves and stems of *Ipomoea pes-tigridis* Linn. Advance Pharmaceutical Journal 2017; 2(1): 34-40.
15. Chatwal GR: Organic Chemistry. Himalaya Publishing Home, Mumbai, First edition 2000: 2539.
16. Vogel HG: Drug discovery and evaluation: pharmacological assays. Berlin: Springer Verlag 2002.
17. Nirmala D: Studies on anticonvulsant activity of *Annacyclus pyrethrum* in albino mice. Asian Journal of Pharmaceutical and Clinical Research 2015; 8(4): 76.
18. Saikia, Purkayastha A, Tigga R and Roy D: Anticonvulsant activity of the methanolic extract of *Lawsonia intermis* leaves in albino rats. SJR 2017; 137.
19. Srivastav N, Saklani S, Juyal V and Tiwari BK: Anticonvulsant activity of Albizia lebbeck Linn in rats. Int J Pharm Sci Rev Res 2016; 41(2): 173-76.
20. Amir R, Fatemeh K and Saeed M: Anticonvulsant effects of aerial parts of *Verbena officinalis* extract in mice: Involvement of Benzodiazepine and Opioid receptors. J of Evidence-Based Comp and Alt Med 2017; 5(2): 165-89.
21. Brown RG and Nemes C: The exploratory behaviour of rats in the hole-board apparatus: Is head-dipping a valid measure of neophilia? Behav Processes. Epub 2008; 78(3): 442-48.
22. Kaur D, Kaur D, Chopra A and Arora P: Anti-anxiety evaluation of extracts of *Stigma maydis* (corn silk). Int J Pharm Sc 2015; 7(8): 309-12.
23. Kulkarni S and Reddy DS: Animal behavioural models for testing anti-anxiety agents. Methods and Findings in Experimental and Clinical Pharmacol 1996; 18(3): 219-30.
24. Tamboli AM, Rub RA and Ghosh P: Antiepileptic activity of lobeline isolated from the leaf of *Lobeline nicotianaefolia* and its effect on brain GABA level in mice. Asian Pac J Trop Biomed 2012; 537-42.

How to cite this article:
Anaha VI and Manohar RN: Evaluation of anticonvulsant, antianxiety activity of *Ipomoea pes-tigridis* extracts in mice. Int J Pharm Sci & Res 2021; 12(4): 2323-30. doi: 10.13040/IJPSR.0975-8232.12(4).2323-30.