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Research Article

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Evaluation of anticonvulsant activity of alcoholic extract of *Mimosa pudica* in swiss albino rats

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ABSTRACT

Epilepsy is a central nervous system disorder(neurological disorder)in which the nerve cell activity in your brain is disturbed, causing a seizure during which you experience abnormal behavior, symptoms and sensation including loss of consciousness. The present study was performed to evaluate the anti – convulsant activity of alcoholic extract of Mimosa pudica (Mimosaceae) against the MES-Induced Seizures. A total of 30 Swiss albino rats were divided into five groups containing six in each. Group I – Control Rats (Normal saline 25 ml/kg), Group II – Standard (Phenytoin 25 mg/kg), Group III – AEMP 50 mg/kg, Group IV – AEMP 100 mg/kg, Group V – AEMP 200 mg/kg. Maximal electroshock seizures (MES) in albino rats were used to study anticonvulsant activity of alcoholic extract of Mimosa pudica. Alcoholic Extract of Mimosa pudica exhibited a significant (P<0.00) dose dependent protection against tonic extensor phase at all tested doses (50, 100 and 200mg/kg), with maximal effect seen in higher dose (200 mg/kg).

Keywords: Epilepsy, Maximal Electro Shock Seizures, Phenytoin, Swiss Albino Rats, Alcoholic Extract of *Mimosa pudica* (AEMP). Mr. Narapogu Venkatanarayana

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INTRODUCTION

Traditional medicinal practices have remained as a component of health care system of many societies in spite of the availability of well established alternatives [1]. Epilepsy is a .condition, which causes seizures to occur. It is one of the most common chronic diseases affecting human beings. According to several publications this can amount to 70% of the people with epilepsies, with a high prevalence of about 0.8% in children below the age of seven years [2]. These observations have led to a shift in focus to the use of herbal remedies in the management of epileptic seizures, probably because these measures fit into the cultures of people and are not usually as expensive as the more refined orthodox drugs. Besides, these orthodox drugs possess many side effects, contraindications and possible interactions with drugs used simultaneously. The alternative drug therapy for the management of this disease can be by the use of medicinal plants and their active principles.

Mimosa pudica (Family: Leguminosae) is a small or middle sized tree, about 1.5 m (5 ft) in height cultivated throughout India. It is a multipurpose tree, used as vegetable, spice, and a source of cooking and cosmetic oil and as a medicinal plant. It is known as Sensitive plant in English, Ajalikalika in Sanskrit, Lajawanti in Hindi, Lajjabate in Bangali, Hadergitte in Kannada, Kasirottam in Tamil and Manugumaramu in Telugu [3].

It is reported to contain alkaloid, glycoside, flavono and tannis. It is used in suppresses kapha and pitta Heals wounds, Coagulates blood and sexual weakness. All parts of the tree are considered to possess medicinal properties and used in the treatment of biliousness, leprosy, dysentery, vaginal and uterine complaints, inflammations, burning sensation, fatigue, asthma, leucoderma, blood diseases etc [4]. According to the Unani system of medicine, root is resolvent, alternative, useful in diseases arising from blood impurities and bile, bilious fevers, piles, jaundice, leprosy etc. Its extract immobilizes the filariform larvae of Strongyloides stercoralis in less than one hour. *Mimosa pudica* has been extensively studied for Myotoxicity and toxic enzymes of *Naja kaouthia* venom [5, 6, and 7]. Hyperglycemic activity [8] , Wound healing activity [9,10] Strong antimicrobial activity against Staphylococcus aureus and Bacillus subtilis [11] In contemporary medicine, *Mimosa pudica* is being investigated for its potential to yield novel chemotherapeutic compounds. It contains an alkaloid called mimosine, which has been found to have potent antiproliferative and apoptotic effects. Aqueous extracts of the roots of the plant have shown significant neutralizing effects on the lethality of the venom of the periodic leaf movement factors are reportedly the derivatives of 4-o-(b-D-glucopyranosyl-6-sulphate) gallic acid [12].

EXPERIMENTAL SECTION

Plant Material

The leaves of *Mimosa pudica* were obtained from a field at Khammam district of Andhra Pradesh, India.The plants were authenticated by the Head of the Department of Botany, Government Degree College, Khammam.

Extract Preparation

The leaves of *Mimosa pudica* was dried in air, crushed to coarse powder and extracted with ethanol using Soxhlet apparatus. The extract was dried under vacuum, stored at room temperature and protected from direct sunlight in the Department of Pharmacology, Mamata Medical College, Khammam.

Drugs and Chemicals

Phenytoin (Anglo-French Drugs & Industries Ltd., Banglore) 25mg/kg and normal saline (0.9% NaCl solution) were administered in the volume of 25 ml/kg. The extracts were suspended in ethanol and subjected for anticonvulsant activity using MES models respectively. The extracts were administered orally in the dose of 50,100 and 200 mg/kg of body weight.

Experimental Animals

Swiss Albino rats of the either sex weighing 120 to150 gm were used. The animals were housed in standard cages with free access to food (standard laboratory pellet diet) and water. The animal house temperature was maintained at 23 ± 5.0^0C with a 12-h light/dark cycle. Permission from Institutional Animal Ethics Committee was taken. The guidelines for the investigation of experimental seizures in conscious animals were followed in all.

Acute Toxicity Studies

Acute toxicity studies were carried out using acute toxic class-limit test dose guidelines 425 of Organization for Economic and Cultural Development (OECD). Acute toxicity of the plant extract was carried out using groups of three Swiss albino mice by administering a dose of 2000 mg kg -1 body weight per o.s. (p.o.), while control group received normal saline. The toxicological effects were assessed on the basis of mortality and behavioral changes during 48 h [13]. Depending on this we have taken the dosages of 50 mg, 100 mg and 200 mg/kg body weight and conducted the studies.

Experimental design:

Group I – Control Rats (Normal saline 25 ml/kg)
Group II – Standard (Phenytoin 25 mg/kg)
Group III – AEMP 50 mg/kg
Group IV – AEMP 100 mg/kg
Group V – AEMP 200 mg/kg
AEMP: - alcoholic extract of *Mimosa pudica*

MES-Induced Seizures

Corneal electrodes were used for bilateral delivery of electrical stimulus (Maximal Electroshock Seizures, MES-50mA; 50Hz; 0.2 Sec). Convulsive shock including Hind Limb Tonic Extension (HLTE) in 99% of the animals [14]

was previously determined. The time of peak effect of Phenytoin as 30 min after administration was previously established [15] The time for the extract to reach its maximum effect was determined as 60 min after oral .administration. The incidence and duration of extensor tonus was noted. A complete abolition of hind limb tonic extension (HLTE) in 99% of the animals was previously determined. Intensity of stimulus was 150mA, 50Hz for 0.2 second duration was applied through corneal electrodes using electroconvulsiometer for five groups of 6 rats each, in which one control were pre-treated with normal saline (0.9% NaCl solution, 25 ml/kg p.o.), one standard with phenytoin as positive control (25 mg/kg, oral) and three groups pre-treated with 50, 100, and 200 mg/kg, p.o. of ethanol extract of *Mimosa pudica* .Duration of various phases of epileptic attacks were recorded and compared with the control and phenytoin group. All precautions were taken to minimize animal suffering and to reduce the number of animal used.

Statistical analysis

The results were expressed as mean ± SD. Statistical analysis was carried out by using ANOVA followed by Dunnet's multiple comparison tests using primer of windows McGraw –Hill software version 5.0.0.0 (2011). Pvalues < 0.05 were considered significant.

RESULTS

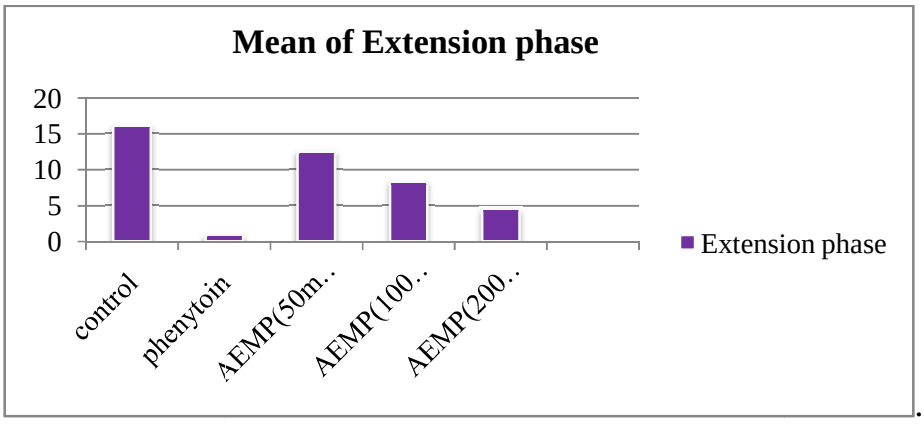
Evaluation was made by electro-shock using eye electrodes after 1hr of administration of extract. Dose dependent effect of graded dose (50, 100, 200 mg/kg, p.o.) of extract on MES-induced seizures was seen in rats. Alcoholic Extract Of *Mimosa pudica* at 100 mg/kg dose significantly (P<0.00) decreased the duration of tonic extensor phase in MES-induced seizures. Where as at 200mg/kg dose the decrease in the duration of tonic extensor phase is highly significant (p<0.000) and the extract also showed a maximum inhibition (80% mortality) against MES-induced seizures. The observations are shown in Table 1 and Bar diagram.

Table 1. Effect of Alcoholic Extract of *Mimosa pudica* in MES induced seizures in Swiss Albino Rats

Treatment Groups	Duration of tonic Extension in sec. (Mean±SEM)
Group I (NS- 25ml/kg)	16.1 ± 0.4
Group II (Phenytoin- 25 mg/kg)	0.9 ± 0.08
Group III (AEMP-50 mg/kg)	12.5 ± 0.7**
Group III (AEMP-100 mg/kg)	8.25 ± 0.5**
Group III (AEMP-200 mg/kg)	4.4 ± 0.4**

AEMP: *Alcoholic Extract of Mimosa pudica,*
***P<0.00 Highly significant when compared to normal saline treated group*

Bar diagram showing the mean duration of tonic hind limb extension in seconds



DISCUSSION

Antiepileptic drugs may produce their effects by the following mechanism normalization of seizure foci, prevention of the origin of seizures from the foci, prevention of post-titanic potential, elevation of excitatory synaptic threshold, potentiation of pre or post synaptic inhibition, prolongation of the refractive period. Phenytoin inhibits Na+ channels, but diazepam act through GABA (gabba amino butyric acid) producing pharmacological action [16]. Phenytoin does not effect chemically induced seizures but prevent tonic convulsions produced by MES.Diazepam prevent chemically induced seizures and it is drug of choice of statusepilepticus, but is having sedative action and development of tolerance.. MES-induced convulsion model is a widely used tool to screen drugs for generalized tonic-clonic seizures. MES causes several changes at the cellular level, disrupting the signal transduction in the neurons. MES causes cellular damage by facilitating the entry of Ca 2+ into the cells in large amounts, prolonging the duration of convulsions [17]. Apart from Ca 2+ ions, MES may also facilitate the entry of other positive ions like Na +, blockade of which, can prevent the MES-induced tonic extension [18]. Currently available anticonvulsant drugs like sodium valproate and phenytoin act by modulation of these ion channels [19]

Mimosa pudica show the protection againest the MES-Induced Seizures. Mimosa belongs to the taxonomic group Magnoliopsida and family Mimosaseae. Its pharmacological activities such as anti diabetic, antitoxin, antihepatotoxin and wound healing activities. It is reported to contain alkaloid, glycoside, flavonoid and tannis. It is used in suppresses kapha and pitta heals wounds, coagulates blood and sexual weakness [20]. All parts of the tree are considered to possess medicinal properties and used in the treatment of biliousness, leprosy, dysentery, vaginal and uterine complaints, inflammations, burning sensation, fatigue, asthma, leucoderma, blood diseases [21]. It has been suggested that MES induced convulsions are associated with oxidative damage [22, 23]. *Mimosa pudica* also has strong antioxidant property [24].

Alcoholic Extract of *Mimosa pudica* exhibited a significant ($P<0.00$) dose dependent protection against tonic extensor phase at all tested doses (50, 100 and 200mg/kg), with maximal effect seen in higher dose (200 mg/kg). This observed effect suggests that the protection of *Mimosa pudica* was maximum at 200 mg/kg.

CONCLUSION

Based on the results of the present study, we conclude that the plant extract possesses anticonvulsant activity. However, further studies are necessary to examine underlying mechanisms of anticonvulsant activity and to isolate the active compound (s) responsible for these pharmacological activities.

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